Asset Retirement Obligations Standard and Value Relevance

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Abstract

This study aims to investigate whether the adoption of the Asset Retirement Obligations (AROs) Standard (ASBJ18) affected the value relevance of accounting information. The findings show that (1) the explanatory power of accounting information for firm value at the initial implementation of ASBJ18 has improved, (2) change in net assets had an incremental effect owing to the adoption of ASBJ18 on value relevance, and (3) there was an incremental effect of AROs on value relevance but not of capitalized asset retirement costs. ASBJ18 enabled us to illustrate the economic reality of firms' obligations on their financial statements, implying that it improved the value relevance of their accounting information. However, the qualification of capitalized asset retirement costs as assets remains an issue. This is the first empirical-based research to investigate the value relevance of AROs and related information.

1. Introduction

The objective of this paper is to investigate the value relevance of Asset Retirement Obligations (AROs) and related information. As part of the convergence project with the International Accounting Standards Board (IASB), the Accounting Standards Board of Japan (ASBJ) on March 31, 2008, issued Statement No. 18: *Accounting Standard for Asset Retirement Obligations* (hereafter, ASBJ18) and ASBJ Guidance No. 21: *Guidance on Accounting Standard for Asset Retirement Obligations*. ASBJ18 emulates Statement of Financial Accounting Standard (SFAS) No. 143: *Accounting for Asset Retirement Obligations* in the US; it requires recognition of a firm's asset retirement obligations as a liability in order to improve accounting recognition of a firm's current economic situation. Before the above events, most firms in Japan did not recognize obligations related to any asset retirement decisions expected to take place in the future

The reason ASBJ worked on a project dealing with accounting practices for AROs was

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that the board considered it would be useful for investors and financial analysts to provide information reflecting future cash outflows resulting from discharging such obligations. However, there has been no empirical evidence evaluating the appropriateness of this opinion after the adoption of ASBJ18 on April 1, 2010, even in the US after SFAS No. 143, as far as we know. This paper will investigate the effects of the adoption of ASBJ18 on the value relevance of accounting information, based on reported value at the time of initial implementation of the statement. It may be that before the issuance of ASBJ18, net assets were underestimated. Therefore, in this paper we examine three effects: (1) changes in explanatory power of the accounting information for firm value at the time of the initial implementation of ASBJ18; (2) incremental effects of the change in net assets (e.g., extraordinary loss due to the initial implementation of the standard) on value relevance; and (3) the incremental effects of the divided factors, i.e., the AROs and the capitalized asset retirement costs, on value relevance.

The structure of the remainder of the paper is as follows. Section 2 discusses the background of the study and reviews the existing literature, Section 3 details the research design, and Section 4 provides the results of the analysis. Section 5 summarizes our conclusions.

2. Background and Previous Research

2.1 Outline of ASBJ18

An ARO in ASBJ18 is a statutory or comparable obligation concerning the removal of tangible fixed assets incurred with the acquisition, construction, development, or use of tangible fixed assets. When the firm incurs an ARO, it estimates the undiscounted future cash flow required for removal of the relevant tangible fixed assets, and calculates the discounted value. Then, when the firm recognizes the ARO as a liability, any corresponding asset retirement costs are included in the cost of the relevant tangible fixed asset by the same amount. The firm then allocates the asset retirement expense for the ARO over the remaining economic life of the relevant tangible fixed asset through depreciation. When a firm makes a payment for the removal of the tangible fixed asset, it removes an amount reflecting the ARO from its liabilities.

The main points of the argument of ARO accounting treatment are (1) recognizing the full amount of the ARO, instead of setting up a provision, and (2) the qualification of the capitalized asset retirement costs as assets. The ASBJ discussed these issues when developing ASBJ18 (ASBJ, 2008a, paras. 32-33).

2.2 Impact of Initial Implementation of ASBJ18

According to a field survey of ARO accounting practices in Japanese firms' financial

accounts (Saka, 2012),[1] Twenty-nine percent of listed firms on the First Section of the Tokyo Stock Exchange (473 firms) reported their AROs in their consolidated balance sheets, with total obligations of about 249.2 billion yen. Most firms recognized the following obligations as AROs: removal obligations for oil manufacturing equipment in the oil industry; prevention of mining-induced pollution and removal obligations for mining facilities in the mining industry; recovery obligations related to a lease contract for premises in the retailing industry; and recovery obligations in terms of a lease contract for a business office or factory. Forty-nine percent of listed firms (746 firms) recognized extraordinary losses because of the changes in the accounting standards for AROs, which amounted to 46.0 billion yen.

ASBJ18 affected balance sheets or income statements, depending on the business type of the firm. For example, firms with large-scale plants accounted for a significant amount of the AROs recognized on balance sheets, whereas firms with lease contracts for real estate, including retail premises, factories, and business offices, tended to recognize extraordinary losses related to AROs on their income statement.

Judging from the number and share of firms that recognized AROs and their losses, ASBJ18 could have a significant effect on financial reporting by Japanese firms. The information required to recognize AROs under ASBJ18 represents the future payment obligations of firms on their financial statements. On balancing these future obligations, the value relevance of the accounting information improves. Therefore, following our discussion of the existing research on AROs, we discuss the value relevance of the accounting information available upon the initial implementation of ASBJ18.

2.3 Previous Research

Two main research questions arise concerning ASBJ18: (1) relevance of recognizing the full amount of the ARO as a liability, instead of setting up a provision, and (2) qualification of capitalized asset retirement costs as assets. Several previous studies discussed these issues

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1 The number of firms listed on the first section of the Tokyo Stock Exchange as of the end of March 2011 is 1,668. Financial data surveyed in firm's annual report include "1. Information on the Company," "2. Business Overview," "3. Property, Plant and Equipment," and "5. Financial Statements" (including classifications, accounts, amounts on both consolidated balance sheet and consolidated income statement, significant changes, changes in accounting procedures, notes, schedule of consolidated financial statements, and others in fiscal year 2009 and 2010). The investigation period is from July to August in 2011. The total amount of AROs for the firms surveyed was 249.22 billion yen. The total amount of all listed firms estimated based on the financial data from the Nikkei NEEDS Financial-QUEST (in August 2011) was 257.03 billion yen. The amount of AROs for the firms surveyed in this research accounts for 97% of the total amount for all listed firms, and it is adequate to obtain the information of firms' disclosure for AROs.

(e.g., Tsuji and Fujibayashi, 2011).

The introduction of the ARO accounting standard in Japan was part of a wider convergence project. SFAS No. 143 issued in 2001 is the comparable standard in the US, and provides the basis for some studies. For instance, Boatsman *et al*. (2000) anticipated the accounting effect of the then-proposed SFAS No. 143 on 38 nuclear power utilities. Their findings showed that the adoption of SFAS No. 143 would increase median assets by 3.2 percent, liabilities by 4.6 percent, net assets by 11.1 percent, annual expenses by 7.3 percent, and change annual expenses by 100.8 percent. Overall these findings suggested that SFAS No. 143 would have a significant adoption effect.

Later, Schroeder *et al*. (2005) examined effects on the actual financial statements from SFAS No. 143 using the same sample of nuclear power utilities as in Boatsman *et al*. (2000). They found that the change in accounting standards increased assets on average by 1.6 percent, liabilities by 3.3 percent, and profits and losses by 11.4 and 31.4 percent, respectively. Guinn *et al*. (2005) applied a similar analysis to US-listed firms and showed that SFAS No. 143 affected 10.5 percent of firms (especially firms in the steel, mining, transportation, and public services industries). In these sample firms, the implementation of SFAS No. 143 generally increased assets by 4.0 percent, liabilities by 2.6 percent, and profits and losses by 6.7 and 5.1 percent, respectively. Overall, these results show that the accounting effect of SFAS No. 143 was not as significant as initially expected. Following the issuance of the exposure draft, the Financial Accounting Standards Board (FASB) received opinions from the firms that were potentially affected and duly modified the content of the standard.

There is also the possibility that firms manipulated their accounting figures to offset the impact of the adoption of SFAS No. 143. For example, Elbannan (2003) undertook a study into the cleanup costs for soil contamination, which is included in AROs. Elbannan (2003) concluded that firms decreased their profits in the fiscal year before the recognition of cost and increased their profits for a few fiscal years following recognition, implying that firms tend to manipulate their accounting figures regardless of the amount of cleanup costs. Similarly, Jordan *et al*. (2007) found that large firms with high profitability in the oil, gas, and energy industries manipulated earnings to reduce the costs related to their AROs. Fornaro and Huang (2012) also showed that firms employ earnings management to reduce their conditional AROs, while Wilson and Zabriskie (2010) suggested that firms in the mining industry are generally unlikely to have the financial resources required to meet their AROs.

For the most part, these studies focus on the accounting effects of the adoption of SFAS No. 143, including earnings management. There is no known study concerning the value relevance of AROs themselves. A number of existing studies concern value relevance

(Francis and Schipper, 1999; Barth *et al*,. 2001; Holthausen and Watts, 2001; Entwistle and Phillips, 2003; Fukui, 2008; Pirie and Smith, 2008; Srinivasan and Narasimhan, 2012). Most value relevance studies aim to investigate whether investors use some specific accounting information to evaluate firm equity based on capital market value measurements concerning the usefulness of the accounting information. There are also many analyses of the value relevance of the adoption of new accounting standards (Asthana and Mishra, 2003; Chambers *et al*., 2007; Hope *et al*., 2008; Hossain, 2008; Mitra and Hossain, 2009; Song *et al*., 2010; Jones and Smith, 2011; Koonce *et al*., 2011; Hales *et al*., 2012). Typically, these studies adopt stock returns or prices as market value measurement. For instance, Kothari (2001) argues that stock price drives a firm's future financial results, including both returns and unexpected factors in the firm's results. Therefore, when the study focuses on a firm's overall result, not only unexpected factors, stock price should be used as a benchmark, not stock return. For this reason, we also employ stock price as the benchmark and examine whether the accounting information on AROs increases value relevance.

3. Research Design

3.1 Value Relevance of ASBJ18

The purpose of this study is to examine the value relevance of ASBJ18. Consistent with prior research, we operationalize value relevance as the ability of financial information to explain market measures. Using this approach, if we identify a significant association between financial information and market measures, we are able to conclude that the information is relevant to investor decisions and thereby is incorporated in stock prices. Therefore, if the accounting information following implementation of ASBJ18 explains relatively more of the variation in market value, we consider that the statutory requirement governing implementation of ASBJ18 contributes to enhancing the value relevance of accounting information.

Potentially, ASBJ18 encompasses changes in firm financial reporting in at least three respects: (1) an increase in liabilities due to the recognition of AROs, (2) an increase in the carrying amount of the related tangible asset from the capitalization of asset retirement costs, and (3) the cumulative effect of these adjustments flowing through the income statement as an extraordinary loss (see Figure 1). In other words, the firm's initial implementation of ASBJ18 provisions decreases shareholders' equity and net income by an amount equivalent to the difference between AROs and capitalized costs. Therefore, we focus on changes in the explanatory power for the value of the accounting information firms would have reported if the firms had not implemented ASBJ18 and accounting information under the provisions of ASBJ18. The value relevance of the book value of equity and earnings under alternative accounting methods regarding asset retirement is assessed by

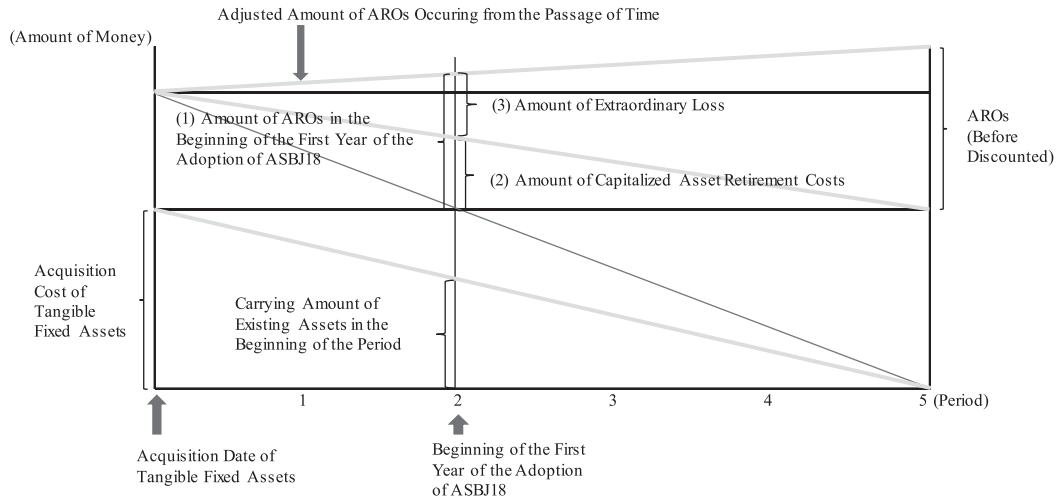

Figure 1. The Effect of the Initial Implementation of ASBJ18

examining the relative ability of the book value of equity and earnings. This explains the variation in market value when the accounting variables are calculated using either the pre- or post-ASBJ18 accounting treatments. To test for the incremental value relevance of ASBJ 18, we run the following two regressions:

$$MVE_i = \alpha_0 + \alpha_1 BVE_i + \alpha_2 X_i + u_i \quad (1)$$

$$MVE_i = \beta_0 + \beta_1 BVE\_Adj_i + \alpha_2 X\_Adj_i + v_i \quad (2)$$

where i denotes firms, *MVE* and *BVE* are respectively the market and book value of equity, and X is income. As measures of income, we specify operating income (*OP*) and ordinary income (*OI*) in addition to net income (*NI*). In Equation (2), *BVE_Adj* is the book value of equity firms would have reported if they had not implemented ASBJ18, calculated by adding the cumulative effect adjustments to *BVE*, and *X_Adj* is the income firms would have reported if they had not implemented ASBJ18. For the income variable, we use either operating income or ordinary income, $X = X\_Adj$, whereas when we use net income, we calculate *NI_Adj* by adding the cumulative effect adjustments to net income.

It is expected that Equation (1) (based on accounting information following the adoption of ASBJ18) can better explain the variability in the stock price than can Equation (2) (using adjusted accounting information and assuming a conventional method). We employ the following hypothesis.

Hypothesis 1. Accounting information under the provisions of ASBJ18 explains significantly

more of the variation in market value of equity than accounting information under previous practices.

3.2 Incremental Effect of Changes in the Book Value of Equity

Our second focal point is to establish the incremental effect of ASBJ18, and determine whether the adoption of ASBJ18 provides investors any additional information. Whereas Hypothesis 1 postulates the ability of accounting information in terms of income and the book value of equity to explain variability in a stock price, it cannot quantify directly the impact of the cumulative effect of adjustments associated with the adoption of ASBJ18.

The difference between the balance of AROs and of asset retirement costs recognized as an asset at the beginning of the period comprises two elements: the accretion expense accrued from the time of the initial asset acquisition and the cumulative allocated cost of the capitalized asset retirement cost. Because this implies an increase in AROs or a decrease in the book value of assets, the cumulative effect of the adjustments may also have incremental information content in terms of the firm's future earnings. From this standpoint, we examine the value relevance of the decrease in the book value of equity by calculating a model explicitly including the cumulative effect adjustments. Because the book value of equity and income variable X in Equation (1) includes the change according to the adoption of ASBJ 18, we can rewrite Equation (1) as follows:

$$MVE_i = \gamma_0 + \gamma_1 BVE\_Adj_i + \gamma_2 X\_Adj_i + \gamma_3 \Delta BVE\_Adj_i + s_i \qquad (3)$$

where ΔBVE_Adj is the increase in the book value of equity. Because both the book value of equity and net income are decreased by an amount equal to the cumulative effect adjustments when the firm adopts ASBJ18, BVE in Equation (1) is divided into BVE_Adj and ΔBVE_Adj. Based on Equation (3), we test the following hypothesis:

Hypothesis 2. Changes in the book value of equity resulting from the adoption of ASBJ18 have a significant association with the market value of equity.

Since ΔBVE_Adj is the increase in the book value of equity, we expect it to be associated with the increase in stock price, and so expect $\gamma_3 > 0$.

3.3 Incremental Effect of ARO and Capitalized Cost

We also calculate a model containing an asset item and a debt item separated from the increment in the book value of equity in order to verify the value relevance of the recognition of the balance sheet items resulting from the provision of ASBJ18. As the

increment in the book value of equity is composed of an increase in assets, $\Delta BVA\_Adj \equiv BVA\text{-}BVA\_Adj$, and a decrease in debt, $\Delta BVD_{Adj} \equiv BVD_{Adj} - BVD$, we can rewrite Equation (3) as follows:

$$MVE_i = \omega_0 + \omega_1 BVE\_Adj_i + \omega_2 X\_Adj_i + \omega_3 \Delta BVA\_Adj_j + \omega_4 \Delta BVD\_Adj_i + t_i \quad (4)$$

where *BVA_Adj* is the adjusted book value of assets, calculated by deducting *ARO* − *LOSS* from *BVA*, *BVD_Adj* is the adjusted book value of debt, calculated by deducting *ARO* from *BVD*, and AROs are asset retirement obligations. ΔBVA_Adj is the increase in the book value of an asset item and ΔBVD_Adj is the decrease in the book value of a debt item. Based on Equation (4), we test the following hypothesis:

Hypothesis 2´. ARO and capitalized retirement costs significantly relate to the market value of equity.

The coefficient for ΔBVA_Adj represents the impact of the increase in assets resulting from the provision of ASBJ18, more specifically, capitalized asset retirement costs. Therefore, if asset retirement costs qualify assets containing future earnings information, we expect ω_3 will be positively associated with the market value of equity. In contrast, ω_4 is the increase in the book value of equity in terms of the decrease in debt. We expect ω_4 to be positive. We examine whether increments in the two balance sheet items have a homogeneous impact on the stock price.

4. Empirical Results

4.1 Sample Selection and Data

The sample consists of 412 listed firms with data available for fiscal year 2010. We identified an initial set of 1,340 firms listed on the first section of the Tokyo Stock Exchange in March 2011, excluding financial institutions. Of these, we excluded 119 firms that did not close their books in March, four firms with accounting periods less than twelve months, and three firms that had already voluntarily applied ASBJ18 prior to April 1, 2010. We removed an additional 21 firms from the sample because they lacked the necessary market and financial statement data other than those related to ARO disclosure. Using this selection process, we obtained a final sample of 1,193 firms.

When investigating ARO disclosures in the annual securities reports of the 1,193 firms, we found that 746 firms had reported cumulative effect adjustments from the adoption of ASBJ18 as an extraordinary loss, 473 firms had reported AROs, and 412 firms disclosed

Table 1. Descriptive Statistics (N=412)

	MVE	*BVE*	*BVE_Adj*	*OP*	*OI*	*NI*	*NI_Adj*	*ΔBVE_Adj*	*ΔBVA_Adj*	*ΔBVD_Adj*
Mean	0.960	1.230	1.238	0.131	0.128	0.052	0.060	-0.008	0.007	-0.015
Median	0.929	1.152	1.153	0.115	0.116	0.052	0.056	-0.003	0.001	-0.005
Max	2.766	4.437	4.533	0.693	0.625	0.525	0.535	0.002	0.142	0.001
Min	0.006	0.014	0.014	-0.757	-0.751	-0.830	-0.813	-0.096	-0.026	-0.178
Std. Dev.	0.260	0.589	0.592	0.100	0.098	0.099	0.096	0.013	0.015	0.024

MVE = market value of equity, *BVE* = book value of equity, *BVE_Adj* = adjusted book value of equity, *OP* = operating income, *OI* = ordinary income, *NI* = net income, *NI_Adj* = adjusted net income, *ΔBVE_Adj* = decrease in net asset from adoption of ASBJ18, *ΔBVA_Adj* = capitalized asset retirement costs, *ΔBVD_Adj* = decrease in liabilities from adoption of ASBJ18; all variables are per share and deflated by the stock price at the end of the previous fiscal year.

both. We selected the 412 firms that were classified as ASBJ18 adoption firms.

We obtained the market and financial data from the Nikkei NEEDS Financial QUEST, with the exception of the ARO-related data. We measured the market value of equity at the end of fiscal year 2010, along with the income measures of operating income, ordinary income, and net income. The data related to ASBJ18 (ARO recognized and cumulative effect adjustments from the adoption of ASBJ18) are from the sample firms' annual securities reports. As the firms had previously recognized reserves for asset retirement, we specify their net ARO calculated by deducting these reserves from the recognized ARO based on the requirements in ASBJ18.

In addition, we calculate the increase in the carrying amount of the related tangible assets associated with the capitalization of the asset retirement costs (*ΔBVA_Adj*), the adjusted book value of equity (*BVE_Adj*), the adjusted book value of debt (*BVD_Adj*), and the adjusted net income (*NI_Adj*). We use data per share deflated by the stock price at the end of March of the previous year. Table 1 details descriptive statistics for the data and Table 2 provides the Pearson correlation coefficients between the variables used in the analysis.

4.2 Findings

Table 3 presents the results for the test of the relative value relevance of the alternative accounting regimes concerning AROs as per Hypothesis 1. We excluded loss firms in consideration of asymmetric value relevance between profit firms and loss firms, and excluded samples with more than two studentized residual errors as outliers.

Column 1 in Table 3 shows the OLS regression results for the model using operating income. As expected, the calculated coefficients for book value of equity and operating

Table 2. Peason Correlation Coefficients for All Variables Included in the Models (N=412)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *MVE*	1.000									
(2) *BVE*	0.194***	1.000								
(3) *BVE_Adj*	0.193***	1.000***	1.000							
(4) *OP*	0.383***	0.298***	0.300***	1.000						
(5) *OI*	0.389***	0.322***	0.324***	0.961***	1.000					
(6) *NI*	0.417***	0.059	0.053*	0.670***	0.692***	1.000				
(7) *NI_Adj*	0.426***	0.095	0.092**	0.709***	0.728***	0.991***	1.000			
(8) *ΔBVE_Adj*	0.010	-0.247***	-0.268***	-0.156**	-0.182**	0.246***	0.114*	1.000		
(9) *ΔBVA_Adj*	-0.040	0.116*	0.127*	0.215***	0.049***	-0.134**	-0.069	-0.049***	1.000	
(10) *ΔBVD_Adj*	0.030	-0.206***	-0.224***	-0.217***	-0.181***	0.216***	0.104*	0.845***	-0.881***	1.000

MVE = market value of equity, *BVE* = book value of equity, *BVE_Adj* = adjusted book value of equity, *OP* = operating income, *OI* = ordinary income, *NI* = net income, *NI_Adj* = adjusted net income, *ΔBVE_Adj* = decrease in net asset from adoption of ASBJ18, *ΔBVA_Adj* = capitalized asset retirement costs, *ΔBVD_Adj* = decrease in liabilities from adoption of ASB18; all variables are per share and deflated by the stock price at the end of the previous fiscal year; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (Two-tailed).

income in the as-if data model are positive and significant. Similarly, in the actual data model, the calculated coefficients for book value of equity and operating income are as expected. The values of adjusted R^2 for the as-if and actual data models are 24.5 and 24.4 percent, respectively; both are significantly different from zero. The value of the Vuong Z-statistic used to compare the as-if data and the actual data is 1.67 ($p < 0.05$). These results indicate that accounting information under the provisions of ASBJ18 is more value relevant than under traditional practice. Similarly, the value of the Vuong Z-statistic comparing the as -if and actual data models is 1.44 ($p < 0.10$), as shown in column 2 using ordinary income. The results in column 3 using net income indicate that the coefficients for book value and net income are both positive and significant. The values of adjusted R^2 for the as-if and actual data are 34.5 and 34.7 percent, respectively, and significantly different from zero. Unlike the results presented in columns 1 and 2, the Vuong Z-statistic is -0.23, indicating that the accounting information available under the provisions of ASBJ18 does not have greater explanatory power than that available under traditional practice.

Overall, the results presented in Table 3 indicate that the book value of equity and income under the provisions of ASBJ18 have greater relative value relevance. This is consistent with Hypothesis 1. Additionally, when we calculated equations (1) and (2) using income before taxes instead of net income, we found results similar to those above.

Table 3. Regression Results Using Actual Data from Adoption of ASBJ18 and Adjusted Data

	(1)		(2)		(3)	
	Without ASBJ18	With ASBJ18	Without ASBJ18	With ASBJ18	Without ASBJ18	With ASBJ18
Intercept	0.767	0.768	0.767	0.767	0.762	0.758
	(0.021)***	(0.020)***	(0.021)***	(0.021)***	(0.021)***	(0.021)***
BVE	0.030	0.029	0.027	0.026	0.048	0.044
	(0.016)†	(0.014)*	(0.016)†	(0.016)	(0.015)**	(0.015)**
OP	0.958	0.959				
	(0.111)***	(0.098)***				
OI			1.017	1.018		
			(0.119)***	(0.119)***		
NI					1.756	1.735
					(0.191)***	(0.187)***
Adj. R^2	0.245	0.244	0.255	0.254	0.345	0.347
F	62.157***	61.992***	65.400***	65.271***	92.730***	93.551***
AIC	-0.924	-0.923	-0.934	-0.933	-0.971	-0.974
Vuong Z	1.669*		1.441†		-0.230	
N	378		378		349	

MVE = market value of equity, *BVE* = book value of equity, *BVE_Adj* = adjusted book value of equity, *OP* = operating income, *OI* = ordinary income, *NI* = net income, *NI_Adj* = adjusted net income, The t-statistics shown in the parentheses are based on the White Heteroskedasticity-consistent standard errors; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (Two-tailed).

We further examine the incremental value relevance of the changes in the book value of equity based on Hypothesis 2. Table 4 columns 1, 2, and 3 detail the results obtained by calculating Equation (3) using OLS. For the model specifying operating income, we can see that the coefficient for the change in the book value of equity is positive and significant ($p < 0.01$), as expected. With regard to the model with ordinary income, the results indicate that the coefficient for the change in the book value of equity is positive and significant ($p < 0.05$). These results suggest that the change in book value of equity caused by the adoption of ASBJ18 has value relevance. This is consistent with Hypothesis 2.

Further, to investigate the incremental value relevance of the AROs and capitalized asset retirement costs, we separate ΔBVE_Adj into the increase in assets $\Delta BVA\_Adj (\equiv BVA -$

Table 4. Incremental Effects of Adoption of AROs and Capitalized Asset Retirement Costs

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.766	0.766	0.759	0.766	0.767	0.759
	(0.021)***	(0.022)***	(0.022)***	(0.021)***	(0.021)***	(0.022)***
BVE_Adj	0.038	0.034	0.045	0.037	0.034	0.045
	(0.015)**	(0.015)*	(0.015)**	(0.015)**	(0.015)*	(0.015)**
OP	0.996			1.012		
	(0.114)***			(0.116)***		
OI		1.041			1.049	
		(0.120)***			(0.121)***	
NI_Adj			1.755			1.754
			(0.157)***			(0.190)***
ΔBVE_Adj	1.857	1.585	-1.068			
	(0.780)**	(0.751)*	(0.955)			
ΔBVA_Adj				0.791	0.931	0.861
				(1.110)	(1.002)	(1.218)
ΔBVD_Adj				1.461	1.340	0.756
				(0.791)†	(0.743)†	(1.001)
Adj. R^2	0.258	0.264	0.347	0.259	0.263	0.345
F	44.729***	46.026***	62.506***	33.866***	34.583***	46.753***
N	378	378	349	378	378	349

MVE = market value of equity, *BVE* = book value of equity, *BVE_Adj* = adjusted book value of equity, *OP* = operating income, *OI* = ordinary income, *NI* = net income, *NI_Adj* = adjusted net income, *ΔBVE_Adj* = decrease in net asset from adoption of ASBJ18, *ΔBVA_Adj* = capitalized asset retirement costs, *ΔBVD_Adj* = decrease in liabilities from adoption of ASBJ18; all variables are per share and deflated by the stock price at the end of the previous year; The t-statistics shown in the parentheses are based on the White Heteroskedasticity-consistent standard errors; † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (Two-tailed).

BVA_Adj) and the decrease in liabilities $\Delta BVD\_Adj (\equiv BVD\_Adj - BVD)$, and calculate Equation (4) using OLS. Table 4 columns 4, 5, and 6 presents the results for the tests of relative value relevance. The coefficient for ΔBVD_Adj_i in the model with operating income is significant ($p < 0.10$) for the results of the model with ordinary income; however, the coefficient for ΔBVA_Adj_i is not significant. These results suggest that the recognition of AROs has value relevance, whereas the capitalized costs information has no value relevance.

The results above provide some evidence that the implementation of ASBJ18 has value relevance as accounting information when the model contains operating income or ordinary income. Based on these results, we conduct two additional investigations concerning the robustness of the calculation in view of the possibility that the results may depend on sample characteristics discussed in this section: (1) investigation with full samples including the loss firms, and (2) investigation between subsamples by the amount of extraordinary losses.

Examining the full samples including the loss firms, the model with operating income has the same result as in the above. The Vuong Z-statistic is 1.47 and significant ($p < 0.10$), and the value of adjusted R^2 increases from 24.0 to 24.5 percent. The results for the model with ordinary income indicate that the Vuong Z-statistic is 1.17 and not significant at the 10 percent level. Investigating the value relevance of changes in equity, the coefficient for ΔBVE_Adj_i in the model with operating income is positive and significant ($p < 0.05$) as shown in Table 4; however, the coefficient in the model with ordinary income is not significant. When we calculate Equation (4) after including the changes in assets and liabilities caused by ASBJ18, the coefficient for ΔBVA_Adj_i is not significant in either the operating or ordinary income model.

For the second supplementary investigation, we also consider the possibility that the accounting information displays dissimilar value relevance depending on the amount of the extraordinary loss at the time of the fiscal year to which ASBJ18 is applied. We calculate an index dividing the amount of extraordinary loss by sales, and split the sample at the median of the index into two subsamples. Then, we test whether the impacts of the book value of equity and operating income on the market value differ between the two subsamples. The results for the subsample with greater extraordinary losses show that the Vuong Z-statistic is 1.30 and statistically significant at the 10 percent level, whereas the Vuong Z-statistic for firms with lesser extraordinary losses is not significant. This suggests that the application of ASBJ18 has made the accounting information for firms with larger changes in the book values of equity (implying greater extraordinary losses) more value relevant. ASBJ18, however, does not influence the explanatory power of the accounting information of firms with smaller changes in the book values of equity (implying lesser extraordinary losses).

5. Conclusion

This paper provided a brief overview of firm accounting practices with regard to the initial implementation of ASBJ18, and determined whether the adoption of ASBJ18 had an effect on the value relevance of accounting information. The results indicate the following. (1) The explanatory power of accounting information for firm value at the initial implementation of ASBJ18 has improved. (2) There was an incremental effect on change in

net assets (extraordinary loss) owing to the adoption of ASBJ18 on value relevance. Finally, (3) there was an incremental effect of AROs on value relevance, but not of capitalized asset retirement costs. Therefore, ASBJ18 enabled us to illustrate the economic reality of firms' obligations on their financial statements, implying that ASBJ18 improved the value relevance of their accounting information. However, the qualification of capitalized asset retirement costs as assets remains an issue, as discussed when developing the standard.

Further research is required in consideration of the following: the attribution of firms should be analyzed to identify factors that make a difference between firms recognizing or not recognizing their AROs and between firms recognizing large or small amounts of AROs in a similar business environment. To improve comparability among firms, it would be useful to identify the factors causing these differences among firms conducting similar activities in the same industry.

This is the first empirical research to investigate the value relevance of AROs and related information. We found evidence to support future-oriented and fair value liability accounting, while the qualification of asset account charged from the obligation has issues from a value relevance perspective.

References

Accounting Standards Board of Japan (ASBJ) (2008a), *Accounting Standards for Asset Retirement Obligation*. ASBJ Statement No. 18, Tokyo, ASBJ.

Accounting Standards Board of Japan (ASBJ) (2008b), *Guidance on Accounting Standards for Asset Retirement Obligation*. ASBJ Guidance No. 21, Tokyo, ASBJ.

Asthana, S. and Mishra, B. (2003), "Incremental value-relevance of SFAS 106". *Review of Accounting and Finance*, Vol. 2 No. 2, pp. 18-42.

Barth M., Beaver, W.H. and Landsman, W.R. (2001), "The relevance of the value relevance literature for financial accounting standard setting: another view", *Journal of Accounting and Economics*, Vol. 31 No. 1, pp. 77-104.

Boatsman, J.R., Khurana, I.K. and Loudder M.L. (2000), "The economic implications of proposed changes in the accounting for nuclear decommissioning costs", *Accounting Horizons*, Vol. 14 No. 2, pp. 211-233.

Chambers, D., Linsmeier, T.J., Shakespeare, C. and Sougiannis, T. (2007), "An evaluation of SFAS No. 130 comprehensive income disclosures", *Review of Accounting Studies*, Vol. 12 No. 4, pp. 557-593.

Elbannan, M.A. (2003), "An empirical model of the relationship between the environmental remediation expense recognition and accounting accruals and the effect on the earnings response coefficient", A dissertation submitted of the School of Accountancy in the Graduate School Southern Illinois University Carbondale, pp. 1-134.

Entwistle, G.M. and Phillips, F. (2003), "Relevance, reliability, and the earnings quality debate", *Issues in Accounting Education*, Vol. 18 No. 1, pp. 79-92.

Financial Accounting Standards Board (FASB) (1996), *Accounting for Certain Liabilities Related to Closure or Removal of Long-Lived Assets*. Exposure Draft, Proposed Statement of Financial Accounting Standards, Norwalk, CT, FASB.

Financial Accounting Standards Board (FASB) (2001), *Accounting for Asset Retirement Obligation*. Statement of Financial Accounting Standards No. 143, Norwalk, CT, FASB.

Fornaro, J.M. and Huang, H.W. (2012), "Further evidence of earnings management and opportunistic behavior with principles-based accounting standards: the case of conditional asset retirement obligations", *Journal of Accounting and Public Policy*, Vol. 31 No. 2, pp. 204-225.

Francis, J. and Schipper, K. (1999), "Have financial statements lost their relevance?", *Journal of Accounting Research*, Vol. 37 No. 2, pp. 319-352.

Fukui, Y. (2008), "Value relevance study - relevant for what? - and beyond: changing equity premium and empirical research", *Accounting Horizon*, Vol. 22 No. 4, pp. 439-440.

Guinn, R.E., Schroeder R.G. and Sevin S.K. (2005), "Accounting for asset retirement obligations understanding the financial statement impact", *The CPA Journal*, Vol. 75 No. 12, pp. 30-36.

Hales, J.W., Venkataraman S. and Wilks, T.J. (2012), "Accounting for lease renewal options: the information effects of unit of account choices", *The Accounting Review*, Vol. 87 No.1, pp. 173-197.

Holthausen, R.W. and Watts, R.L. (2001), "The relevance of the value-relevance literature for financial accounting standard setting", *Journal of Accounting and Economics*, Vol. 31 No. 1, pp. 3-75.

Hope, O.K., Kang, T., Thomas, W.B. and Vasvari, F. (2008), "Pricing and mispricing effects of SFAS 131", *Journal of Business Finance and Accounting*, Vol. 35 Nos. 3/4, pp. 281-306.

Hossain, M. (2008), "Change in value relevance of quarterly foreign sales data of U.S. multinational corporations after adopting SFAS 131", *Review of Quantitative Finance and Accounting*, Vol. 30 No. 1, pp. 1-23.

Jones, D.A. and Smith, K.J. (2011), "Comparing the value relevance, predictive value, and persistence of other comprehensive income and special items", *The Accounting Review*, Vol. 86 No. 6, pp. 2047-2073.

Jordan, C.E., Clark, S.J. and Waldron, M.A. (2007), "Company characteristics and the use of SFAS No.143 to effect earnings management", *Academy of Accounting and Financial Studies Journal*, Vol. 11 No. 2, pp. 97-142.

Koonce, L., Nelson, K.K. and Shakespeare, C.M. (2011), "Judging the relevance of fair value for financial instruments", *The Accounting Review*, Vol. 86 No. 6, pp. 2075-2098.

Kothari, S.P. (2001), "Capital markets research in accounting", *Journal of Accounting and Economics*, Vol. 31 No. 1, pp. 105-231.

Mitra, S. and Hossain, M. (2009), "Value-relevance of pension transition adjustment and other comprehensive income components in the adoption year of SFAS No. 158", *Review of Quantitative Financial Accounting*, Vol. 33 No. 3, pp. 279-301.

Pirie, S. and Smith, M. (2008), "Stock prices and accounting information: evidence from Malaysia", *Asian Review of Accounting*, Vol. 16 No. 2, pp. 109-133.

Saka, C. (2012), "Disclosure status in the first application year of accounting standard for asset retirement obligations", Kokubu, K., *Development of Social Environmental Information Disclosure*, ChuoKeizai-Sha, Tokyo, pp. 105-126. (in Japanese)

Schroeder, R., Suzanne, S. and Kathryn, Y. (2005), "Reporting effects of SFAS 143 on nuclear decommissioning costs", *International Advances in Economic Research*, Vol. 11 No. 4, pp. 449-458.

Song, C.J., Thomas, W.B. and Yi, H. (2010), "Value relevance of FAS No.157 fair value hierarchy information and the impact of corporate governance mechanisms", *The Accounting Review*, Vol. 85 No. 4, pp. 1375-1410.

Srinivasan, P. and Narasimhan, M.S. (2012), "The value relevance of consolidated financial statements in an emerging market", *Asian Review of Accounting*, Vol. 20 No. 1, pp. 58-73.

Tsuji, M. and Fujibayashi, M. (2011), "The impact of accounting for asset retirement obligation on smaller and mediumsized entities", *Journal of International Business Research*, Vol. 10 No. 2, pp. 129-142.

Vuong, Q.H. (1989), "Likelihood ratio tests for model selection and non-nested hypotheses", *Econometrica*, Vol. 57 No. 2, pp. 307-333.

Wilson, P.A. and Zabriskie, F. (2010), "When the gold is gone: reporting of asset retirement obligations for the ultimate cleanup of closed mining operations", *Accounting and the Public Interest*, Vol. 10 No. 1, pp. 57-87.