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Earnings Informativeness of Long-Lived Assets Impairment Recognized and Reversals

長期資產減損認列與迴轉對盈餘資訊性之影響

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Abstract

This study examines how recognition of long-lived asset impairment influences the amount of current and future earnings that are embedded in current stock returns. Note that Taiwan accounting standards permit an impairment on a long-lived asset to be reversed if the asset's economic value recovers. We further examine whether firms with reversed asset impairment show significantly distinctive informativeness patterns of future earnings when compared with non-reversed firms. Based on unbalanced-panel data, empirical results conform with expectations, i.e., the informativeness of current (future) earnings decreases (increases) in firms with a large magnitude of recognized long-lived asset impairment. We also find that this increased informativeness of future earnings for firms with impairment is mitigated in the reversals subsample, which supports the managerial incentives hypothesis of impairment decisions. This study implements some diagnostic checks and demonstrates that our results are robust to various specifications.

【Keywords】earnings informativeness, assets impairment, reversals, future earnings

摘 要

本研究檢測股票報酬率如何反應公司認列長期資產減損之當期及未來盈餘資訊（即長期資產減損認列之盈餘資訊性）；其次，因我國會計準則允許在減損資產價值回復後，認列減損迴轉利益，本文進而檢測認列減損迴轉利益公司相對於未認列減損迴轉利益者，其盈餘資訊性是否有顯著差異。以非平衡式追蹤資料進行實證，結果顯示：公司認列長期資產減損顯著降低（提高）當期（未來）盈餘資訊性。進一步檢測發現認列長期資產減損且在後續年度認列迴轉利益之公司，資產減損的認列對未來盈餘資訊性之影響並不明顯，此實證發現支持部分公司管理當局運用資產減損認列決策以影響未來報導盈餘之觀點。本研究進行若干敏感性測試，實證結果具相當穩固性。

【關鍵字】盈餘資訊性、資產減損、迴轉、未來盈餘

1. Introduction

Earnings informativeness has been identified as a major characteristic useful for describing the magnitude of the return-earnings relationship. Prior studies (e.g., Kothari, 2001; Lundholm and Myers, 2002; Ettredge, Kwon, Smith, and Zarowin, 2005; Orpurt and Zang, 2009; Choi, Myers, Zang, and Ziebart, 2011; among others) have investigated the determinants of the return-earnings relation and have found that the informativeness of current stock returns with respect to current/future earnings is influenced by the quality of disclosure. Owing to the continuous nature of the business operating cycle, a firm's gradual realization that its current earnings suffer from long-lived asset impairment provides certain private knowledge about future earnings. Based on our understanding of the return-earnings relation, this study investigates how the recognition of long-lived asset impairment (hereafter asset impairment) influences the amount of current and future earnings that are embedded in current stock returns.

Managers record assets as being impaired if the value of the firm's assets decline below their carrying value. However, managers may or may not report an economic impairment if there are explicit (e.g., contractual) and/or implicit (e.g., perceived stock market effects) reporting incentives (Riedl, 2004). The recognition of asset impairment explicitly affects current income and implicitly influences future earnings reporting. On the one hand, recognition of asset impairment will cause the impaired firm to record unrealized impairment in income, resulting in a charge against current earnings. The impact of recognizing asset impairment in the income statement should be taken as noise impounded in current earnings.[1] We suggest that current earnings are less informative given the recognition of asset impairment. Meanwhile, the recognition of impairment should result in a more correct valuation for long-lived asset on the firm's balance sheet. Future earnings, which better reflect the approximation of intrinsic economic value of the underlying impaired assets, is expected to give a better signal for stock returns which, in turn, enhances earnings informativeness. Based on the current and future earnings informativeness model suggested by Collins, Kothari, Shanken, and Sloan (1994) (i.e., the

1 Riedl (2004) suggests that long-lived assets typically do not have active markets, thus managers may provide an estimate of fair value based on the best available information. The impairment loss is then reported as a component of current income from continuing operations.

CKSS model),[2] this study suggests that the recognition of asset impairment will reveal distinctive earnings informativeness for current and future earnings, i.e., the informativeness of current earnings (future earnings) is decreased (increased) when firms recognize impairment of long-lived assets.

Consistent with IAS No. 36, the Statement of Financial Accounting Standards No. 35 in Taiwan (hereafter, SFAS No. 35) permits an impairment of a long-lived asset to be reversed if its economic value recovers, thus bringing these items closer to their current values. Previous studies (e.g., Duh, Lee, and Lin, 2009; Zhang, Lu, and Ye, 2010) revealed that managerial manipulations are even more evident with reversible impairment standards, because they provide reporting flexibility through the timing of recognition of gains as well as losses. This suggests that managers may manipulate the timing of recognizing an asset as impaired and its subsequent reversal to achieve some future reporting objective, and thus reducing the informativeness of future earnings. However, Trottier (2013) argues that IAS No. 36 allows impairment reversals to provide more accurate and timely loss reporting. He documents that allowing the reversal of impairments both improves representational faithfulness in situations where an asset has recovered its value and improves reporting by increasing the likelihood that managers will record existing impairments in the first place. Thus, the effect of asset impairment reversals on earnings informativeness is unclear and calls for further examination. Data on impairment reversal in Taiwan provides a unique opportunity to examine this issue.

Empirical results confirm our conjectures: the informativeness of current earnings decreases, yet that of future earnings increases in firms with a large magnitude of assets recognized as impaired. We also find that the increased informativeness of future earnings with asset impairment is mitigated in firms whose impairment was reversed in the following year. This finding suggests that managerial incentives may reduce the reliability of otherwise informative reversal information. The conclusions remain intact when we re-estimate the coefficients of using distinct subsamples and model specifications. Our study related to earnings informativeness of asset impairment is similar to Young and Wu (2009), which showed that firms with stronger corporate governance can moderate the

2 Some studies have extended the CKSS model to examine the earnings informativeness of financial reporting. For example, Gelb and Zarowin (2002), Lundholm and Myers (2002), and Ettredge et al. (2005) examine how firm disclosure activity or disclosure quality affects the relation between current annual stock returns and future earnings. Tucker and Zarowin (2006) find that higher-smoothing firms provide more information about future earnings than do lower-smoothing firms.

higher incentives for opportunistic reporting write-offs which, in turn, improves the informativeness of earnings. However, they use the subsequent one-year earnings (year t+1) to examine the informativeness of future earnings and do not examine the effects of *ex post* write-off reversals due to data availability. Taking advantage of the assets impairment reversals subsample in our study, we extend this stream of research to examine whether the informativeness of a firm's future earnings associated with asset impairment is compromised by subsequent reversal decisions by management. Our results provide new evidence that informs our understanding of the comprehensive effect of asset impairment on earnings informativeness in Taiwan.

This study enriches related research from two angles. First, although asset impairment has been widely documented for decades, the effect on earnings informativeness, specifically the informativeness of future earnings, is largely unknown. We extended Collins et al.'s (1994) model and examined whether the recognition of asset impairment induces discriminated informativeness patterns of current and future earnings. This study shows that asset impairment is informative about future earnings in the expected direction. It suggests that assets impairment represents the underlying economic factors associated with future firm performance and sheds light on the consequences of the implementation of new accounting standards, particularly in emerging markets. Second, asset impairment reversal is an important type of accounting discretion available in countries or jurisdictions that follow IAS/IFRS. Previous studies (e.g., Duh et al., 2009; Zhang et al., 2010; Trottier, 2013; Rennekamp, Rupar, and Seybert, 2015) have shown that managerial incentives for asset impairment decisions are associated with the recognition and reversals of assets impairment. The possibility of reversing impairments may create opportunities for earnings management, but it also provides good market signals. Note that regulators face a dilemma of whether or not to grant managers more discretion to reflect their firms' underlying economic activities. We document evidence on whether the informativeness of a firm's future earnings associated with asset impairment is compromised by subsequent reversal decisions. It provides some insight for the debate about the IASB's allowance of impairment loss reversals.

The remainder of this paper is organized as follows. Section 2 provides background information and reviews the relevant literature to develop our testable hypothesis. Section 3 outlines our research design and describes the empirical data. Section 4 presents and discusses empirical findings. Section 5 provides a robustness check on the empirical findings and Section 6 presents conclusions.

2. Background, Literature Reviews, and Hypotheses

2.1 Background

Since the mid-1990s, both U.S. and international accounting standards have increasingly emphasized the recognition of asset impairment. The Financial Accounting Standards Board (FASB) issued SFAS No. 121 with the intent of reducing managerial flexibility and enhancing the reporting of assets impairment. Since fair value information is generally more difficult to obtain for long-lived assets due to their lower liquidity,[3] FASB reflected an increasing reliance on impairment testing and then issued SFAS No. 144 in 2001, which replaced SFAS No. 121 but did not change the latter's general provisions. Meanwhile, the International Accounting Standards (IAS) 36, *Impairment of Assets*, was initially issued in 1998 and amended in 2004. Prior to 2004, Taiwan accounting rules did not address reporting issues for the impairment of long-lived assets. The SFAS No. 35, *Accounting for the Impairment of Assets*, was issued in July 2004 with the intent of solving reporting problems with asset impairments. SFAS No. 35 in Taiwan mandates that all listed companies must write-down the fair value on any overvalued long-term investments, fixed assets, and other assets and record the unrealized loss in annual reports.

Similar to IAS No. 36, and different from the regulation of U.S., the SFAS No. 35 not only requires listed firms to write-down impaired assets when impacted but also permits impairment firms reversing their prior recognized impairments as unrealized gains when the impaired assets' values recover. The SFAS No. 35 regulation is intended to enhance conservatism, but allowing the reversal of impaired losses provides a space for earnings management, especially for firms with unexpected losses and/or earnings smoothing (Duh et al., 2009). Permitting asset impairment reversals in subsequent periods provides managers with relatively strong incentives to use asset impairment to manipulate current and future earnings. Note that reversals after assets are written down are all observable under SFAS No. 35. We can establish a somewhat more intact sample, i.e., a reversals subsample, to capture managerial incentives which, in turn, can be used to examine the relationship between the recognition of asset impairment and earnings informativeness.

3 Watts (2003) also argues that assessing fair values requires managers to estimate future cash inflows and outflows and those estimates are unlikely to be verifiable and contractible; thus, valuation based on them are likely to be manipulated.

2.2 A Brief Literature Review

The return-earnings relation has widely studied (e.g., Ball and Brown, 1968; Beaver, Lambert, and Morse, 1980; Strong and Walker, 1993; Kothari, 2001; Jiambalvo, Rajgopal, and Venkatachalam, 2002). Collins et al. (1994) investigated the relation between current annual returns and future annual earnings, finding that a large proportion of current stock returns can be explained by future earnings (i.e., FERC). This finding suggests the weak relation between stock returns and contemporaneous earnings is caused by investors, to some extent, anticipating and pricing future earnings. Following Collins et al. (1994), several studies have investigated whether variations in firm disclosure practices affect the strength of the relationship between current stock returns and future earnings. For example, Gelb and Zarowin (2002) and Lundholm and Myers (2002) found that firms with more informative disclosures have higher future earnings response coefficients (FERCs). Other studies have investigated the effect of specific types of disclosures on the relation between current returns and future earnings. Ettredge et al. (2005) found that FERCs are higher for firms that began disclosing multiple segments under SFAS No. 131. Tucker and Zarowin (2006) found that changes in the current stock price of higher-smoothing firms contain more information about future earnings. More recently, Orpurt and Zang (2009) found that FERCs are higher when firms prepare their cash flow statements using the direct approach rather than the indirect approach. Choi et al. (2011) found that FERCs are higher for firms that both issue management earnings forecasts and these forecasts are more frequent and precise. Overall, these papers find that FERCs increase as more information about future earnings becomes available.

Several strands of research have investigated asset impairment. Prior studies focusing on market reaction have shown that the announcement of an impairment loss suggests the decreased economic value of assets and results in negative market reaction (e.g., Strong and Meyer, 1987; Elliott and Shaw, 1988; Zucca and Campbell, 1992; Rees, Gill, and Gore, 1996; Francis, Hanna, and Vincent, 1996; Comprix, 2000). From the motives perspective, Rees et al. (1996) found that write-off firms experience a permanent shift in their accrual balances in the write-off year. Francis et al. (1996) found that firms with write-offs are more likely to subsequently undergo changes in senior management. Empirical evidence from Thailand shows that managers tend to recognize impairment loss to smooth earnings (Peetathawatchai and Acaranupong, 2012). In addition, standards in place or changes in impairment accounting standards have been shown to be associated with more strategic earnings reporting.[4] Riedl (2004) found a higher association between write-offs and "big bath" reporting behavior after SFAS No. 121 implementation. This "big bath" reporting behavior more likely reflects the opportunistic reporting behavior of managers rather than the provision of their private information. In the context of IFRS, Szczesny and Valentincic (2013) found that private German firms impair assets more when they are more profitable or have more financial debt. To some extent, this supports Riedl's (2004) contention. Focusing on goodwill impairment, previous studies have shown that SFAS No. 142 provides managers with too much discretion for goodwill write-offs (e.g., Henning, Shaw, and Stock, 2004; Ramanna, 2008; Ramanna and Watts, 2012; Lawrence, Sloan, and Sun, 2013; Li and Sloan, 2017). Yet, Jarva (2009) found no agency-based motives for goodwill write-downs and concluded that goodwill impairments are more closely related to economic factors than to opportunistic incentives. Thus, empirical findings are mixed regarding the motives of firms in recognizing impairment.

As for the issues of impairment reversal, Aboody, Barth, and Kasznik (1999) used financial data from UK firms to find that upward revaluations indicate good financial health and are correlated with good future performance. Ai (2005) found that firms facing financial distress engage in opportunistic asset write-offs and reversals to manage earnings. In Taiwan, Duh et al. (2009) found that firms recognizing more impairment losses are more likely to reverse impairment losses when doing so would avoid an earnings decline in a subsequent period, which is consistent with the "cookie jar" reserve hypothesis. Rennekamp et al. (2015) found that managers responsible for decisions to record asset impairment are more likely to invest in the impaired division when the accounting effect of the impairment is reversible than when it is irreversible. Two studies have examined this issue from the regulation perspective in China. Chen, Wang, and Zhao (2009) found firms reverse asset impairments to reduce or avoid the possibility of trading suspensions or de-listing due to profitability-based regulations. Zhang et al. (2010) investigated the effect of moving away from a standard like IAS No. 36 to one that prohibits reversals of impairments on long-lived assets in China. Recently, Trottier (2013) found that permitting reversals significantly increases the likelihood that a manager will record an impairment, especially given bonus incentives to do so. Trottier provided an

4 Yen and Chao (2009) documented that asset write-offs are taken concurrently with discretionary accruals to manage earnings downward and that their magnitudes are determined jointly in Taiwan. Zeng, Li, Wang, and Huang (2011) also found that Chinese firms strategically decrease the write-offs or increase the reversals of asset impairment losses to qualify for issuing new shares.

alternative explanation for impairment reversals, which is that allowing reversals induces truthful reporting without increasing opportunism. There is also evidence that in the 2008-2009 crisis, the impairment reversal possibility generated increased transparency for investors (Bowen and Khan, 2014). Thus, the managerial incentives hypothesis for assets impairment decisions is incomplete in terms of explaining the reversal of asset impairment recognition. In sum, these studies generally examine the incentives or consequences of asset impairment behaviors and largely overlook the informativeness of earnings for firms which recognize asset impairment.

Two studies have examined the earnings informativeness of asset write-offs in Taiwan. Young and Wu (2009) examined the effects of corporate governance on earnings informativeness for firms which recognize asset impairments. They found that, on average, the informativeness of current earnings and subsequent one-year earnings is lower for firms recognizing asset impairments. Yet, their evidence further reveals that for firms with strong (weak) corporate governance, the magnitude of asset impairment is mainly explained by the firm's economic conditions (opportunistic reporting by managers), which thereby improves (deteriorates) earnings informativeness. We extend this stream of research and examine whether the earnings informativeness of a firm with recognized impaired assets is compromised by subsequent reversals. Recently, Chen, Kao, and Wu (2013) found that firms which recognize asset impairments in a given quarter and then reverse the impairments in the subsequent quarter have a higher earnings response coefficient (ERC) than firms which only recognize asset impairments in a year. Accordingly, they argue that firms will improve earnings informativeness to reflect the true values of assets when asset impairment is reversed in the same year. Chen et al. (2013) focused on the electronic industry and only examined the informativeness of current earnings. The present study covers additional industries and examines the effects of asset impairment on informativeness for both current and future earnings.

2.3 Hypotheses Establishment

Previous studies (e.g., Francis et al., 1996; Loh and Tan, 2002; Riedl, 2004) have found that two factors (managerial incentives and economic factors) drive managerial asset impairment decisions. However, the effect of these factors on the characteristics of assets impairment remains unclear because managers have substantial flexibility over the timing, calculation, and presentation of these items (Riedl, 2004). Managers may write down assets to take a bath in the current period, making it more likely to increase earnings and compensation in the future (Frantz, 1999). Asset impairment is noisy in this circumstance, which explains why the market may respond negatively, as documented by Elliott and Shaw (1988). Riedl (2004) also found a weaker association between economic factors and asset write-downs, suggesting a decrease in the quality of write-off information following SFAS No. 121. Yet, to date, it is still unclear which factor dominates firm asset impairment decisions.

Recognized impairments, either through managerial reporting incentives or economic factors, should cause write-off firms to record unrealized losses in their income statements. If investors cannot distinguish the characteristics of asset write-offs, unrealized impairment loss should be taken as noise impounded in the current earnings which, in turn, would deteriorate the contemporaneous return-earnings relationship. In other words, relatively noisy asset impairment recognition reduces the use of current earnings in predicting future cash flow and hence firm value.[5] We note that, in an efficient market framework, a noise embedded in earnings is uncorrelated with returns, not only in the current period but in all lead and lag periods as well (Collins et al., 1994). However, in their expectations of future earnings and/or cash flows, investors do not look beyond current earnings that will be affected by embedded asset impairment. In this case, the "noisy" earnings component of the written-off assets will weaken the contemporaneous return-earnings relationship. Although previous studies proposed competing hypotheses for asset write-offs, e.g., managerial incentives or economic factors, it is reasonably expected that current earnings are less informative given the recognition of asset impairment. Thus, our first hypothesis is developed as follows:

H1. *Ceteris paribus*, the informativeness of current earnings is lower for firms with recognized asset impairment.

One characteristic of asset write-offs is that impairment implicitly influences future reported earnings, e.g., through amortization or further impairment diagnostic checks. Prior studies have found that recognition of the impairment of long-lived assets is informative about future firm performance (Easton, Eddey, and Harris, 1993; Aboody et al., 1999; Barth and Clinch, 1998; Gordon, 2001). SFAS No. 35 should produce more

5 Long-lived assets impairment also can be considered a non-recurring item. Non-recurring items are often viewed as transitory, having zero persistence and lacking the ability to predict future performance and firm value (e.g., Jones and Smith, 2011; Burgstahler, Jiambalvo, and Shevlin, 2002).

correct valuations for long-lived assets on balance sheets as asset impairment is recognized, i.e., it provides more faithful identification and recognition of asset values (Fan and Chen, 2009). Future earnings, which provide an approximation of the intrinsic economic value of the underlying impaired assets, is expected to give a better signal of current returns and enhance earnings informativeness. In addition, Warfield and Wild (1992) and Collins et al. (1994) pointed out that the accounting measurement process triggers a non-contemporaneous return-earnings association, e.g., a lack of timeliness which should result in current returns positively correlating with changes to future earnings. Lundholm and Myers (2002) also argue that current returns over the year are partly due to the unexpected portion of the current year's earnings realization and partly due to changes in expectations about future earnings. It implies that changes in (expected) future earnings may be due to a shock that has no effect on current earnings, which is not captured by current earnings, yet will be reflected in the current stock price (Tucker and Zarowin, 2006). Note that reported future earnings should absorb different motivations for asset write-offs, such as managerial incentives or economic factors, at gradual time intervals. Current return is expected to reflect information beyond future earnings after the recognition of asset impairment that is embedded in the asset's impairment. If impairment recognition can produce more correct valuations for long-lived assets, even with noise, the valuation process impacts investor expectations of future cash flows generated by the impaired assets, and hence returns. Inspired by the framework proposed by Collins et al. (1994) and Lundholm and Myers (2002), the process of valuing impaired assets can, to some extent, improve the non-contemporaneous return-earnings association resulting from the accounting measurement process.

On the other hand, managers' decisions on asset impairment may, to some extent, play a role in conveying informative private information regarding a firm's future unfavorable operating environment (Francis et al., 1996; Loh and Tan, 2002). If a firm reveals news related to its future earnings through asset write-offs, realized future earnings will be reflected in current returns, although asset write-offs still suffer from some degree of measurement error. In this case, the coefficient on future earnings will be positive in the returns regressions. It is expected that more extensive recognition of asset impairment implies poor future performance. If asset impairment decisions adequately convey a firm's economic condition through expectations of poor future performance, this informative signal increases the predictability of the impact of asset impairment on subsequent earnings performance and enhances earnings informativeness. Accordingly, it either improves the non-contemporaneous return-earnings association or plays a role in conveying future private managerial information, thus the positive association between current returns and future earnings should be enhanced for valuing impaired assets. This study suggests that the recognition of asset impairment in the current year will enhance the informativeness of future earnings. Thus, the second hypothesis is as follows:

H2. *Ceteris paribus*, recognition of asset impairment enhances the informativeness of future earnings.

Riedl (2004) argued that discretion over long-lived assets impairment may allow managers to more easily justify their reporting choices. Taiwan's SFAS No. 35 (and IAS No. 36) is related to managerial estimation of parameters used to determine the amount of recognized impairment, which may be reversed if there is any indication that the recognized impairment loss no longer exists. This discretion may provide opportunities to manipulate reported earnings, inferring that managers strategically determine when to take an impairment loss and when to reverse such a loss (Duh et al., 2009). Trottier (2013) found that impairment reversals can result in more accurate and timely loss reporting, and highlighted that permitting the reversal of impairment losses in the subsequent period may induce managers to manipulate the timing of impairment recognition and reversal to achieve particular reporting objectives. It anomalously appears that a manager recognizes asset impairment in the current year, but then reverse impairment losses in subsequent periods. Thus, impairment reversals may be attributed to management attempts to manipulate earnings reports. Recently, Rennekamp et al. (2015) found that reversible accounting effects encourage the alteration of cash flow outcomes. Their findings to some extent support the idea that reversible accounting is associated with strategic managerial decision making regarding asset impairment.[6]

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6 Asset impairment reversals issue is not broadly studied and so there is limited empirical evidence in the literature. Chen et al. (2013) use quarterly write-off data and show that firms will improve earnings response coefficient (ERC) when assets impairment is reversal in the same year. Yet, the timely reversal in the estimate of the value of long-lived assets in the same fiscal year may be strong candidate for correcting estimation error rather than managerial incentives reporting. Three studies are closely related to the managerial incentives of impairments recognition. Chen et al. (2009) find that reporting incentives explain asset impairment reversals more than economic factors do. Zhang et al. (2010) provide evidence that companies use the assets impairment reversal practice as an earnings management tool when the accounting standards allow the reversal of previously reported assets impairment losses. Duh et al. (2009) show that badly performing companies are significantly more likely to report impairment reversals and argue that their finding is consistent with the "cookie jar" reserve hypothesis. These three empirical studies are likely to support the idea that impairment reversible accounting is associated with managerial incentives reporting.

Excluding reporting incentives for recognition of write-offs, impairment reversals may only reflect managers' inaccurate valuation processes. In this case, *ex post* reversals to some extent suggest that managers' initial estimations of asset write-offs are insufficient. If investors are unable to ravel measurement errors in managers' write-off judgment, the relatively "inaccurate" recognized impairment embedded in current earnings weakens the linkage between earnings and future cash flows which, in turn, may deteriorate the relationship between current returns and future earnings. Accordingly, we suggest that the informativeness of future earnings for firms with impairment reversals is mitigated as compared to firms without impairment reversals. We establish the third hypothesis as follows:

H3. *Ceteris paribus*, the informativeness of future earnings is mitigated for firms with assets impairment reversals.

3. Research Design

3.1 Data and Sample Selection

The years 2004-2010 are chosen as the observation period because we need the earning and stock return data for the subsequent consecutive three years to examine the earnings informativeness in the CKSS model. 2004 is chosen as the starting year because SFAS No. 35 was first enforced in Taiwan that year. Empirical data are retrieved from the Taiwan Economic Journal (TEJ) Database. Table 1 reports the sample selection process in the study.

The sample firms used in this study are publicly traded companies that listed on Taiwan Stock Exchange (TSE) or Over-The-Counter (OTC). The observations on the TEJ database from 2004 to 2010 include 12,427 firm-years (excluding finance-related institutions (codes No. 28 and 30 in TEJ) as they are subject to different disclosing requirements). This study deleted 4,149 observations for financial data and 342 observations for firms for which stock return data was unavailable. We also deleted three observations due to data unavailability for other control variables and one observation for its unreasonable value in impairment recognition. This selection procedure yielded a final sample of 7,932 observations for empirical analysis.

Table 1 Sample Selection

Descriptions	N
Firms listed on TEJ during 2004-2010	12,427
Less:	
Missing financial data	(4,149)
Missing data of ex-dividend stock return	(342)
Firms' data unavailability for other control variables	(3)
Impairment loss with error sign	(1)
Final empirical observations	7,932
Non-impairment loss samples	6,989
Impairment loss without reversals samples	875
Impairment loss with reversals samples	68

Table 2 presents the sample year and industry distributions used in this study. Table 2 shows that the sample in each year reveals an increasing pattern during the observation period. There were 236 observations with asset impairment in 2005 (25.03%), followed by 161 observations in 2008 (17.07%) and 145 observations in 2006 (15.38%). Accordingly, we control the year effect in the following empirical models. Approximately 53.49% (4,243/7,932) of observations come from the electronics industry. This sample structure supports the findings of Wang, Lee, and Huang (2003) that electronic-related industries dominate so-called traditional industries in Taiwan.[7] The remaining observations are spread across other industries. The final sample includes 943 instances of asset impairment, 68 of which were reversed in the following accounting year. Almost 76.99% of impaired observations occur within five industries: Electronics & Telecommunications (code 23, 461/943 = 48.89%), Construction (code 25, 96/943 = 10.18%), Comprehensive (code 99, 60/943 = 6.36%), Spin & Fiber (code 14, 58/943 = 6.15%), and Electric Machinery (code 15, 51/943 = 5.41%). According to Table 2, specific industries with high rates of impairment include Automotive (code 22, 10/34 = 29.41%), Construction (code 25, 96/460 = 20.87%), and Software (code 32, 15/81 = 18.52%). Finally, industries with high rates of impairment reversal include: Construction (code 25, 12/96 = 12.5%), Merchandize & Trade (code 29, 4/22 = 18.18%), and Electronics & Telecommunications (code 23, 34/461 = 7.38%).

7 We rerun the empirical models using cross-sectional data with both year and industry effects. The results are not qualitatively different from the findings.

Table 2 Year and Industry Composition

TEJ Code	Industry name	2004			2005			2006		
		obs	im	rev	obs	im	rev	obs	im	rev
11	Cement	7	1	0	7	4	0	7	0	0
12	Food	24	2	0	24	6	0	24	0	0
13	Plastics	24	0	0	26	4	0	26	3	0
14	Spin & Fiber	52	7	0	51	16	2	51	12	0
15	Electric Machinery	52	3	0	57	8	0	58	12	1
16	Electric Appliance	15	2	0	14	4	1	14	3	0
17	Chemical	56	4	0	64	11	0	69	6	1
18	Glass & Ceramics	6	2	0	4	1	0	4	0	0
19	Paper	7	0	0	7	1	0	7	0	0
20	Steel	35	7	0	35	10	1	36	4	0
21	Rubber	10	0	0	10	4	0	10	1	0
22	Automobile	4	0	0	5	1	0	5	1	0
23	Electronics & Telecommunications	467	38	3	539	105	9	581	70	8
25	Construction	67	15	0	66	28	3	65	12	0
26	Shipping	22	0	0	21	1	0	21	0	0
27	Tours	14	0	0	15	4	0	15	1	0
29	Merchandize & Trade	19	5	0	22	3	2	23	4	0
32	Software	8	2	0	10	4	0	10	2	0
97	Oil &Gas	12	0	0	12	3	1	12	2	0
99	Comprehensive	58	7	1	61	18	1	63	12	0
Total		959	95	4	1,050	236	20	1,101	145	10

Legends:

obs: total observations within X industry in year *t*.

im: impaired observations within X industry in year *t*.

rev: reversal observations within X industry in the next year *t*+1.

	2007			2008			2009			2010			Total		
	obs	im	rev	obs	im	rev	obs	im	rev	obs	im	rev	obs	im	rev
	7	0	0	7	0	0	7	0	0	7	1	0	49	6	0
	24	0	0	24	3	1	24	5	0	24	1	0	168	17	1
	26	3	0	26	4	0	26	1	1	26	2	0	180	17	1
	53	5	0	52	8	0	52	4	1	52	6	0	363	58	3
	60	8	1	61	10	1	62	5	0	64	5	0	414	51	3
	13	0	0	13	1	0	13	0	0	13	0	0	95	10	1
	70	8	0	72	5	0	79	7	1	89	3	0	499	44	2
	4	0	0	4	0	0	4	0	0	4	0	0	30	3	0
	7	3	0	7	0	0	7	1	0	7	0	0	49	5	0
	39	6	0	40	5	1	41	1	0	41	1	0	267	34	2
	11	1	1	11	1	0	11	1	0	11	0	0	74	8	1
	5	2	0	5	2	0	5	3	0	5	1	0	34	10	0
	611	58	2	662	91	8	677	60	4	706	39	0	4,243	461	34
	63	11	4	65	12	4	66	10	1	68	8	0	460	96	12
	21	0	0	21	3	0	22	0	0	23	2	0	151	6	0
	15	1	0	14	4	0	13	2	0	13	1	0	99	13	0
	23	2	0	23	4	2	23	1	0	23	3	0	156	22	4
	12	2	0	13	1	0	14	2	0	14	2	0	81	15	0
	12	1	0	13	0	0	13	0	0	13	1	0	87	7	1
	61	6	0	64	7	1	63	5	0	63	5	0	433	60	3
	1,137	117	8	1,197	161	18	1,222	108	8	1,266	81	0	7,932	943	68

3.2 Variables Measurement

Dependent Variable:

Stock Return (R_t):

High quality information increases the likelihood of correctly forecasting the outcomes of past or present events (SFAC No. 2). If recognition of asset impairment deteriorates (improves) earnings informativeness, stock prices will provide less (more) information about current (future) earnings. This study follows Collins et al. (1994), Lundholm and Myers (2002) and Tucker and Zarowin (2006) in using a firm's ex-dividend annual stock return in year *t* (R_t) as the dependent variable and then examines whether recognition of asset impairment embedded in the current stock price reflects information about current and future earnings.[8]

Pivotal Explanatory Variables:

Magnitude of Assets Impairment Recognized (IM_t):

This study uses disclosures of long-lived asset impairment in aggregate, rather than broken down into asset categories, since a separate analysis of the impairments would require assumptions about the distribution of assets across cash generating units. Accordingly, the magnitude of asset recognized as impaired (IM_t) is measured as the disclosed aggregate of long-lived impaired assets for the firm in each year scaled by the lagged total assets (Francis et al., 1996; Riedl, 2004; Young and Wu, 2009).[9] Note that the magnitude of assets recognized as impaired is tiny in some listed firms and thus is likely to have a negligible impact on earnings. Therefore, IMt values below 0.1% are rounded down to zero. While the magnitude of assets recognized as impaired is a continuous

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8 Collins et al. (1994) pointed out that annual earnings are announced about several months after the fiscal year-end, resulting in the mismatch between earnings and contemporaneous annual stock returns. Consequently, a portion of year *t* returns is in response to the previous fiscal year's (year *t*-1) earnings and dividend reported in year *t*. Thus, Collins et al. (1994) and Tucker and Zarowin (2006) suggested the use of lagged earnings in the model and used ex-dividend annual returns to exclude the mismatch of current earnings and annual stock returns.

9 We also use an alternative measure of assets impairment (IM), i.e., a firm's magnitude of assets impairment in year *t* deflated by the total long-term assets at the beginning of year *t*, and rerun the models. The results do not qualitatively change the initial findings.

variable in the analysis, it is set at zero if the IM value is below 0.1%.[10]

Dummy Variable of the Reversing Assets Impairment (REV_t):

This study uses a dummy variable to measure firms with asset impairment reversals (REV_t), denoted as one for firms recognizing impairment in year *t* and reversing some or all of the impairment in the following year (*t*+1), and otherwise 0.

Control Variables:

Increased volatility in earnings may be associated with increased risk of debt default. To avoid default, firm managers are more likely to manipulate reported income which, in turn, can affect earnings informativeness (Whittred and Zimmer, 1986; Carlson and Bathala, 1997). This study uses leverage (LEV_t), defined as total liabilities divided by total assets, as a proxy for default risk. We also incorporate market-to-book ratio (MB_t) which is calculated by regressing the market to book value of common equity at the end of the fiscal year to serve as a proxy for growth opportunities (Collins and Kothari, 1989). Finally, we include firm size ($SIZE_t$), calculated by the natural logarithm of total assets to control for the potential effects of omitted variables (Becker, DeFond, Jiambalvo, and Subramanyam, 1998).

3.3 Model Specification

Earnings reporting may differ markedly between firms due to unobservable firm-specific traits (Henderson and Kaplan, 2000). Using panel data analysis, especially as the estimation focuses on variations within firms, omitted variables bias can be avoided provided the omitted variable is constant over the examined time frame. However, the need to report data consistently across every year in the panel creates difficulty through

10 The enforcement of a materiality threshold for the assets impairment (Bens, Heltzer, and Segal, 2011) in the analysis allows us to focus on firms where the recognition of assets write-off had obviously impact on earnings reporting, which in turn, on earnings informativeness. Moreover, either opportunistic reporting or effectively contracting reasons of assets impairment (Strong and Meyer, 1987; Zucca and Campbell, 1992; Francis et al., 1996; Riedl, 2004; Young and Wu, 2009; among others), it is likely to find that considerable magnitude of assets impairment recognized has earnings and/or economic implication for investors.

potential sample attrition and survivorship bias (Hsiao, 1986). We thus use an unbalanced-panel regression which controls for firm characteristics. We also add year dummies to control for the year effect in all regressions.

To test Hypotheses H1 and H2, we expand the earnings informativeness model suggested by Collins et al. (1994), Lundholm and Myers (2002) and Tucker and Zarowin (2006) by incorporating the magnitude of asset impairment (IM_t) variable, the variables which interact with IM_t and the other explained variables. The empirical regression is presented as follows:

$$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t \quad (1)$$

where:

R_t : a firm's ex-dividend annual stock return in year *t*.

X_{t-1} : a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*.

X_t : a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*.

X_{t3} : a firm's sum of earnings per share for three years excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*.

R_{t3} : a firm's compounded annual stock returns for year *t*+1 through *t*+3.

IM_t : a firm's magnitude of asset impairment in year *t*, deflated by total assets at the beginning of year *t*.

LEV_t : a firm's leverage measured as total debt divided by total assets at the end of the fiscal year *t*.

MB_t : a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year *t*.

$SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year *t*.

ε_t : the error term.

Based on Hypothesis H1, the coefficient of IM_t*X_t (β_7) is expected to be negative to reflect the decreased informativeness of current earnings for firms with asset impairment. Meanwhile, according to Hypothesis H2, the coefficient of IM_t*X_{t3} (β_8) is expected to be positive to reflect better approximation of the intrinsic economic value of the underlying impaired assets and enhanced earnings informativeness.

To examine the third hypothesis, we expand Reg. (1) by incorporating the dummy variable of the reversed asset impairments (REV_t) and the relatively interactive variables. The regression is presented as follows:

$$\begin{aligned} R_t = {} & \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \\ & \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \\ & \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t \end{aligned} \tag{2}$$

where:

REV_t : a dummy variable for firms with asset impairment reversals; REV_t is set as one if the firm recognized asset impairment in year *t* and reversed some or all of the impairment in the following year, and otherwise 0.

The definitions of the remaining variables are the same as for Reg. (1).

According to Hypothesis H3, the coefficient of $REV_t*IM_t*X_{t3}$ (β_{14}) is expected to be negative to reflect the decreased informativeness of future earnings for firms with asset impairment reversals.

4. Empirical Results

4.1 Descriptive Statistics

Table 3 presents the descriptive statistics for the related variables in this study. For the following analysis, this study winsorizes the top and the bottom 1.5% of outliers[11] for all continuous variables, except for the assets impairment variable (IM_t) due to its truncated characteristic. The mean (median) of annual stock returns (R_t), earnings per

11 The number of winsorized 1.5% samples is approximately the same as the number of outliers that is outside three standard deviations in the empirical samples.

share (X_t) in year *t* is respectively 0.263 (0.042) and 0.088 (0.081) in the entire sample. The mean (median) of total earnings per share (X_{t3}) for three years in year *t* is 0.301 (0.218). The mean (median) of assets recognized as impaired (IM_t) is 0.002 (0.000) of the total assets in the entire sample. However, the mean (median) of impairment for firms without reversals (875 observations) and with reversals (68 observations) is respectively 1.53% (0.6%) and 2.11% (1.5%). The magnitude of recognized impairment for the reversing firms is larger than that of firms without reversal. The mean recognized impairment reversals is 1.27% (untabulated), suggesting that approximately 60% of the initially recognized impairment was reversed in the following year. Given the rather large standard deviation of our empirical variables, this study adopts White's (1980) heteroskedastity consistent covariance matrix estimator to correct estimates of the coefficient covariances in the possible presence of heteroskedasticity in all regressions.

Table 4 presents the correlations among the related variables. Asset impairment (IM_t) is found to be significantly negative-associated with past, current, and future earnings. Thus firms with significant asset impairment have negative earnings performance. We find the correlation between annual stock returns (R_t) and recognized asset impairment (IM_t) is negative and statistically significant, indicating that a recognized asset impairment results in negative stock returns. While most of the independent variables are highly correlated with each other, the variance inflation factors (VIF) of the pivotal interactive variables, i.e., IM_t*X_t, IM_t*X_{t3} in Reg. (1) and $REV_t*IM_t*X_t$, $REV_t*IM_t*X_{t3}$ in Reg. (2) are 2.364, 1.177, 2.210, and 1.341, respectively, and do not suggest severe multicollinearity problems (Neter, Wasserman, and Kutner, 1989).

Table 3 Descriptive Statistics of The Various Variables

	R_t	X_{t-1}	X_t	X_{t3}	R_{t3}	IM_t	$SIZE_t$	LEV_t	MB_t
Panel A: Entire Sample (N = 7, 932)									
Mean	0.263	0.063	0.088	0.301	0.311	0.002	15.107	0.376	1.582
SD	0.816	0.173	0.170	0.490	0.892	0.010	1.305	0.169	1.038
Min	-0.746	-0.649	-0.402	-0.632	-0.834	0.000	12.753	0.071	0.340
Q1	-0.258	0.007	0.006	-0.008	-0.276	0.000	14.170	0.245	0.870
Median	0.042	0.082	0.081	0.218	0.105	0.000	14.933	0.368	1.300
Q3	0.513	0.157	0.169	0.502	0.638	0.000	15.836	0.490	1.970
Max	3.432	0.410	0.595	2.084	3.853	0.359	18.901	0.790	5.640
Panel B: Without Impairment Subsample (N = 6, 989)									
Mean	0.275	0.070	0.097	0.312	0.315	0.000	15.108	0.370	1.611
SD	0.813	0.167	0.161	0.488	0.883	0.000	1.299	0.167	1.046
Min	-0.746	-0.649	-0.402	-0.632	-0.834	0.000	12.753	0.071	0.340
Q1	-0.241	0.013	0.013	0.006	-0.267	0.000	14.172	0.241	0.900
Median	0.055	0.087	0.087	0.232	0.114	0.000	14.933	0.363	1.330
Q3	0.518	0.161	0.173	0.511	0.644	0.000	15.827	0.482	2.000
Max	3.432	0.410	0.595	2.084	3.853	0.000	18.901	0.790	5.640
Panel C: Impairment without Reversals Subsample (N = 875)									
Mean	0.175	0.011	0.019	0.221	0.273	0.015	15.130	0.419	1.381
SD	0.826	0.202	0.208	0.501	0.953	0.026	1.365	0.181	0.951
Min	-0.746	-0.649	-0.402	-0.632	-0.834	0.001	12.753	0.071	0.340
Q1	-0.391	-0.051	-0.094	-0.088	-0.357	0.003	14.155	0.278	0.710
Median	-0.026	0.036	0.017	0.122	0.030	0.006	14.956	0.414	1.110
Q3	0.460	0.125	0.128	0.427	0.585	0.016	15.912	0.534	1.740
Max	3.432	0.410	0.595	2.084	3.853	0.359	18.901	0.790	5.640
Panel D: Impairment with Reversals Subsample (N = 68)									
Mean	0.130	-0.027	-0.028	0.213	0.354	0.021	14.802	0.446	1.178
SD	0.968	0.185	0.191	0.468	1.000	0.022	1.107	0.194	0.871
Min	-0.746	-0.649	-0.402	-0.593	-0.765	0.001	12.753	0.075	0.340
Q1	-0.477	-0.120	-0.159	-0.059	-0.205	0.005	13.865	0.263	0.650
Median	-0.158	0.014	-0.028	0.109	0.020	0.015	14.868	0.426	0.965
Q3	0.280	0.080	0.094	0.390	0.515	0.030	15.661	0.626	1.440
Max	3.432	0.365	0.595	2.084	3.853	0.108	17.167	0.790	5.350

Legends:

R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: the earnings per share in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: the earnings per share in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: the sum of earnings per share for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: the annually compounded returns for year *t*+1 through *t*+3. IM_t: impairment loss in year *t*, deflated by the total assets at the beginning of year *t*. LEV_t: a firm's leverage in year *t*. MB_t: market-to-book ratio in year *t*. $SIZE_t$: natural logarithm of book value of total assets in year *t*.

Table 4 Pearson/Spearman Correlation Matrix for Related Variables

	R_t	X_{t-1}	X_t	X_{t3}	R_{t3}	IM_t	$SIZE_t$	LEV_t	MB_t
R_t		-0.065[a]	0.338[a]	0.269[a]	-0.244[a]	-0.049[a]	0.008[0]	-0.050[a]	0.398[a]
X_{t-1}	0.081[a]		0.512[a]	0.385[a]	0.070[a]	-0.127[a]	0.154[a]	-0.160[a]	0.118[a]
X_t	0.416[a]	0.638[a]		0.599[a]	0.035[b]	-0.187[a]	0.149[a]	-0.109[a]	0.233[a]
X_{t3}	0.274[a]	0.560[a]	0.657[a]		0.407[a]	-0.076[a]	0.082[a]	0.013	0.141[a]
R_{t3}	-0.240[a]	0.160[a]	0.119[a]	0.470[a]		-0.014	-0.041[a]	0.007	-0.211[a]
IM	-0.069[a]	-0.129[a]	-0.165[a]	-0.089[a]	-0.034		-0.077[a]	0.063[a]	-0.026
SIZE	0.059[a]	0.180[a]	0.200[a]	0.153[a]	0.011	-0.008[a]		0.121[a]	0.006
LEV	-0.058[a]	-0.094[a]	-0.088[a]	-0.023	-0.020	0.089[a]	0.136[a]		-0.064[a]
MB	0.466[a]	0.197[a]	0.332[a]	0.194[a]	-0.275[a]	-0.096[a]	0.026	-0.076[a]	

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: the earnings per share in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: the earnings per share in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: the sum of earnings per share for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: the annually compounded returns for year *t*+1 through *t*+3. IM_t: impairment loss in year *t*, deflated by the total assets at the beginning of year *t*. LEV_t: firm's leverage in year *t*. MB_t: market-to-book ratio in year *t*. $SIZE_t$: natural logarithm of book value of total assets in year *t*.
2. "a" and "b" denote the significance on the 1% and 5% levels respectively, based on two-tailed tests.
3. The upper triangular of matrix presents Pearson correlation coefficients, and the lower triangular of matrix presents Spearman correlation coefficients.

4.2 Regression Results

The estimation process of this study begins with the least-squares regression of the pooled data followed by an assessment of the validity of the pooled model's assumption of a single, overall intercept term. The Lagrange Multiplier Statistic (LM test) rejects the pooled model (LM = 22.92 > $\chi_{(5)}$ in Reg. (1) and LM = 25.29 > $\chi_{(10)}$ in Reg. (2), which implies heterogeneous intercepts), thus the panel data model offers a more powerful approach. Subsequently, the estimation proceeds to the panel data analysis and a choice between the fixed effect and a random effect. The Hausman specification test (Hausman, 1978) reveals the potential for omitted variable bias and the importance of firm-specific effects in this setting (χ^2 = 1,271.80 in Reg. (1) and χ^2 = 1,274.27 in Reg. (2)). We anticipate the need to use the fixed-effect unbalanced-panel approach (Greene, 2004) to examine the influence of asset impairment recognition on earnings informativeness.

Table 5 reports the empirical results from Reg. (1) based on the unbalanced-panel fixed effect model (denoted as the IM model). The coefficients of X_t and X_{t3} are respectively 1.386 (t = 8.45) and 0.387 (t = 6.21), which is positive and statistically significant at the 1% level. This result is consistent with the findings documented by Collins et al. (1994) and provides evidence supporting the use of the CKSS model as a benchmark model to examine the hypotheses. Importantly, the coefficient of IM_t*X_t is -10.060 (t = -5.07), which is negative and statistically significant at the 1% level and supports the first hypothesis. The informativeness of current earnings definitely decreases for firms which recognize asset impairment. Meanwhile, the coefficient of IM_t*X_{t3} is 2.041 (t = 2.23), which is positive and statistically significant at the 5% level. This means that the informativeness of future earnings is enhanced for firms with recognized asset impairment. The second hypothesis gains empirical support in the analysis. As conjectured, the recognition of asset impairment presents distinctive informativeness patterns for current and future earnings, i.e., the informativeness of current earnings (future earnings) is decreased (increased) when firms recognize asset impairment.

Reg. (2) (denoted as the REV model) considers reversal of asset impairment. Table 5 shows that the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -11.350 (t = -4.79) and 2.871 (t = 3.07), and both statistically significant at the 1% level. This suggest that the informativeness of current earnings (future earnings) is decreased (increased) for firms recognizing impairment losses without reversals in the following year. However, the coefficient of $REV_t*IM_t*X_{t3}$ is -16.300 (t = -1.53), which is negative and statistically insignificant. Thus, the third hypothesis does not gain empirical support in the analysis. It is interesting to note that the combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -13.429 (t = -1.23), which represents the entire informativeness of future earnings for firms with asset impairment reversals, and is negative and statistically insignificant. This result suggests that impairment reversals weaken the positive association between informativeness of future earnings and initial asset impairment recognition, which lead to no significant difference in earnings informativeness of impairment reversals firms and that of firms without impairment. The coefficient of $REV_t*IM_t*X_t$ is 35.498 (t = 1.67), which is positive and marginally statistically significant. The combined coefficient of IM_t*X_t and $REV_t*IM_t*X_t$ ($\beta_7+\beta_{12}$) is 24.148 (t = 1.12), which represents the entire informativeness of current earnings for firms with asset impairment reversals, and is positive and statistically insignificant. Note that Trottier (2013) argues that allowing reversals promotes truthful reporting without increasing opportunism. However, previous studies (e.g., Ai, 2005; Duh et al., 2009; Chen et al., 2009; Zhang et al., 2010) have also provided evidence of managerial incentives that can explain the recognition of asset impairment and reversal decisions. Although the third hypothesis does not gain empirical support in the analysis, the finding to some extent supports the managerial incentives school. Nevertheless, we note that only 7.2% (68/943) of impairment recognizing firms reversed their impairments in the following year. We cannot exclude that the paucity of reversals contributed to this somewhat frustrating result.[12,13]

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12 This study extends the reversing period to subsequent two accounting years to measure the dummy variable of the reversing assets impairment sample (REV variable) and reruns Reg. (2). The further testing does not qualitatively change the results.

13 We add three interactive variables, i.e., LEV_t*X_{t3}, MB_t*X_{t3}, and $SIZE_t*X_{t3}$, to control the interaction between X_{t3} and the control variables (Tucker and Zarowin, 2006; Reg. (7)) and rerun the regressions. The results are approximately the same as in the initial empirical findings.

Table 5 Results of Assets Impairment Recognized and Reversals in Earnings Informativeness

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t$

Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)
Constant	β_0	-1.282[b] (-2.47)	-1.273[b] (-2.47)
X_{t-1}	β_1	-0.844[a] (-7.59)	-0.841[a] (-7.52)
X_t	β_2	1.386[a] (8.45)	1.382[a] (8.37)
X_{t3}	β_3	0.387[a] (6.21)	0.388[a] (6.14)
R_{t3}	β_4	-0.119[b] (-2.36)	-0.118[b] (-2.34)
IM_t	β_5	-0.644 (-0.71)	-0.780 (-0.86)
$IM_t{*}X_{t-1}$	β_6	7.393[b] (2.29)	7.357[a] (2.72)
$IM_t{*}X_t$	β_7	-10.060[a] (-5.07)	-11.350[a] (-4.79)
$IM_t{*}X_{t3}$	β_8	2.041[b] (2.23)	2.871[a] (3.07)
$IM_t{*}R_{t3}$	β_9	-0.182 (-0.18)	-0.484 (-0.47)
REV_t	---/β_{10}		0.110 (1.52)
$REV_t{*}IM_t{*}X_{t-1}$	---/β_{11}		-10.940 (-0.44)
$REV_t{*}IM_t{*}X_t$	---/β_{12}		35.498[c] (1.67)
$REV_t{*}IM_t{*}X_{t3}$	---/β_{13}		-16.300 (-1.53)
$REV_t{*}IM_t{*}R_{t3}$	---/β_{14}		1.150 (0.85)
LEV_t	β_{10}/β_{15}	-0.499[b] (-2.13)	-0.496[b] (-2.14)

Model		IM model	REV model
Variables	β	β (t-value)	β (t-value)
MB_t	β_{11}/β_{16}	0.357[a] (16.23)	0.357[a] (16.27)
$SIZE_t$	β_{12}/β_{17}	0.067[c] (1.89)	0.067[c] (1.89)
Year Effect	---	Included	Included
$\beta_7+\beta_{12}$			24.148 (1.12)
$\beta_8+\beta_{13}$			-13.429 (-1.23)
N		7,932	7,932
Adj R^2		66.88%	66.89%
F-statistic		12.57[a]	12.54[a]
Hausman test		1271.80[a]	1274.27[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: a firm's annually compounded returns for year *t*+1 through *t*+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. REV_t: the dummy variable of the reversing assets impairment loss in year *t*; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

5. Robustness Tests

5.1 Propensity Score Matching (PSM) Examination

Relatively few firms recognize asset impairment, resulting in an asymmetric sample distribution. Following Lawrence, Minutti-Meza, and Zhang (2011) and Mitra, Jaggi, and Hossain (2013), this study uses the propensity-score matching approach to obtain a matched control sample and reruns the regressions. We estimate the propensity-score matching model by including company characteristics and managerial incentives that are expected to influence a firm's recognition of asset impairment (Riedl, 2004). The estimation model is a logit regression of the assets write-off using all firm-years (with and without asset write-offs, D_IM) with the explanatory variables, i.e., ΔGDP (the percent change of gross domestic product from year *t*-1 to *t*), ΔROA (a firm's industry-adjusted change of return on assets from year *t*-1 to *t*), ΔSALES (a firm's percent change in sales from year *t*-1 to *t*), ΔUE (a firm's change in pre-write-off earnings from year *t*-1 to *t*, divided by total assets at the end of *t*-1), ΔOCF (a firm's change in operating cash flows from year *t*-1 to *t*, divided by total assets at the end of *t*-1), ΔMGT (a dummy variable equal to 1 if a firm experiences a change in CEO from year *t*-1 to *t*, and 0 otherwise), BATH (a proxy for "big bath" reporting, equal to the change in a firm's pre-write-off earnings from year *t*-1 to *t*, divided by total assets at the end of *t*-1, when below the median of nonzero negative values of this variable, and 0 otherwise), SMOOTH (a proxy for "earnings smoothing" reporting, equal to the change in a firm's pre-write-off earnings from year *t*-1 to *t*, divided by total assets at the end of *t*-1, when above the median of nonzero negative values of this variable, and 0 otherwise), and LEV (a firm's leverage measured as total debts divided by total assets in year *t*). The estimating regression is presented as follows:

$$\begin{aligned} D\_IM_t = {} & \beta_0 + \beta_1 \Delta SALES_t + \beta_2 \Delta ROA_t + \beta_3 \Delta UE_t + \beta_4 \Delta OCF_t + \beta_5 LEV_t + \beta_6 \Delta MGT_t + \\ & \beta_7 BATH_t + \beta_8 SMOOTH_t + \beta_9 \Delta GDP_t + \varepsilon_t \end{aligned} \tag{3}$$

For each firm with impaired assets, without replacement and using a caliper distance of 0.03 (Rice, Weber, and Wu, 2014; Bills, Cunningham, and Myers, 2016),[14] we choose a

14 We also match each impaired firm with the non-impaired firm most similar in terms of Reg. (3), without replacement and no limitations on the caliper distance, and reexamine the empirical regressions. The results from these examinations do not qualitatively change the empirical findings.

firm without recognized impairment whose predicted probability of being a recognized impairment firm is closest to that of the firms with impairment. This process enables us to select a set of benchmark firms that are characteristically similar to the impairment firms but without such impairments. We obtain a final sample consisting of 933 recognized impairment firms matched with an equal number without recognized impairment. The results from the matched sample testing are presented in Table 6.

From the IM model in Table 6, the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -9.518 (t = -1.68) and 3.708 (t = 1.81), both statistically significant at the 10% level. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -9.803 (t = -1.81) and 4.205 (t = 2.97) in the REV model, both statistically significant. The results indicate the informativeness of current earnings (future earnings) decrease (increase) when firms recognize asset impairment. We find that the coefficient of $REV_t*IM_t*X_{t3}$ is -18.613 (t = -1.46) and is negative and statistically insignificant. The combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -14.407 (t = -1.07) and is negative and statistically insignificant. These diagnostic checks again demonstrate that the results do not qualitatively change the empirical findings in the propensity-score matching specification.

Table 6 Results of Assets Impairment Recognized and Reversals in Earnings Informativeness---PSM Sample Examination

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t$

Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)
Constant	β_0	0.350 (0.27)	0.421 (0.34)
X_{t-1}	β_1	-0.786[a] (-8.89)	-0.779[a] (-7.71)
X_t	β_2	1.069[a] (6.04)	1.057[a] (5.79)
X_{t3}	β_3	0.146[b] (2.31)	0.142[b] (2.22)
R_{t3}	β_4	-0.161[a] (-3.25)	-0.158[a] (-3.18)
IM_t	β_5	-0.971 (-0.85)	-1.307 (-1.06)
$IM_t{*}X_{t-1}$	β_6	7.583 (1.61)	7.035 (1.63)
$IM_t{*}X_t$	β_7	-5.798[b] (-2.43)	-6.614[a] (-2.80)
$IM_t{*}X_{t3}$	β_8	5.742[a] (2.79)	7.498[a] (2.97)
$IM_t{*}R_{t3}$	β_9	0.119 (0.10)	-0.607 (-0.45)
REV_t	---/β_{10}		0.116 (1.33)
$REV_t{*}IM_t{*}X_{t-1}$	---/β_{11}		-16.323 (-0.57)
$REV_t{*}IM_t{*}X_t$	---/β_{12}		33.079 (1.26)
$REV_t{*}IM_t{*}X_{t3}$	---/β_{13}		-22.023 (-1.50)
$REV_t{*}IM_t{*}R_{t3}$	---/β_{14}		1.835 (0.89)
LEV_t	β_{10}/β_{15}	-0.748[a] (-3.13)	-0.751[a] (-3.15)

Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)
MB_t	β_{11}/β_{16}	0.390[a] (9.80)	0.390[a] (9.37)
$SIZE_t$	β_{12}/β_{17}	-0.026 (-0.29)	-0.031 (-0.35)
Year Effect	---	Included	Included
$\beta_7+\beta_{12}$			26.465 (0.97)
$\beta_8+\beta_{13}$			-14.525 (-1.09)
N		1,866	1,866
Adj R^2		63.18%	63.22%
F-statistic		4.52[a]	4.51[a]
Hausman test		111.03[a]	112.28[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: a firm's annually compounded returns for year *t*+1 through *t*+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. REV_t: the dummy variable of the reversing assets impairment loss; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

5.2 Alternative Earnings Informativeness Model Testing

To test the first hypothesis, we follow Fan and Wong (2002), Yeo, Tan, Ho, and Chen (2002) and Francis, Schipper, and Vincent (2005) in measuring the informativeness of current earnings by examining a regression of cumulative abnormal stock returns (CAR) on net income. Naturally, we also use the unbalanced-panel fixed effect with year dummy model to run the regressions.[15] Naturally, we also use the unbalanced-panel fixed effect with year dummies model to run the regressions. The models are presented as follows:

$$CAR_t = \beta_0 + \beta_1 X_t + \beta_2 IM_t + \beta_3 IM_t{*}X_t + \beta_4 LEV_t + \beta_5 MB_t + \beta_6 SIZE_t + \varepsilon_t \quad (4)$$

$$CAR_t = \beta_0 + \beta_1 X_t + \beta_2 IM_t + \beta_3 IM_t{*}X_t + \beta_4 REV_t + \beta_5 REV_t{*}IM_t{*}X_t + \beta_6 LEV_t + \beta_7 MB_t + \beta_8 SIZE_t + \varepsilon_t \quad (5)$$

CAR_t is the firm's market-adjusted annual stock returns for the 12-month period ending four months following the end of the fiscal year.[16] The definitions of the remaining variables are the same as Reg. (1) and Reg. (2). The results are presented in Table 7.

From Table 7, we find that the coefficients of $IM_t{*}X_t$ are -9.282 (t = -2.77) and -10.258 (t = -3.14), which are both statistically significant at the 1% level in the IM and REV models. The coefficient of $REV_t{*}IM_t{*}X_t$ is 18.903 (t = 1.58) in the REV model and is statistically insignificant. The combined coefficient of $IM_t{*}X_t$ and $REV_t{*}IM_t{*}X_t$ ($\beta_3+\beta_5$) is 8.645 (t = 0.65), which is positive and statistically insignificant. These results again show the informativeness of current earnings decreases when firms recognize the impairment of long-lived assets. Thus, the initial empirical result for the informativeness of current earnings in the present study are not qualitatively different from the empirical findings of informativeness model which is suggested by Fan and Wong (2002), Yeo et al. (2002) and Francis et al. (2005).

15 Note that most of assets write-off information was included in a firm's financial reports and was announced together with the filed earnings numbers to the Market Observation Post System (MOPS). This feature limits this study to identify a clearly separating write-off date and uses the short-term event study to examine the information content of assets impairment announcement.

16 Taiwan Securities Exchange Law §36 requires listed firms to issue an annual financial report during four months after the end of the calendar year before 2012. As a consequence, the abnormal stock return is measured as May 1 of the current calendar year to April 30 of the next calendar year.

Table 7 Results of Assets Impairment Recognized and Reversals in Earnings Informativeness---CAR Model Examination

$CAR_t = \beta_0 + \beta_1 X_t + \beta_2 IM_t + \beta_3 IM_t{*}X_t + \beta_4 LEV_t + \beta_5 MB_t + \beta_6 SIZE_t + \varepsilon_t$

$CAR_t = \beta_0 + \beta_1 X_t + \beta_2 IM_t + \beta_3 IM_t{*}X_t + \beta_4 REV_t + \beta_5 REV_t{*}IM_t{*}X_t + \beta_6 LEV_t + \beta_7 MB_t + \beta_8 SIZE_t + \varepsilon_t$

Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)
Constant	β_0	0.316 (0.45)	0.318 (0.46)
X_t	β_1	1.134[a] (7.95)	1.134[a] (7.92)
IM_t	β_2	-1.554 (-1.53)	-1.550 (-1.60)
$IM_t{*}X_t$	β_3	-9.282[a] (-2.77)	-10.258[a] (-3.14)
REV_t	---/β_4		0.017 (0.41)
$REV_t{*}IM_t{*}X_t$	---/β_5		18.903 (1.58)
LEV_t	β_4/β_6	-0.062 (-0.35)	-0.058 (-0.33)
MB_t	β_5/β_7	0.340[a] (13.76)	0.340[a] (13.80)
$SIZE_t$	β_6/β_8	-0.055 (-1.24)	-0.055 (-1.24)
Year Effect	---	Included	Included
$\beta_3+\beta_5$			8.645 (0.65)
N		7,401	7,401
Adj R^2		37.47%	37.49%
F-statistic		4.65[a]	4.65[a]
Hausman test		952.20[a]	953.53[a]

Legends:

1. CAR_t: X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. REV_t: the dummy variable of the reversing assets impairment loss; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

5.3 The Tiny Assets Impairment Consideration

This study rounds IM variable values below 0.1% to zero in the initial analysis, thus magnitude of assets recognized as impaired is unlikely to have a significant impact on earnings. To obtain confirmatory evidence to support our empirical findings, we restore the initial recognized impairment and rerun the regressions. The empirical results from these additional tests are presented in Table 8.

From the IM model in Table 8, the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -10.040 (t = -5.07) and 2.051 (t = 2.26), both statistically significant. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -10.589 (t = -5.50) and 2.084 (t = 2.58) in the REV model, both statistically significant at the 1% level. These results again indicate the informativeness of current earnings (future earnings) decrease (increase) when firms recognize the impairment loss of long-lived assets. The coefficient of $REV_t*IM_t*X_{t3}$ is -3.687 (t = -0.38), which is negative and statistically insignificant. The combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -1.603 (t = -0.16), again negative and statistically insignificant.

This study also excludes 299 tiny asset impairment observations and uses the remaining 7,633 observations to examine the hypotheses. The untabulated results reveal that the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -10.249 (t = -6.01), 1.896 (t = 2.03) and -11.484 (t = -5.28), 2.742 (t = 2.88) in the IM and REV models, which are all statistically significant. The coefficients of $REV_t*IM_t*X_t$ and $REV_t*IM_t*X_{t3}$ are respectively 34.698 (t = 1.72) and -16.774 (t = -1.66), both marginal statistically significant. However, the combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -14.032 (t = -1.35), which is negative and statistically insignificant. Thus, the results are robust given the tiny amount of asset impairment.

Table 8 Results of Assets Impairment Recognized and Reversals in Earnings Informativeness---Tiny Magnitude of Impairment Loss Examination

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t$

Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)
Constant	β_0	-1.283[b] (-2.47)	-1.278[b] (-2.48)
X_{t-1}	β_1	-0.844[a] (-7.58)	-0.841[a] (-7.35)
X_t	β_2	1.386[a] (8.45)	1.383[a] (8.36)
X_{t3}	β_3	0.387[a] (6.21)	0.387[a] (6.14)
R_{t3}	β_4	-0.119[b] (-2.36)	-0.118[b] (-2.34)
IM_t	β_5	-0.640 (-0.71)	-0.458 (-0.46)
$IM_t{*}X_{t-1}$	β_6	7.374[b] (2.28)	7.945[a] (3.06)
$IM_t{*}X_t$	β_7	-10.040[a] (-5.07)	-10.589[a] (-5.50)
$IM_t{*}X_{t3}$	β_8	2.051[b] (2.26)	2.084[a] (2.58)
$IM_t{*}R_{t3}$	β_9	-0.186 (-0.19)	-0.381 (-0.30)
REV_t	---/β_{10}		0.035 (0.91)
$REV_t{*}IM_t{*}X_{t-1}$	---/β_{11}		-15.741 (-0.55)
$REV_t{*}IM_t{*}X_t$	---/β_{12}		21.404 (1.14)
$REV_t{*}IM_t{*}X_{t3}$	---/β_{13}		-3.687 (-0.38)
$REV_t{*}IM_t{*}R_{t3}$	---/β_{14}		0.401 (0.40)
LEV_t	β_{10}/β_{15}	-0.499[b] (-2.13)	-0.497[b] (-2.13)

Model		IM model	REV model
Variables	β	β (t-value)	β (t-value)
MB_t	β_{11}/β_{16}	0.357[a] (16.23)	0.357[a] (16.20)
$SIZE_t$	β_{12}/β_{17}	0.068[c] (1.89)	0.067[c] (1.89)
Year Effect	---	Included	Included
$\beta_7+\beta_{12}$			10.815 (0.55)
$\beta_8+\beta_{13}$			-1.603 (-0.16)
N		7,932	7,932
Adj R^2		66.88%	66.87%
F-statistic		12.57[a]	12.52[a]
Hausman test		1271.69[a]	1272.64[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: a firm's annually compounded returns for year *t*+1 through *t*+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. REV_t: the dummy variable of the reversing assets impairment loss; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

5.4 Subsample Examinations

In the initial analysis, this study uses a dummy variable for the reversing sub-sample in Reg. (2) to examine whether the informativeness of future earnings is mitigated for firms with asset impairment reversals. An alternative approach to test the third hypothesis, based on Reg. (1), but directly examining the "with" versus "without" impairment reversals subsample. This study reruns Reg. (1) using three subsamples: (1) 7,864 observations for the "Non-reversals vs. Non-impairment" sub-sample (875 non-reversing plus 6,989 without impairment observations); (2) 7,057 observations for the "Reversals vs. Non-impairment" sub-sample (68 reversing plus 6,989 without impairment observations); and (3) 943 observations for the "Reversals vs. Non-reversals" sub-sample (875 non-reversing plus 68 non-reversing observations). The empirical results are presented in Table 9.

From the "Non-reversals vs. Non-impairment" model in Table 9, the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -11.055 (t = -4.70) and 2.696 (t = 3.13), both statistically significant at the 1% level. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively 29.782 (t = 0.96) and -12.965 (t = -1.30) in the "Reversals vs. Non-impairment" model, both statistically insignificant. The empirical result from "Reversals vs. Non-reversals" model (a firm reversed its impairment is denoted as one) is reported in the right-hand column of Table 9. The coefficients of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ are respectively 10.959 (t = 2.06) and -32.948 (t = -2.25), both statistically significant at the 5% level. However, the combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ is -21.989 (t = -1.46), negative and statistically insignificant.[17] These additional results reveal that the informativeness of current earnings (future earnings) decreases (increases) when firms recognize the impairment of long-lived assets without reversals in the following year. Nevertheless, the informativeness of future earnings is mitigated for impairment reversal firms. This provides additional empirical support for the findings.[18]

17 We use impairment reversals ratio, which is measured by the reversal amounts in year t+1 divided by the impairment recognized in year t, to replace the dummy variable for the firms with assets impairment reversals in the initial model and rerun "Reversals vs. Non-reversals" model. This setting allows this study to further examine the effects of assets impairment with different magnitude of reversals, compared with the non-reversals sample, on earnings informativeness. The untabulated results reveal that the coefficients of IM_t*X_t and IM_t*X_{t3} are 11.819 (t = 1.17) and 10.037 (t = 1.90). The coefficients of $REV_t*IM_t*X_t$ and $REV_t*IM_t*X_{t3}$ are 65.919 (t = 1.43) and -71.232 (t = -2.15). The results again reveal the informativeness of future earnings is mitigated for the impairment reversals firms.

18 We also match the 68 reversing samples with the same observations who recognized impairment yet without reversals using Reg. (3) and rerun the equation. The results do not qualitatively change the primary findings.

Table 9 Results of Assets Impairment Recognized in Earnings Informativeness --- Reversals Subsamples Examination

$R_t = \beta_0 + \beta_1X_{t-1} + \beta_2X_t + \beta_3X_{t3} + \beta_4R_{t3} + \beta_5IM_t + \beta_6IM_t{*}X_{t-1} + \beta_7IM_t{*}X_t + \beta_8IM_t{*}X_{t3} + \beta_9IM_t{*}R_{t3} + \beta_{10}LEV_t + \beta_{11}MB_t + \beta_{12}SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1X_{t-1} + \beta_2X_t + \beta_3X_{t3} + \beta_4R_{t3} + \beta_5IM_t + \beta_6IM_t{*}X_{t-1} + \beta_7IM_t{*}X_t + \beta_8IM_t{*}X_{t3} + \beta_9IM_t{*}R_{t3} + \beta_{10}REV_t + \beta_{11}REV_t{*}IM_t{*}X_{t-1} + \beta_{12}REV_t{*}IM_t{*}X_t + \beta_{13}REV_t{*}IM_t{*}X_{t3} + \beta_{14}REV_t{*}IM_t{*}R_{t3} + \beta_{15}LEV_t + \beta_{16}MB_t + \beta_{17}SIZE_t + \varepsilon_t$

Model		Non-reversals vs. Non-impairment	Reversals vs. Non-impairment	Reversals vs. Non-reversals
Variables	*β*	*β* (*t*-value)	*β* (*t*-value)	*β* (*t*-value)
Constant	β_0	-1.285[b] (-2.57)	-1.354[b] (-1.99)	-2.822 (-0.89)
X_{t-1}	β_1/---	-0.832[a] (-7.38)	-0.829[a] (-7.27)	---
X_t	β_2/---	1.377[a] (8.31)	1.433[a] (7.99)	---
X_{t3}	β_3/---	0.385[a] (6.07)	0.415[a] (6.09)	---
R_{t3}	β_4/---	-0.117[b] (-2.28)	-0.113[b] (-2.18)	---
IM_t	β_5/β_1	-0.673 (-0.79)	2.590 (0.38)	-0.981 (-0.61)
$IM_t{*}X_{t-1}$	β_6/β_2	7.181[a] (2.64)	-2.862 (-0.12)	-10.573[b] (-2.06)
$IM_t{*}X_t$	β_7/β_3	-11.055[a] (-4.70)	29.782 (0.96)	11.311 (1.06)
$IM_t{*}X_{t3}$	β_8/β_4	2.696[a] (3.13)	-12.965 (-1.30)	10.959[b] (2.06)
$IM_t{*}R_{t3}$	β_9/β_5	-0.451 (-0.43)	0.424 (0.19)	-1.676[b] (-2.15)
REV_t	---/β_6			0.232[c] (1.68)
$REV_t{*}IM_t{*}X_{t-1}$	---/β_7			3.673 (0.08)
$REV_t{*}IM_t{*}X_t$	---/β_8			26.449 (0.95)
$REV_t{*}IM_t{*}X_{t3}$	---/β_9			-32.948[b] (-2.35)
$REV_t{*}IM_t{*}R_{t3}$	---/β_{10}			2.024 (0.51)

Model		Non-reversals vs. Non-impairment	Reversals vs. Non-impairment	Reversals vs. Non-reversals
Variables	β	β (t-value)	β (t-value)	β (t-value)
LEV_t	β_{10}/β_{11}	-0.484[b] (-2.03)	-0.482[b] (-2.17)	-1.173[a] (-3.09)
MB_t	β_{11}/β_{12}	0.355[a] (15.67)	0.355[a] (13.51)	0.552[a] (4.19)
$SIZE_t$	β_{12}/β_{13}	0.067[b] (1.98)	0.070 (1.55)	0.181 (0.90)
Year Effect	---	Included	Included	Included
N		7,864	7,057	943
Adj R^2		67.00%	67.19%	51.18%
F-statistic		12.54[a]	11.48[a]	2.69[a]
Hausman test		1233.82[a]	1065.24[a]	69.13[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: a firm's annually compounded returns for year *t*+1 through *t*+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

5.5 Recognized versus Non-Recognized Assets Impairment Examination

The decision to recognize asset impairment includes two facets: 1. Do managers recognize asset impairment (a binary decision)? 2. What magnitude of impairment is to be recognized (the magnitude of impairment loss decision)? This study thus uses a binary variable to replace the initial magnitude of asset impairment variable and reexamines the earnings informativeness of managerial recognition versus non-recognition decisions. In this case, the magnitude of asset impairment variable (IM_t) in Regs. (1) and (2) is replaced by the dummy variable of recognized impairment (D_IM_t). The D_IM_t variable in this analysis is denoted as one for firms recognizing asset impairment (winsorized if IM_t less than 0.1%), otherwise, D_IM = 0. Empirical results are reported in Table 10.

The IM model in Table 10 shows that the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -0.208 (t = -1.78) and 0.050 (t = 1.75), both statistically significant at the 10%. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -0.304 (t = -2.08) and 0.070 (t = 2.03) in the REV model, both statistically significant at the 5% level. We also find that the coefficient of $REV_t*IM_t*X_{t3}$ is -0.287 (t = -1.85), which is negative and statistically significant at the 10% level. The combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -0.217 (t = -1.43), negative and statistically insignificant. The additional diagnoses do not qualitatively change the primary results. Thus, both managerial decisions to recognize asset impairment and the magnitude of assets impairment to be recognized are related to earnings informativeness.

Table 10 Results of Assets Impairment Recognized and Reversals in Earnings Informativeness---The Dummy Variable and Self-Selection Bias Testing

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \beta_{13} IMR_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \beta_{18} IMR_t + \varepsilon_t$

Dummy Variable Test				Self-selection Correction			
Model		IM model	REV model	Model		IM model	REV model
Variables	β	β (t-value)	β (t-value)	Variables	β	β (t-value)	β (t-value)
Constant	β_0	-1.313[b] (-2.47)	-1.325[b] (-2.52)	Constant	β_0	-1.225[b] (-2.33)	-1.217[b] (-2.31)
X_{t-1}	β_1	-0.831[a] (-7.87)	-0.831[a] (-8.00)	X_{t-1}	β_1	-0.839[a] (-7.64)	-0.837[a] (-7.58)
X_t	β_2	1.399[a] (8.14)	1.398[a] (8.11)	X_t	β_2	1.395[a] (8.54)	1.391[a] (8.46)
X_{t3}	β_3	0.383[a] (6.28)	0.383[a] (6.28)	X_{t3}	β_3	0.387[a] (6.15)	0.387[a] (6.08)
R_{t3}	β_4	-0.114[b] (-2.29)	-0.113[b] (-2.27)	R_{t3}	β_4	-0.118[b] (-2.36)	-0.118[b] (-2.34)
IM_t	β_5	0.088 (0.11)	-0.043 (-0.05)	IM_t	β_5	-1.781 (-1.53)	-1.867[c] (-1.65)
$D\_IM_t{*}X_{t-1}$	β_6	0.042 (0.55)	0.089 (1.10)	$IM_t{*}X_{t-1}$	β_6	7.321[b] (2.21)	7.212[a] (2.65)
$D\_IM_t{*}X_t$	β_7	-0.208[c] (-1.78)	-0.304[b] (-2.08)	$IM_t{*}X_t$	β_7	-12.238[a] (-5.75)	-13.407[a] (-5.63)
$D\_IM_t{*}X_{t3}$	β_8	0.050[c] (1.75)	0.070[b] (2.03)	$IM_t{*}X_{t3}$	β_8	1.590[c] (1.75)	2.479[a] (2.73)
$D\_IM_t{*}R_{t3}$	β_9	-0.038 (-1.62)	-0.044[b] (-2.31)	$IM_t{*}R_{t3}$	β_9	-0.252 (-0.26)	-0.613 (-0.61)
REV_t	---/β_{10}		0.085 (0.93)	REV_t	---/β_{10}		0.074 (0.93)
$REV_t{*}D\_IM_t{*}X_{t-1}$	---/β_{11}		-0.763[c] (-1.71)	$REV_t{*}IM_t{*}X_{t-1}$	---/β_{11}		-10.203 (-0.41)
$REV_t{*}D\_IM_t{*}X_t$	---/β_{12}		1.248[a] (2.72)	$REV_t{*}IM_t{*}X_t$	---/β_{12}		33.817 (1.62)

Dummy Variable Test				Self-selection Correction			
Model		IM model	REV model	Model		IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)	Variables	β	β (*t*-value)	β (*t*-value)
REV_t* D_IM_t*X_{t3}	---/β_{13}		-0.287[c] (-1.85)	REV_t*IM_t*X_{t3}	---/β_{13}		-14.970 (-1.41)
REV_t* D_IM_t*R_{t3}	---/β_{14}		0.054 (0.71)	REV_t*IM_t*R_{t3}	---/β_{14}		1.450 (1.02)
LEV_t	β_{10}/β_{15}	-0.495[b] (-2.16)	-0.494[b] (-2.19)	LEV_t	β_{10}/β_{15}	-0.515[b] (-2.16)	-0.511[b] (-2.16)
MB_t	β_{11}/β_{16}	0.357[a] (16.30)	0.357[a] (16.29)	MB_t	β_{11}/β_{16}	0.358[a] (16.16)	0.358[a] (16.21)
$SIZE_t$	β_{12}/β_{17}	0.069[c] (1.89)	0.070[c] (1.92)	$SIZE_t$	β_{12}/β_{17}	0.067[c] (1.85)	0.066[c] (1.85)
				IMR_t	β_{13}/β_{18}	0.034[a] (2.84)	0.033[b] (2.52)
Year Effect	---	Included	Included	Year Effect	---	Included	Included
$\beta_7+\beta_{12}$			0.944[b] (2.44)	$\beta_7+\beta_{12}$			20.409 (0.95)
$\beta_8+\beta_{13}$			-0.21 (-1.43)	$\beta_8+\beta_{13}$			-12.491 (-1.15)
N		7,932	7,932	N		7,932	7,932
Adj R^2		66.86%	66.90%	Adj R^2		66.93%	66.94%
F-statistic		12.56[a]	12.54[a]	*F*-statistic		12.59[a]	12.55[a]
Hausman test		1269.96[a]	1275.50[a]	Hausman test		1278.35[a]	1280.53[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year *t*. X_{t-1}: a firm's earnings per share excluding extraordinary items in year *t*-1, deflated by the stock price at the beginning of year *t*. X_t: a firm's earnings per share excluding extraordinary items in year *t*, deflated by the stock price at the beginning of year *t*. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year *t*+1 through *t*+3, deflated by the stock price at the beginning of year *t*. R_{t3}: a firm's annually compounded returns for year *t*+1 through *t*+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year *t*, deflated by the total assets at the beginning of year *t*. D_IM: D_IM is denoted as 1 for firms with assets impairment recognition, otherwise 0. REV_t: the dummy variable of the reversing assets impairment loss; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year. IMR_t: Inverse Mill's ratio follows Heckman (1979).
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

We also run additional tests to address issues related to potential self-selection bias. Our regressions include the inverse Mills ratio estimated from the Reg. (3) of the determinant of asset write-off recognition model (Heckman, 1979). We then add the inverse Mills ratio (IMR) generated from the estimation to the regressions. The additional results are reported in the "Self-selection Correction" model in Table 10, which shows that the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -12.238 (t = -5.75) and 1.590 (t = 1.75), both statistically significant. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -13.407 (t = -5.63) and 2.479 (t = 2.73) in the REV model, both statistically significant. We also find that the coefficients of $REV_t*IM_t*X_t$ and $REV_t*IM_t*X_{t3}$ are respectively 33.817 (t = 1.62) and -14.970 (t = -1.41), both statistically insignificant. The combined coefficient of IM_t*X_t and $REV_t*IM_t*X_t$ ($\beta_7+\beta_{12}$) is 20.409 (t = 0.95), meanwhile, the combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) is -12.491 (t = -1.15), which is statistically insignificant. The results from this robustness test provide some corroborative evidence to exclude self-selection bias in our analysis.

5.6 Voluntarily Early Adoption of SFAS No.35 and The Occurrence of Global Financial Crisis Consideration

Note that SFAS No. 35 was promulgated in July, 2004 and began enforcement in January 2005. However, SFAS No.35 allowed for voluntary adoption prior to the effective mandatory date. Thus, early adoption in 2004 allowed managers to convey private information regarding asset valuations and/or alter measures of financial performance used in debt agreements and compensation contracts. To understand whether the voluntary adoption of SFAS No. 35 had an effect on our analysis (Hsieh and Wu, 2005), this study excludes the year 2004 and runs the regressions using the remaining years. In addition, the 2008 global financial crisis represents a relatively exogenous shock that increased the demand for quality accounting reporting. It is expected that the global crisis would have increased demand for higher quality accounting reporting. We thus further exclude observations from the year 2008 and examine whether the global financial crisis confounded the relationship between asset impairment recognition and the informativeness of earnings in the initial analysis. Empirical results are reported in Table 11.

From the IM model in Table 11, in the 2005-2010 model, the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -12.022 (t = -3.30) and 2.128 (t = 1.45). The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -14.267 (t = -4.08) and 3.073 (t = 1.84) in the REV model, both statistically significant. We also find that the combined coefficient of IM_t*X_{t1} and $REV_t*IM_t*X_{t1}$ ($\beta_7+\beta_{12}$) and combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) are all statistically insignificant. In the 2005-2010 model (excluding 2008), the coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -13.650 (t = -2.32) and 3.469 (t = 1.71) in the IM model. The coefficients of IM_t*X_t and IM_t*X_{t3} are respectively -14.412 (t = -2.61) and 4.290 (t = 2.45) in the REV model, both statistically significant. The combined coefficient of IM_t*X_{t1} and $REV_t*IM_t*X_{t1}$ ($\beta_7+\beta_{12}$) and the combined coefficient of IM_t*X_{t3} and $REV_t*IM_t*X_{t3}$ ($\beta_8+\beta_{13}$) are respectively 37.562 (t = 1.62) and -20.632 (t = -1.42), both statistically insignificant. The additional diagnoses do not qualitatively change the primary results. Thus, managerial decisions to recognize asset impairment also influence earnings informativeness when we exclude the years of voluntarily early adoption of SFAS No. 35 and the onset of global financial crisis.

Table 11 The Results of Assets Impairment Recognized and Reversals in Earnings Informativeness---Voluntarily Early Adoption and Global Financial Crisis Consideration

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} LEV_t + \beta_{11} MB_t + \beta_{12} SIZE_t + \varepsilon_t$

$R_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_t + \beta_3 X_{t3} + \beta_4 R_{t3} + \beta_5 IM_t + \beta_6 IM_t{*}X_{t-1} + \beta_7 IM_t{*}X_t + \beta_8 IM_t{*}X_{t3} + \beta_9 IM_t{*}R_{t3} + \beta_{10} REV_t + \beta_{11} REV_t{*}IM_t{*}X_{t-1} + \beta_{12} REV_t{*}IM_t{*}X_t + \beta_{13} REV_t{*}IM_t{*}X_{t3} + \beta_{14} REV_t{*}IM_t{*}R_{t3} + \beta_{15} LEV_t + \beta_{16} MB_t + \beta_{17} SIZE_t + \varepsilon_t$

		2005-2010		2005-2010 (Exclude 2008)	
Model		IM model	REV model	IM model	REV model
Variables	β	β (*t*-value)	β (*t*-value)	β (*t*-value)	β (*t*-value)
Constant	β_0	-1.548[c] (-1.78)	-1.539[c] (-1.77)	-1.369 (-1.29)	-1.385 (-1.30)
X_{t-1}	β_1	-0.845[a] (-8.91)	-0.843[a] (-8.72)	-0.892[a] (-8.34)	-0.891[a] (-8.30)
X_t	β_2	1.508[a] (8.95)	1.508[a] (8.93)	1.621[a] (12.50)	1.616[a] (12.61)
X_{t3}	β_3	0.429[a] (8.49)	0.429[a] (8.34)	0.446[a] (6.21)	0.447[a] (6.11)
R_{t3}	β_4	-0.151[b] (-2.23)	-0.150[b] (-2.21)	-0.166[c] (-1.93)	-0.166[c] (-1.92)
IM_t	β_5	-1.012 (-1.10)	-1.211 (-1.33)	-1.393 (-1.63)	-1.274 (-1.60)
$IM_t{*}X_{t-1}$	β_6	6.767[b] (2.38)	7.079[b] (2.51)	7.451[a] (3.08)	6.927[a] (2.92)
$IM_t{*}X_t$	β_7	-12.022[a] (-3.30)	-14.267[a] (-4.08)	-13.650[b] (-2.32)	-14.412[a] (-2.61)
$IM_t{*}X_{t3}$	β_8	2.128 (1.45)	3.073[c] (1.84)	3.469[c] (1.71)	4.290[b] (2.45)
$IM_t{*}R_{t3}$	β_9	-0.171 (-0.14)	-0.511 (-0.38)	-0.378 (-0.19)	-0.656 (-0.35)
REV_t	---/β_{10}		0.126 (2.13)		0.133[c] (1.73)
$REV_t{*}IM_t{*}X_{t-1}$	---/β_{11}		-11.322 (-0.44)		0.018 (0.00)
$REV_t{*}IM_t{*}X_t$	---/β_{12}		37.833[c] (1.69)		51.973[a] (2.71)
$REV_t{*}IM_t{*}X_{t3}$	---/β_{13}		-15.536 (-1.44)		-24.922[c] (-1.78)
$REV_t{*}IM_t{*}R_{t3}$	---/β_{14}		1.319 (0.93)		12.445[a] (6.75)

		2005-2010		2005-2010 (Exclude 2008)	
Model		IM model	REV model	IM model	REV model
Variables	β	β (t-value)	β (t-value)	β (t-value)	β (t-value)
LEV_t	β_{10}/β_{15}	-0.425[b] (-2.06)	-0.422[b] (-2.08)	-0.459 (-1.57)	-0.460 (-1.60)
MB_t	β_{11}/β_{16}	0.370[a] (21.37)	0.370[a] (21.67)	0.365[a] (19.15)	0.364[a] (18.70)
$SIZE_t$	β_{12}/β_{17}	0.083 (1.45)	0.082 (1.44)	0.076 (1.15)	0.077 (1.16)
Year Effect	---	Included	Included	Included	Included
$\beta_7+\beta_{12}$			23.567 (1.02)		37.562 (1.62)
$\beta_8+\beta_{13}$			-12.464 (-1.15)		-20.632 (-1.42)
N		6,973	6,973	5,776	5,776
Adj R^2		67.19%	67.20%	60.70%	60.74%
F-statistic		11.50[a]	11.47[a]	7.58[a]	7.57[a]
Hausman test		1168.19[a]	1170.56[a]	576.38[a]	583.91[a]

Legends:

1. R_t: a firm's ex-dividend annual stock return in year t. X_{t-1}: a firm's earnings per share excluding extraordinary items in year t-1, deflated by the stock price at the beginning of year t. X_t: a firm's earnings per share excluding extraordinary items in year t, deflated by the stock price at the beginning of year t. X_{t3}: a firm's sum of earnings per share excluding extraordinary items for year t+1 through t+3, deflated by the stock price at the beginning of year t. R_{t3}: a firm's annually compounded returns for year t+1 through t+3. IM_t: a firm's magnitude of long-lived assets impairment loss recognized in year t, deflated by the total assets at the beginning of year t. REV_t: the dummy variable of the reversing assets impairment loss; REV is denoted as one if the firms recognizing assets impairment loss and reversing immediately in the following year, otherwise 0. LEV_t: a firm's leverage measured as total debts divided by total assets of the sample firms at the end of the fiscal year. MB_t: a firm's market-to-book ratio measured as the market value of equity divided by book value of equity at the end of the fiscal year. $SIZE_t$: a firm's size measured by the natural logarithm of book value of total assets at the end of the fiscal year.
2. "a", "b" and "c" denote the significance on 1%, 5% and 10% levels respectively, based on two-tailed tests.

6. Conclusion

SFAS No. 35 (and IAS No. 1, paragraph 98) requires that the recoverable amount of written down property, plant, and equipment, along with reversals of such write-downs, if material, be disclosed separately as non-recurring items in the firm's income statement. A non-recurring item is often viewed as transitory and should be taken as noise included within current net income which, in turn, deteriorates the informativeness of current earnings. However, long-lived asset impairment is relevant as it conceptually implies that the asset's ability to generate future benefits has declined. Previous studies have shown that long-lived asset impairment is informative about future firm performance (Easton et al., 1993; Aboody et al., 1999; Barth and Clinch, 1998; Gordon, 2001). We suggest the informativeness of future earnings will be enhanced by recognition of long-lived asset impairment. In addition, the permission to reverse impairment of long-lived assets if economic value recovers also provides an opportunity to examine whether managers use the timing of loss recognition and reversals to achieve specific reporting objectives and thus influence the informativeness of current and future earnings.

Our results suggest that the informativeness of current earnings decreases, but that of future earnings increases in firms recognizing large magnitude assets impairments. We also find that the positive association between informativeness and future earnings disappears in the subsample of firms who reverse some of their initial asset impairment in the following year. This means the informative function of impairment recognition is offset by impairment reversals. We note that the IASB and FASB provide different accounting treatments for the reversal of asset impairment losses. Our results to some extent support the findings of Ai (2005), Duh et al. (2009), Chen et al. (2009) and Zhang et al. (2010) and provide a rationale for the FASB's prohibition of impairment loss reversals.

The findings in this study are subject to a number of limitations and should be interpreted with caution. First, the study depends on a relatively small sample of asset impairment reversals, creating an asymmetric sample distribution and possibly introducing bias. Secondly, our analysis is based on the stylized CKSS model as extended by Tucker and Zarowin (2006), and caution should be taken in interpreting results for joint model fitting and the initial asset impairment effect. Finally, we focus only on the consequence earnings informativeness of managerial asset impairment recognized, any extensions of applying such standard to other settings are concerned.

References

Aboody, D., Barth, M. E., and Kasznik, R. 1999. Revaluations of fixed assets and future firm performance: Evidence from the UK. *Journal of Accounting and Economics*, 26 (1-3): 149-178.

Ai, D. 2005. *Assets write-down in China: Incentives and the effect of corporate governance*. Working paper, SSRN, Asia Pacific Capital, Inc.

Ball, R., and Brown, P. 1968. An empirical evaluation of accounting income numbers. *Journal of Accounting Research*, 6 (2): 159-178.

Barth, M. E., and Clinch, G. 1998. Revalued financial, tangible, and intangible assets: Associations with share prices and non-market-based value estimates. *Journal of Accounting Research*, 36 (3): 199-233.

Beaver, W., Lambert, R., and Morse, D. 1980. The information content of security prices. *Journal of Accounting and Economics*, 2 (1): 3-28.

Becker, C. L., DeFond, M. L., Jiambalvo, J., and Subramanyam, K. R. 1998. The effect of audit quality on earning management. *Contemporary Accounting Research*, 15 (1): 1-24.

Bens, D. A., Heltzer, W., and Segal, B. 2011. The information content of goodwill impairments and SFAS 142. *Journal of Accounting, Auditing and Finance*, 26 (3): 527-555.

Bills, K. L., Cunningham, L. M., and Myers, L. A. 2016. Small audit firm membership in associations, networks, and alliances: Implications for audit quality and audit fees. *The Accounting Review*, 91 (3): 767-792.

Bowen, R. M., and Khan, U. 2014. Market reactions to policy deliberations on fair value accounting and impairment rules during the financial crisis of 2008-2009. *Journal of Accounting and Public Policy*, 33 (3): 233-259.

Burgstahler, D., Jiambalvo, J., and Shevlin, T. 2002. Do stock prices fully reflect the implications of special items for future earnings?. *Journal of Accounting Research*, 40 (3): 585-612.

Carlson, S. J., and Bathala, C. T. 1997. Ownership differences and firms' income smoothing behavior. *Journal of Business Finance and Accounting*, 24 (2): 179-196.

Chen, A., Kao, L., and Wu, C. I. 2013. The effects of impairment recognitions and reversals on earnings response coefficient. *Journal of Management*, 30 (1): 55-71.

Chen, S., Wang, Y., and Zhao, Z. 2009. Regulatory incentives for earnings management through asset impairment reversals in China. *Journal of Accounting, Auditing and Finance*, 24 (4): 589-620.

Choi, J. H., Myers, L. A., Zang, Y., and Ziebart, D. A. 2011. Do management EPS forecasts allow returns to reflect future earnings? Implications for the continuation of management's quarterly earnings guidance. *Review of Accounting Studies*, 16 (1): 143-182.

Collins, D. W., and Kothari, S. P. 1989. An analysis of intertemporal and cross-sectional determinants of earnings response coefficients. *Journal of Accounting and Economics*, 11 (2-3): 143-181.

Collins, D. W., Kothari, S. P., Shanken, J., and Sloan, R. G. 1994. Lack of timeliness and noise as explanations for the low contemporaneous return-earnings association. *Journal of Accounting and Economics*, 18 (3): 289-324.

Comprix, J. J. 2000. *Write-offs and restructuring charges: Evidence from SFAS No.121 and EITF 94-3 mandatory disclosures*. Doctoral dissertation, University of Illinois at Urbana-Champaign.

Duh, R. R., Lee, W. C., and Lin, C. C. 2009. Reversing an impairment loss and earnings management: The role of corporate governance. *The International Journal of Accounting*, 44 (2): 113-137.

Easton, P. D., Eddey, P. H., and Harris, T. S. 1993. An investigation of revaluations of tangible long-lived assets. *Journal of Accounting Research*, 31: 1-38.

Elliott, J. A., and Shaw, W. H. 1988. Write-offs as accounting procedures to manage perceptions. *Journal of Accounting Research*, 26: 91-119.

Ettredge, M. L., Kwon, S. Y., Smith, D. B., and Zarowin, P. A. 2005. The impact of SFAS No. 131 business segment data on the market's ability to anticipate future earnings. *The Accounting Review*, 80 (3): 773-804.

Fan, H. S., and Chen, C. L. 2009. The value-relevance change of book value of equity versus earnings by the voluntarily early adoption of SFAS No. 35 in Taiwan. *Journal of Management*, 26 (1): 51-77.

Fan, J. P. H., and Wong, T. J. 2002. Corporate ownership structure and the informativeness of accounting earnings in East Asia. *Journal of Accounting and Economics*, 33 (3): 401-425.

Francis, J., Hanna, J. D., and Vincent, L. 1996. Causes and effects of discretionary asset write-offs. *Journal of Accounting Research*, 34: 117-134.

Francis, J., Schipper, K., and Vincent, L. 2005. Earnings and dividend informativeness when cash flow rights are separated from voting rights. *Journal of Accounting and Economics*, 39 (2): 329-360.

Frantz, P. 1999. Discretionary write-downs, write-offs, and other restructuring provisions: A signaling approach. *Accounting and Business Research*, 29 (2): 109-121.

Gelb, D. S., and Zarowin, P. 2002. Corporate disclosure policy and the informativeness of stock prices. *Review of Accounting Studies*, 7 (1): 33-52.

Gordon, E. A. 2001. Accounting for changing prices: The value relevance of historical cost, price level, and replacement cost accounting in Mexico. *Journal of Accounting Research*, 39 (1): 177-200.

Greene, W. H. 2004. *Econometric Analysis (5th ed.)*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica*, 46 (6): 1251-1271.

Heckman, J. 1979. Sample selection bias as a specification error. *Econometrica*, 47 (1): 153-161.

Henderson, B. C., and Kaplan, S. E. 2000. An examination of audit report lag for banks: A panel data approach. *Auditing*: *A Journal of Practice and Theory*, 19 (2): 159-174.

Henning, S. L., Shaw, W. H., and Stock, T. 2004. The amount and timing of goodwill write-offs and revaluations: Evidence from U.S. and U.K. firms. *Review of Quantitative Finance and Accounting*, 23 (2): 99-121.

Hsiao, C. 1986. *Analysis of Panel Data*. New York, NY: Cambridge University Press.

Hsieh, W. T., and Wu, T. Z. 2005. Determinants and market reaction of assets impairment in Taiwan. *Taiwan Accounting Review*, 6 (1): 59-95.

Jarva, H. 2009. Do firms manage fair value estimates? An examination of SFAS 142 goodwill impairments. *Journal of Business Finance and Accounting*, 36 (9-10): 1059-1086.

Jiambalvo, J., Rajgopal, S., and Venkatachalam, M. 2002. Institutional ownership and the extent to which stock prices reflect future earnings. *Contemporary Accounting Research*, 19 (1): 117-145.

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*, 86 (6): 2047-2073.

Kothari, S. P. 2001. Capital markets research in accounting. *Journal of Accounting and Economics*, 31 (1-3): 105-231.

Lawrence, A., Minutti-Meza, M., and Zhang, P. 2011. Can Big 4 versus non-Big 4 differences in audit-quality proxies be attributed to client characteristics?. *The Accounting Review*, 86 (1): 259-286.

Lawrence, A., Sloan, R., and Sun, Y. 2013. Non-discretionary conservatism: Evidence and implications. *Journal of Accounting and Economics*, 56 (2-3): 112-133.

Li, K. K., and Sloan, R. G. 2017. Has goodwill accounting gone bad?. *Review of Accounting Studies*, 22 (2): 964-1003.

Loh, A. L. C., and Tan, T. H. 2002. Asset write-offs—Managerial incentives and macroeconomic factors. *Abacus*, 38 (1): 134-151.

Lundholm, R., and Myers, L. A. 2002. Bringing the future forward: The effect of disclosure on the returns-earnings relation. *Journal of Accounting Research*, 40 (3): 809-839.

Mitra, S., Jaggi, B., and Hossain, M. 2013. Internal control weaknesses and accounting conservatism: Evidence from the post–Sarbanes–Oxley period. *Journal of Accounting, Auditing and Finance*, 28 (2): 152-191.

Neter, J., Wasserman, W., and Kutner, M. H. 1989. *Applied Linear Regression Models (2nd ed.)*. Homewood, IL: Irwin.

Orpurt, S. F., and Zang, Y. 2009. Do direct cash flow disclosures help predict future operating cash flows and earnings?. *The Accounting Review*, 84 (3): 893-935.

Peetathawatchai, P., and Acaranupong, K. 2012. Are impairment indicators and losses associated in Thailand?. *Journal of Financial Reporting and Accounting*, 10 (1): 95-114.

Ramanna, K. 2008. The implications of unverifiable fair-value accounting: Evidence from the political economy of goodwill accounting. *Journal of Accounting and Economics*, 45 (2-3): 253-281.

Ramanna, K., and Watts, R. L. 2012. Evidence on the use of unverifiable estimates in required goodwill impairment. *Review of Accounting Studies*, 17 (4): 749-780.

Rees, L., Gill, S., and Gore, R. 1996. An investigation of asset write-downs and concurrent abnormal accruals. *Journal of Accounting Research*, 34: 157-169.

Rennekamp, K., Rupar, K. K., and Seybert, N. 2015. Impaired judgment: The effects of asset impairment reversibility and cognitive dissonance on future investment. *The Accounting Review*, 90 (2): 739-759.

Rice, S. C., Weber, D. P., and Wu, B. 2014. Does SOX 404 have teeth? Consequences of the failure to report existing internal control weaknesses. *The Accounting Review*, 90 (3): 1169-1200.

Riedl, E. J. 2004. An examination of long-lived asset impairments. *The Accounting Review*, 79 (3): 823-852.

Strong, J. S., and Meyer, J. R. 1987. Asset write-downs: Managerial incentives and security returns. *The Journal of Finance*, 42 (3): 643-661.

Strong, N., and Walker, M. 1993. The explanatory power of earnings for stock returns. *The Accounting Review*, 68 (2): 385-399.

Szczesny, A., and Valentincic, A. 2013. Asset write-offs in private firms-The case of German SMEs. *Journal of Business Finance and Accounting*, 40 (3-4): 285-317.

Trottier, K. 2013. The effect of reversibility on a manager's decision to record asset impairments. *Accounting Perspectives*, 12 (1): 1-22.

Tucker, J. W., and Zarowin, P. A. 2006. Does income smoothing improve earnings informativeness?. *The Accounting Review*, 81 (1): 251-270.

Wang, C. J., Lee, C. H., and Huang, B. N. 2003. An analysis of industry and country effects in global stock returns: Evidence from Asian countries and the U.S. *The Quarterly Review of Economics and Finance*, 43 (3): 560-577.

Warfield, T. D., and Wild, J. J. 1992. Accounting recognition and the relevance of earnings as an explanatory variable for returns. *The Accounting Review*, 67 (4): 821-842.

Watts, R. L. 2003. Conservatism in accounting Part I: Explanations and implications. *Accounting Horizons*, 17 (3): 207-221.

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48 (4): 817-838.

Whittred, G., and Zimmer, I. 1986. Accounting information in the market for debt. *Accounting and Finance*, 26 (2): 19-33.

Yen, S. H., and Chao, C. L. 2009. Asset write-offs and discretionary accruals. *NTU Management Review*, 19 (S2): 165-194.

Yeo, G. H., Tan, P. M., Ho, K. W., and Chen, S. S. 2002. Corporate ownership structure and the informativeness of earnings. *Journal of Business Finance and Accounting*, 29 (7-8): 1023-1046.

Young C. S., and Wu, S. J. 2009. The determinants and effects on earnings informativeness of asset impairments: The role of corporate governance. *International Journal of Accounting Studies*, 48 (1): 68-114.

Zeng, X. Q., Li, K. F., Wang, C. S., and Huang, Q. D. 2011. The motive for earnings management and accounting for asset impairment: Evidence from China. *NTU Management Review*, 22 (1): 1-30.

Zhang, R., Lu, Z., and Ye, K. 2010. How do firms react to the prohibition of long-lived asset impairment reversals? Evidence from China. *Journal of Accounting and Public Policy*, 29 (5): 424-438.

Zucca, L. J., and Campbell, D. R. 1992. A closer look at discretionary writedowns of impaired assets. *Accounting Horizons*, 6 (3): 30-41.

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