Article

The Usefulness of Accounting Information Derived by Applying the Percentage of Completion Method to Enhance Sustainable Business Practices: Evidence from South Korea

Hyun Mi Ji

College of Business Administration, Keimyung University, Daegu 42601, Korea; hmji@kmu.ac.kr;
Tel.: +82-10-2490-3986

check for updates

Abstract: In South Korea, accounting fraud based on the recognition of revenue occurs frequently. The operating profit will be inaccurate if incorrect project completion rates are applied. In order to apply the percentage of completion method (PCM), the project completion rate should be calculated correctly. There has been much controversy regarding the accuracy of the progress rate and the usefulness of the revenue information calculated from the PCM. Therefore, this study investigated whether the quality level of operating profit information using the PCM is actually low in terms of information usefulness. The study period was from 2011 to 2017, the sample was 10,050 firm-year observations among the listed companies in the Korea Stock Exchange, and financial data from the KIS-Value database was used. Empirical analyses showed that investors evaluated the information value of the operating profit by applying the PCM. In other words, there was a low correlation between the stock price and the operating profit when the PCM was used. These results suggest that the practical application of reliable PCM standards and strict supervision by supervisory institutions are necessary. The limitation of this study is that the verification period, i.e., 2011–2017, is short. This is because Korea was obligated to apply the Korean International Financial Reporting Standards (K-IFRS) from 2011. Therefore, in order to ensure comparability of the sample period, only the period after the application of K-IFRS was examined.

1. Introduction

If the performance obligation is fulfilled over a period of time, the revenue is recognized according to the project completion rate calculated based on the basis of the actual cost input ratio to the total planned cost. This is called the percentage of completion method (PCM). The accuracy of the project completion rate is the most important factor in calculating revenue. However, the accuracy of the project completion rate and the usefulness of the revenue information derived from it have been controversial, and no consensus has yet been reached [1,2].

Recently, as a result of a special investigation by the Korea Financial Supervisory Service, it was found that Korea's D construction company had made over 380 million won in profits over the last 40 years. Large construction companies, such as G Construction and S Engineering, were also reported to have concealed large losses incurred at overseas sites using the PCM. Due to the estimation and discretion inherent in applying the PCM, the method has been subjected to significant criticism. The above case of accounting fraud is significant in that concerns about the PCM that had been raised in the past were actually confirmed [3].

When PCM is used to recognize revenue, it can be classified into input method (recognition of construction revenue based on construction input) and output method (recognition of construction revenue based on construction output). Unlike European companies, which mainly use the output method, most South Korean companies use the cost-based input method. The cost-based input method requires a lot of estimation and judgment on the total contract cost to be generated in the future as well as the cost change stemming from contract change or design change. Due to the problem of estimation and judgment, it may be difficult to reflect the progress of the cost-based input method on the profit. Furthermore, the input method can be greatly influenced by the management's judgment and estimation. This means that there is greater requirement for management expertise, soundness of internal accounting control system of the company, and expertise of the external auditor [4].

In order to prevent accounting fraud by applying these progress criteria, the Korean supervisory authority, the Financial Supervisory Service, announced a plan to improve the transparency of accounting for companies applying the PCM [5].

From a theoretical point of view, the PCM is useful for more accurately measuring the results of business activities and for providing information on them in a timely manner. In practice, however, the PCM can be used as a means of inflating revenue and concealing losses. Therefore, it is highly likely that the quality level of net profit information generated by companies applying the PCM will be lower than that of companies not utilizing this method.

Thus, this study examined whether the usefulness of the net profit information of firms calculated using the PCM is lower than that of companies not using the PCM. If the qualitative level of corporate net income information when applying the PCM appears to be lower than that of other companies, it would be an opportunity to call for a more precise PCM and strict supervision by supervisory authorities.

The Korean International Financial Reporting Standards (K-IFRS) allows firms to choose the "most reliable measurement method" when applying the PCM. Most companies applying the PCM apply the input method conventionally. However, it is uncertain whether the precondition "assurance of rationality" is guaranteed. There was a case where a company applying PCM overstated its sales by manipulating the progress of the construction. Korean supervisory authorities should therefore ensure transparent and rational accounting of companies applying the PCM. In order to minimize the error of estimation and prevent big baths, supervisory authorities should prepare measures to enhance transparency in accounting [4].

This study empirically verified the problem of PCM application in terms of information usefulness. The results suggested that strict standards and supervision of PCM application are needed.

In this study, a company adopting PCM referred to a company engaged in construction business. These companies are listed in the Korean KOSPI and KOSDAQ markets. As a way of verifying the usefulness of the operating profit information reported by the application of the PCM, we investigated whether or not the disclosed operating profit information is reflected accurately and without bias in the stock price of the company. This is expressed as the value relevance of the operating profit information. The higher the relevance, the more useful is the information. If the firm's operating profit information calculated by applying the PCM is accurate and useful for investors' decision-making, it will be highly related to the actual stock price of the company.

On the other hand, if the accuracy of the operating profit calculated through the PCM is low in relation to the stock market, it will not be used actively in investment decisions. As a result, the relationship between the operating profit information and the stock price will decrease. Therefore, this study analyzed 10,050 firm-year observations collected through the KIS-Value database using the multiple regression model.

The empirical analyses showed that investors were underestimating the sustainability and reliability of the operating profit calculated according to the PCM. Investors evaluated the operating profit information of companies applying the PCM as negative compared to the operating profit information of companies not applying the PCM.

This paper is structured as follows. In Section 2, we review prior research and set up a research hypothesis with detailed explanation of the PCM. Section 3 describes the research method and sample selection. Section 4 presents results of the empirical and additional analyses. Finally, Section 5 consists of the summary and conclusions.

2. Prior Research and Research Hypothesis

2.1. Revenue Recognition by the Percentage of Completion Method

The PCM is a method of recognizing related income according to the progress of the performance obligation as well as recognizing the contract revenue, reflecting the economic substance of the profit acquisition process apart from the receipt of the contract amount. In order to apply the PCM, the correct completion rate must be estimated first.

The project completion rate is calculated as the ratio of actual planned costs to total planned costs. This estimated progress is multiplied by the total contract amount to recognize the amount of revenue for that period. For example, assuming that the total contract amount during the contract period is 10 billion won, if the progress rate of the accounting period is estimated to be 30%, the amount is 3 billion won.

In order to apply the PCM, it is necessary to estimate the progress accurately, which is likely to involve significant uncertainty and subjective judgment. In particular, when the implementation of obligations occurs over a long period of time, there are frequent cases where the total planned cost intentionally does not reflect the planned cost despite the increase in the total planned cost due to various reasons, such as design changes and economic fluctuations. As a result, the project completion rate is overestimated, and the revenue affected by the project completion rate is inflated. The following media report shows the problems of applying the PCM.

> Construction companies reported a sharp increase in earnings between their preliminary and final results, indicating that earnings volatility is increasing. In particular, it appears that the pattern is close to the completion date and reflects large-scale losses. As such, the earnings volatility of construction companies is growing because of the PCM accounting standards applied by construction companies. [6]

As mentioned above, the problem of the PCM and the reliability of the profit information calculated by applying the PCM must be examined. Therefore, this study empirically examined the sustainability and reliability of the operating profit information calculated by applying the PCM from an information point of view.

2.2. Prior Research and Research Hypothesis

Accounting information, including information on net profits, explains a company's share price. In particular, the accounting profit has a positive correlation with stock prices, and information on net profit is very useful when making investment decisions. Therefore, verifying how accounting information, including revenues and expenses, is relevant to a company's stock price is a very effective method to assess the relevance and reliability of the information [7].

In order to evaluate the quality level of the net profit information, the method of using the stock value is based on the following theory: According to the information perspective, because the stock market is based on an efficient market, the price of the stock reflects all known information immediately without any bias. Thus, in an efficient stock market, the stock price of a particular company may temporarily deviate from its inherent value; however, ultimately, it reflects the true intrinsic value of the firm. Eventually, stock prices can accurately represent the value of the firm. Thus, it is used as a realistic indicator [8].

On the other hand, the intrinsic value of an enterprise represented by stock prices means the true value of the enterprise. Based on traditional financial theory, the present value of the future dividend flow based on the net asset and accounting profit of the company is the intrinsic value [8].

This is expressed by the following equation:

$$V_t = BV_t + \sum (1 + r)^{-\tau} E_t[X_{t+\tau}] \tag{1}$$

where

V_t = the stock price at the end of year t;
BV_t = the book value of equity at the end of year t;
r = the discount rate; and
$X_{t+\tau}$ = the accounting profit during year t + τ.

Based on the model in Equation (1), Ohlson (1995) simplified the surplus relation of net assets and the autoregression of the time series of excess profits by the following equation [8–10]:

$$P_t + DV_t = \alpha_0 + \alpha_1 BV_t + \alpha_2 EPS_t + \varepsilon_t \tag{2}$$

where

P_t = the stock price at the end of year t;
DV_t = the dividend at the end of year t;
BV_t = the book value of equity at the end of year t;
EPS_t = the earning per share during year t; and
ε_t = other value relevant information.

In the end, this process is a valuation link that links the reported firm's accounting net profit with the enterprise value represented by the stock price. Whether such a linking process works smoothly depends on the accuracy and reliability of the company's net profit information.

If the accuracy and reliability of the net profit information is high, the correlation between the stock price and the stock price will be higher. Conversely, if the information is inaccurate, the correlation with stock prices will be low. Therefore, the quality level of the net profit information of the company can be examined through the relationship with the enterprise value, which is expressed as the stock price.

On the other hand, the net profit of the corporation is composed of the operating profit and nonoperating profit. The net operating profit is the most important information, showing the continuous and sustainable performance of the company. The net operating profit is calculated by subtracting the cost of goods sold, the cost of selling, and the management cost from the revenue (sales). The K-IFRS requires that the volatility of the classification of operating income be reduced to some extent and that all companies be able to improve the comparability of financial statements between companies by presenting operating profit information in the same manner. On the contrary, nonoperating profit is the extraordinary and temporary performance of the company. Thus, operating profit, which is more sustainable than net profit, will be more appropriate information for assessing the continuous and sustainable performance of the company [11–13].

Unlike European companies, which mainly use the output method, most South Korean companies use the cost-based input method. The cost-based input method requires a lot of estimation and judgment on the total contract cost item to be generated in the future and the cost change item stemming from contract change or design change. Due to the problem of estimation and judgment, it may be difficult to reflect the progress of the cost-based input method on the profit. The input method can be greatly influenced by the management's judgment and estimation [4].

The value relevance of accounting information of unlisted biotechnology firms is not different from that of listed biotechnology firms [14,15]. Temporary profits are less relevant to share prices than continuous profits. Prior research empirically verified that the greater the temporality of profit,

the greater is the explanatory power of net assets than the profit [16]. Shareholder and enterprise valuation aspects are the core subjects and issues of accounting standards and thus, value relevance research provides important guidelines for the formulation of accounting standards [8].

In this study, based on the relationship between the operating profit information and the stock price, we empirically examined the quality level of the operating profit information calculated by applying the PCM. Whether or not the operating profit information, when applying the PCM, was reflected in the stock market without any bias was also considered.

If the information on the operating profit using the PCM is accurate and useful information, the relevance to the actual stock price of the company will be significantly positive (+). On the contrary, if the accuracy of the operating profit calculated by applying the PCM is low in terms of the stock market, it will not be used actively in investment decisions. As a result, the relationship between the operating profit information and stock prices will decrease.

It is known that detailed factors affecting the relationship between the net profit information and the stock price include risk, profit sustainability, size of the company, debt ratio, growth potential, and profitability prediction [17–22].

The relationship between unbilled accounts receivable (UAR) and the financial performance of construction contractors has been previously investigated. The research found that companies applying PCM overestimated the progress of the construction as well as the UAR and the profits. In the construction industry, the profit may be misestimated as a loss and included in UAR and shown as a profit; this is due to the uncertainty of predicting a total construction cost and project progress on which the calculation of profit is based. The result of the research showed that the profit of construction companies had the possibility to contain estimation errors, causing a significant variance in the process of adjusting the evaluation errors at the end of projects [23].

K-IFRS requires firms to choose the most reliable measurement method when applying PCM. However, there was a case where a company applying PCM overstated its sales by manipulating the progress of the construction.

Firms using the PCM differ from firms not using the PCM in the method of operating revenues. Firms not using the PCM recognize operating revenues by applying the completed contract method, whereas nonoperating earnings per share are not affected by PCM.

Operating profit or loss represents profits or losses arising from ordinary operating activities. Operating profit represents the highest persistence of profit and loss presented in the income statement. Operating profit and loss plays an important role in predicting the future profit and firm value of a company. Because of this important role of operating profit and loss, it appears that there is an incentive for managers to overestimate operating profit or loss [12,13,17].

With this background, this study examined how accurately and reliably the financial performance of a company is measured by the operating profit calculated using the PCM. We analyzed the quality level of operating profit information and, ultimately, the usefulness of PCM. The specific method to confirm whether the quality is excellent, i.e., whether this information regarding the business profit has high accuracy and reliability, can be confirmed by the relationship between the information regarding the business profit and the stock price change of the company. The following hypothesis reflects these factors:

Hypothesis 1. *The operating profit influence on the value of those firms applying the PCM will have low relevance of accounting information.*

3. Research Methodology

3.1. Sample and Data

The study period was from 2011 to 2017. The study sample companies were 10,050 firm-year observations that met the following criteria among the listed companies that used financial data from the KIS-Value database during the study period:

① All firm-year observations from the Korean Stock Exchange market during the period of 2011 to 2017 excluding non-December firms;
② excluding financial institutions; and
③ excluding managing firms.

To avoid distortion of the study results due to extreme values, samples with a 1% upper and lower distribution in the whole sample were excluded. The final sample selected by these criteria is shown in Table 1.

Table 1. Sample selection.

Selection Criteria	Number of Firm-Years
All firm-year observations from the KOSPI and KOSDAQ markets during the period of 2011 to 2017 (excluding non-December firms, managing firms, and financial institutions)	12,586
Less: Firm-years with insufficient data	(1751)
Less: Outliers (firm-years in the top and bottom 1% of independent variable distribution)	(785)
Final Sample	10,050

Table 2 shows the distribution of the samples classified by industry classification according to the Korean Standard Industrial Classification. The highest share of manufacturing was 68.98%, and PCM users were 3.08%.

Table 2. Across industries.

Industries	Sample	%
A. Agriculture, forestry, and fishing	32	0.32
B. Mining	14	0.14
C. Manufacturing	6932	68.98
D. Electricity, gas, steam, and air conditioning supply	54	0.54
E. Water supply; sewerage, waste management, and remediation activities	38	0.38
F. Construction	310	3.08
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	805	8.01
H. Transportation and storage	164	1.63
I. Accommodation and food service activities	11	0.11
J. Information and communication	1183	11.77
L. Real estate business, leasing service activities	41	0.41
M. Professional, scientific, and technical activities	225	2.24
N. Administrative and support service activities	117	1.16
P. Education service activities	50	0.50
R. Arts, entertainment and recreation	67	0.67
S. Other service activities	7	0.07
Total	10,050	100.00

3.2. Research Method

　　This study investigated whether the stock price response to the sustainable operating profit is relatively low when the PCM is applied. This was to confirm the usefulness of the operating profit information generated by the PCM. To do this, the Ohlson model (1995), as shown in Equation (2), was partially modified to fit the purpose of this study, and empirical analysis was conducted using Equation (3), which is a subform, without omitting the non-accounting information [9].

　　First, the stock price of common stock (P) at the end of year t was used as a dependent variable. Second, we included a dummy variable (D), which is 1 for firms applying PCM and 0 otherwise. We also added the interaction variable (OEPS*D) between the operating earnings per share (OEPS) and the dummy variable (D). We added industry dummy variables (IND) to control industrial effects. Lastly, we added year dummy variables (YD) to control yearly effects and replaced the effects of accounting information other than excess profits, which are difficult to measure, with intercept (α) and error term (εt) [9].

　　In order to examine the stock price at the time of disclosure of the operating profit information, Equation (3) was estimated to examine the relationship between the operating profit using the PCM and the stock price.

　　We examined the value relevance of operating profit by dividing net profit into operating profit and nonoperating profit. It is for this reason that the PCM affects operating profit and does not affect nonoperating profit.

$$P_{i,t+1} = \alpha_0 + \beta_1 BV_{i,t} + \beta_2 OEPS_{i,t} + \beta_3 EPS\_OEPS_{i,t} + \beta_4 OEPS_{i,t} {}^*D_{i,t} + \beta_5 EPS\_OEPS_{i,t} {}^*D_{i,t} + \beta_6 YD_{i,t} + \beta_7 IND_{i,t} + \varepsilon_{i,t} \tag{3}$$

where

　　$P_{i,t+1}$ = the stock price at the end of year t + 1;
　　$BV_{i,t}$ = the book value of equity at the end of year t;
　　$OEPS_{i,t}$ = the operating earnings per share during year t;
　　$EPS\_OEPS_{i,t}$ = the nonoperating earnings per share during year t;
　　$D_{i,t}$ = 1 if PCM, otherwise 0;
　　$YD_{i,t}$ = year dummy;
　　$IND_{i,t}$ = industry dummy; and
　　$\varepsilon_{i,t}$ = other value relevant information.

　　If the regression coefficient of the interaction variable (OEPS*D) between the dummy variable (D) and the operating income (OEPS) shows a statistically significant negative value, the hypothesis of this study is supported. In other words, one unit increase in operating profit negatively influences the stock value of those firms applying the PCM. This suggests that investors are responding negatively to accounting information based on the PCM and, consequently, not trusting its usefulness. This result can be interpreted to mean that the accounting information based on the PCM is less useful than that based on the completion criterion (or sales criterion).

4. Finding and Results

4.1. Descriptive Statistics

　　Table 3 shows the descriptive statistics for the variables used in the empirical analysis. The average value of the common stock price (P) was 18,462 won, and the median value was 6425 won. The average value of equity per share (BV) was 14,579 won, the median value was 5315 won, the average operating profit per share (OEPS) was 1188 won, and the median was 310 won. The average nonoperating profit per share (EPS-OEPS) was −342 won, and the median was −107 won. The average value of the dummy variable using the PCM (D) was 0.03, and the median value was 0. The firms using the PCM

were engaged in the construction industry and professional construction. These companies belonged to the order-taking industry. These entities recognized operating revenues by applying the PCM in line with business characteristics. The firms using the PCM differed from other firms not using the PCM in the method of operating revenues. Firms not using the PCM recognized operating revenues by applying the completed contract method.

Table 3. Descriptive statistics of variables.

Variables	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
P	18,462	40,906	62	3115	6425	15,850	841,000
BV	14,579	30,417	265	2493	5315	11,365	319,104
OEPS	1188	3003	−5598	34	310	1064	32,957
EPS-OEPS	−342	1580	−21,652	−389	−107	6	25,448
D	0.03	0.172	0	0	0	0	1

Variables definitions are as follows (unit: Korean won): P = stock price per share at the end of March, year t + 1; BV = book value per share at the end of year t; OEPS = operating earnings per share in year t; EPS_OEPS = nonoperating earnings per share in year t; D = 1 if PCM, otherwise 0.

Table 4 shows the Pearson correlation between the variables used in the empirical analysis. The correlation analysis showed a significant positive correlation between the stock price of common stock (P) and equity per share (BV). Additionally, there was a significant positive correlation between the stock price of common stock (P) and the operating earnings per share (OEPS). It can therefore be predicted that the firm's shareholders' equity (BV) and operating profit per share (OEPS) are the accounting information that best describe the stock price (P).

Table 4. Correlation matrix (Pearson).

Variables	P		BV		OEPS		EPS-OEPS
P	1						
BV	0.644	***	1				
OEPS	0.716	***	0.729	***	1		
EPS-OEPS	−0.287	***	−0.289	***	−0.527	***	1

Variables definitions are as follows (unit: Korean won): P = stock price per share at the end of March, year t + 1; BV = book value per share at the end of year t; OEPS = operating earnings per share in year t; EPS_OEPS = nonoperating earnings per share in year t. *** denote that it is significant at the 1% level, respectively.

On the other hand, there was a significant negative correlation between the stock price of common stock (P) and the nonoperating profit per share (EPS-OEPS). This shows that the operating profit is more sustainable than the nonoperating profit, which makes it possible to predict that the operating profit better accounts for the stock price.

4.2. Regression on the Value Relevance

Table 5 shows the analysis of whether the operating profit using the PCM is relatively low relative to the business value measured by the stock price, as compared to the operating profit without the PCM. Empirical results showed that the regression coefficient of equity per share (BV) and the regression coefficient of operating earnings per share (OEPS) were statistically significant and positive (+). Empirical results showed that the regression coefficient of nonoperating earnings per share (EPS_OEPS) was statistically significant and positive (+).

In addition, the interaction variable (OEPS*D) of the dummy variable (D), indicating the PCM and operating earnings per share (OEPS), were statistically significant negative (−) regression coefficients. In other words, investors already knew that the sustainability and reliability of the operating profit using the PCM was low, and they were evaluated as negative compared to the operating profit calculated without applying the PCM. K-IFRS allows firms to choose the "most reliable measurement

method" when applying PCM. Most companies applying PCM apply the input method conventionally. However, it is uncertain whether the precondition "assurance of rationality" is guaranteed. There was a case where a company applying PCM overstated its sales by manipulating the progress of the construction. Korean supervisory authorities have led to transparent and rational accounting of companies applying PCM. In order to minimize the error of estimation and prevent big baths, supervisory authorities have prepared measures to enhance transparency in accounting.

Table 5. Value relevance of revenue recognition by percentage of completion method (PCM).

Variables	Predicted Signs	Estimates (*t*-Value)		Estimates (*t*-Value)	
Intercept		14138	(6.04) ***	7791	(11.38) ***
BV	+	0.346	(25.78) ***	0.317	(23.99) ***
OEPS	+	8.110	(53.14) ***	8.195	(53.71) ***
EPS_OEPS	+	2.281	(11.18) ***	2.319	(11.11) ***
OEPS*D	−	−3.383	(−4.79) ***	−3.355	(−4.84) ***
EPS_OEPS*D	+/−	0.742	(0.63)	0.865	(0.74)
		Year Dummies: Included		Year Dummies: Included	
		Industry Dummies: Included		Industry Dummies: Not Included	
Adjusted R^2		0.5844		0.5579	
F Value		253.30 ***		1153.93	
N		10,050		10,050	

Variables definitions are as follows (unit: Korean won): P = stock price per share at the end of March, year t + 1; BV = book value per share at the end of year t; OEPS = operating earnings per share in year t; EPS_OEPS = nonoperating earnings per share in year t; D = 1 if PCM, otherwise 0. *** denote that it is significant at the 1% level, respectively.

The interaction variable (EPS_OEPS*D) of the dummy variable (D), indicating the PCM and nonoperating earnings per share (EPS_OEPS), were not statistically significant. Firms using the PCM differed from other firms not using the PCM in the method of operating revenues. Firms not using the PCM recognized operating revenues by applying the completed contract method. Nonoperating earnings per share (EPS_OEPS) were not affected by PCM. For this reason, the interaction variable (EPS_OEPS*D) was not statistically significant.

Multicollinearity between variables was analyzed using the VIF (Variance Inflation Factors) dispersion expansion coefficient. As a result of the analysis, the VIF dispersion expansion coefficient of each variable was at least 1.503–3.035. This can be interpreted to mean that there was no multicollinearity problem between the variables.

$$P_{i,t+1} = \alpha_0 + \beta_1 BV_{i,t} + \beta_2 OEPS_{i,t} + \beta_3 EPS\_OEPS_{i,t} + \beta_4 OEPS_{i,t} {}^*D_{i,t} +$$
$$\beta_5 EPS\_OEPS_{i,t} {}^*D_{i,t} + \beta_6 YD_{i,t} + \beta_7 IND_{i,t} + \varepsilon_{i,t}$$

We performed one additional analysis, which included a dummy variable (D) that gives 1 if applying the PCM, and 0 otherwise. We added a dummy variable (AFTER), which gives a value of 1 if the Korean supervisory authority has strengthened oversight of the PCM (2015–2017) or 0 otherwise (2011–2014). Empirical results showed that the interaction variable (OEPS*D*AFTER) of two dummy variables (D, AFTER) and OEPS were statistically significant negative (−) regression coefficients.

These results, as well as the results shown in Table 6, can be interpreted to mean that investors are still distrustful of the operating profit information using the PCM. In other words, despite the fact that supervisory authorities have announced the strengthening of accounting supervision of the PCM, investors are still negatively evaluating the sustainability and reliability of the accounting information obtained using the PCM.

Finally, White test was conducted to verify the robustness and heterogeneity of the results of Tables 5 and 6. The White test results showed no heteroscedasticity problem.

$$P_{i,t+1} = \alpha_0 + \beta_1 BV_{i,t} + \beta_2 OEPS_{i,t} + \beta_3 EPS\_OEPS_{i,t} + \beta_4 OEPS_{i,t} {}^*D_{i,t} {}^*AFTER +$$
$$\beta_5 EPS\_OEPS_{i,t} {}^*D_{i,t} {}^*AFTER + \beta_6 IND_{i,t} + \varepsilon_{i,t}$$

Table 6. Value relevance of revenue recognition by the PCM after the announcement of accounting transparency.

Variables	Predicted Signs	Estimates (*t*-Value)		Estimates (*t*-Value)	
Intercept		11871	(5.21) ***	5068	(16.70) ***
BV	+	0.349	(25.90) ***	0.320	(24.07) ***
OEPS	+	8.018	(52.60) ***	8.117	(53.22) ***
EPS_OEPS	+	2.290	(11.26) ***	2.347	(11.28) ***
OEPS*D*AFTER	−	−3.168	(−2.83) ***	−3.677	(−3.28) ***
EPS_OEPS*D*AFTER	+/−	0.323	(0.18)	0.350	(0.19)
		Industry Dummies: Included		Industry Dummies: Not Included	
Adjusted R^2		0.5803		0.5533	
F Value		278.90 ***		2489.94 ***	
N		10,050		10,050	

Variables definitions are as follows (unit: Korean won): P = stock price per share at the end of March, year t + 1; BV = book value per share at the end of year t; OEPS = operating earnings per share in year t; EPS_OEPS = nonoperating earnings per share in year t; D = 1 if PCM, otherwise 0; AFTER: 1 if the period is 2015–2017 year, otherwise 0. *** denote that it is significant at the 1% level.

5. Conclusions

The application of the PCM involves estimation and confidence in the estimation of the project completion rate. Accounting fraud that inflates profits and conceals losses by applying the PCM occurs frequently in Korea. This accounting fraud seriously impacts Korea's accounting transparency.

When the PCM is applied, the quality level of the operating profit information may be low. The net operating profit represents the business performance of the main business activity of the company and occurs frequently and repeatedly. Therefore, the company's net operating profit is more sustainable than its nonoperating profit, which is nonrecurring, despite its business performance. Based on this background, this study investigated whether the quality level of operating profit information obtained by applying the PCM is actually low in terms of information usefulness.

We examined an empirical analysis of 10,050 firm-year observations listed on the Korea Stock Exchange that can use financial data from the KIS-Value database for the period from 2011 to 2017. The empirical analysis showed that when the PCM was applied, the value relevance of the operating profit and stock price was low. In other words, investors were already aware of the problem of revenue recognition based on the PCM and were able to confirm that they made a negative evaluation of companies using this method compared to the operating profit of other companies. When the PCM was applied, the association between operating profit and stock price was low. This implies that investors were underestimating the informational value of the operating profit, which is based on the PCM, and were not actively using this information for investment decisions.

The implication of this study is that it proves that the value relevance of PCM-based accounting information in Korea's capital market has been lowered, posing the problem of application of accounting standards, including subjective and discretionary estimation.

The empirical results of this study showed that the quality level of the operating profit information calculated according to the PCM was generally lower than the operating profit information obtained without applying the PCM. In particular, the problem of the PCM being used as a representative method for accounting fraud in Korea has recently been highlighted. The empirical results of this study suggest that institutional improvement of the PCM standards and strict supervision by supervisory institutions are necessary.

The limitation of this study is that the verification period of 2011–2017 is short. The reason for this is that Korea was obligated to apply K-IFRS only from 2011. Therefore, in order to ensure the comparability of the sample period, only the period after the application of K-IFRS was examined.

If more financial information is accumulated in the future, the results of this study will be robustly interpreted using a long-term sample. In addition, it can be proved empirically that PCM application

has a direct relation with profit adjustment in future studies. Research on the financial characteristics of PCM companies can also be a subject of future study.

A better understanding of fraud detection is a potentially important element in forensic accounting analytics for the success of governance policies to enhance development and reduce the risk of bankruptcies related to the reported fraud cases of enterprises. Hence, in this international approach, further research could be fruitful and significant in the future [24].

References

1. Dechow, P.; Dichev, D. The quality of accruals and earnings: The role of accrual estimation errors. *Account. Rev.* **2002**, *77*, 35–59. [CrossRef]
2. Dechow, P.; Ge, W.; Schrand, C. Understanding earnings quality: A review of the proxies, their determinants and their consequences. *J. Account. Econ.* **2010**, *50*, 344–401. [CrossRef]
3. Financial Supervisory Service Survey on Accounting Fraud. Available online: http://english.fss.or.kr/fss/eng/main.jsp (accessed on 24 February 2017).
4. K-IFRS No. 1115 Revenue from Contracts with Customers. Available online: http://www.kasb.or.kr/fe/accstd/NR_view.do?sortCd=K-IFRS&divCd=01&ctgCd=&currentPage=1&rowPerPage=999999&subSearchVal=&searchVal=&accstdSeq=1963&searchDateKey=1000&searchStartDt=&searchEndDt=&searchKey=1000&searchValue= (accessed on 19 December 2018).
5. Financial Supervisory Service. Available online: http://english.fss.or.kr/fss/eng/main.jsp (accessed on 28 October 2015).
6. Edaily News. Available online: http://www.edaily.co.kr/news/news_detail.asp?newsId=01302166609270520&mediaCodeNo=257&OutLnkChk=Y (accessed on 14 February 2015).
7. Ball, R.; Brown, P. An empirical evaluation of accounting income numbers. *J. Account. Res.* **1968**, *6*, 159–178. [CrossRef]
8. Barth, M.E.; Beaver, W.H.; Landsman, W.R. The relevance of the value relevance literature for financial accounting standard setting: Another view. *J. Account. Econ.* **2001**, *31*, 77–104. [CrossRef]
9. Ohlson, J. Earnings, book values, and dividends in equity valuation. *Contemp. Account. Res.* **1995**, *11*, 661–687. [CrossRef]
10. Collins, D.; Maydew, E.; Weiss, I. Changes in the value—Relevance of Earnings and Book Values over the Past Forty Years. *J. Account. Econ.* **1997**, *24*, 39–67. [CrossRef]
11. Collins, D.; Pincus, M.; Xie, H. Equity Valuation and Negative Earnings: The Role of Book Value of Equity. *Account. Rev.* **1999**, *74*, 29–61. [CrossRef]
12. Dreman, D. Fantasy Earnings. *Forbes*, 1 October 2001.
13. McVay, S.E. Earnings Managements Using Classification Shifting: An Examination of Core Earnings and Special Items. *Account. Rev.* **2006**, *81*, 501–531. [CrossRef]
14. Ross, J.F. The Information Content of Accounting Reports: An Information Theory Perspective. *Information* **2016**, *7*, 48. [CrossRef]
15. Hand, J. The Value Relevance of Financial Statements in the Venture Capital Market. *Account. Rev.* **2005**, *80*, 613–648. [CrossRef]
16. Subramanyam, K.; Venkatachalam, M. *The Role of Book Value on Equity Valuation: Does the Stock Variable Merely Proxy for Relevant Past Flow?* Working Paper; Standford University: Stanford, CA, USA, 1998.
17. Rapoport, M. FASB May Seek Standard Definitions for Earnings Metrics. *Dow Jones Newswires*, 21 August 2001.
18. Collins, D.W.; Kothari, S.P. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients. *J. Account. Econ.* **1989**, *11*, 143–181. [CrossRef]
19. Easton, P.D.; Zmijewski, M.E. Cross-sectional variation in the stock-market response the accounting earnings announcements. *J. Account. Econ.* **1989**, *11*, 117–141. [CrossRef]
20. Dhaliwal, D.S.; Lee, K.J.; Fargher, N.L. The association between unexpected earnings and abnormal security returns in the presence of financial leverage. *Contemp. Account. Res.* **1991**, *8*, 20–41. [CrossRef]

21. Basu, S. The conservatism principle and the asymmetric timeliness of earnings. *J. Account. Econ.* **1997**, *24*, 3–37. [CrossRef]

22. Dichev, I. On the balance sheet-based model of financial reporting. *Account. Horiz.* **2008**, *22*, 453–470. [CrossRef]

23. Jung, M.; You, S.; Chi, S.; Yu, I.; Hwang, B.G. The Relationship between Unbilled Accounts Receivable and Financial Performance of Construction Contractors. *Sustainability* **2018**, *10*, 2679. [CrossRef]

24. Sadaf, R.; Oláh, J.; Popp, J.; Máté, D. An Investigation of the Influence of the Worldwide Governance and Competitiveness on Accounting Fraud Cases: A Cross-Country Perspective. *Sustainability* **2018**, *10*, 588. [CrossRef]