COMPARISON OF LONG-LIVED ASSET IMPAIRMENTS UNDER US GAAP AND IFRS

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by
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ABSTRACT
Title: Comparison of long-lived asset impairments under US GAAP and IFRS
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In this dissertation I investigate and compare the impairments of long-lived operating assets under US Generally Accepted Accounting Principles (US GAAP) and International Financial Reporting Standards (IFRS) from different perspective, including the informativeness, determinants, and market valuation of asset impairments. A firm invests in long-lived operating assets with the expectation of generating future benefit. The decision or recognition of asset impairments implies such future benefit is expected to be lower than originally estimated. US GAAP and IFRS both require the recognition of impairment losses but their standards and accounting approaches are different in several ways. These distinctions raise the question whether the reported long-lived asset impairments under US GAAP and IFRS are comparable and motivate this dissertation.

I investigate the predictive ability of reported asset write-offs for firms' future performance and find negative associations suggesting the informativeness of impairment losses. But such informativeness depends on the type of assets impaired, the accounting standards adopted, and the institutional characteristics. In general, aggregate impairments are persistently associated with future performance under IFRS but not US GAAP. The impairments of tangible assets have more predictive ability than those of intangibles. For IFRS adopters, enforcement takes a more important role in determining the informativeness of asset impairments than legal origins.

I also examine the determinants and attributes of asset impairments under US GAAP and IFRS. I find both of them reflect certain economic factors and reporting incentives.

Under US GAAP asset impairments strongly reflect GDP growth, unemployment rate, industry-trend and reporting incentives, including taking a big bath and income smoothing. Under IFRS the impairments reflect most economic factors but less reporting incentives. However, when enforcement is low in IFRS countries, firms tend to manage earnings through asset write-offs.

I further address the market valuation of asset write-offs under US GAAP and IFRS. The reporting of asset impairments improves the explanatory power of accounting information for equity prices under IFRS but not US GAAP, especially when enforcement is high. The associations between asset write-offs and equity prices under IFRS in high enforcement countries are significantly different from those under US GAAP, implying investors weigh reported impairments under IFRS. I also use stock returns as an alternative metric of market valuation. Under US GAAP, asset write-offs are negatively associated with past, current, and future stock returns. Under IFRS in high enforcement countries the effects of impairment loss concentrate on past and current stock returns. The results of comparisons suggest asset write-offs under US GAAP and IFRS are not totally comparable from a market perspective.

This dissertation contributes to literature on special items, impairment accounting, and reporting under IFRS. It is also related to the comparability of financial reporting under US GAAP and IFRS. While studies have compared overall properties of the two standards, examining the differences in a specific accounting area is also important as U.S. SEC express concern about the convergence of different accounting standards and whether U.S. should incorporate IFRS into its financial reporting systems.

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TABLE OF CONTENTS

PAGE

LIST OF TABLES

TABLE **PAGE**

CHAPTER 1

INTRODUCTION

The objective of this dissertation is to compare and investigate impairments of long-lived assets under the US Generally Accepted Accounting Principles (US GAAP) and the International Financial Reporting Standards (IFRS)[1]. A firm makes investments in long-lived operating assets with the expectation of generating future benefit. The recognition of impairment losses implies such future benefit is expected to be lower than originally anticipated. US GAAP and IFRS both require recognizing impairment losses, but their standards differ in several ways, such as the frequency of impairment test, the determination of when or how to write down the value of an asset, the measurement of the amount of the loss, and the assessment of recoverability. These differences motivate this study to compare the attributes and effects of reporting long-lived asset impairments between the two standards.

Accounting for long-lived assets is one of the significant differences between US GAAP and IFRS[2]. Different models of impairment testing are used. Under US GAAP, Accounting Standards Codification (ASC) Topic 350 and 360 (Former Standards of

[1] By the term "impairment" or "write-off" I specifically mean the impairments from long-lived assets subject to general operating purposes in a firm. This prerequisite is kept hereinafter across the dissertation except to specific illustrations.

[2] The SEC releases a series of work plan to compare the specific differences between US GAAP and IFRS. SEC (2011) compares 26 important issues with potential divergence between the two standards. In Section K discussing property, plant, and equipment (PP&E), the report lists examples of potentially more significant differences, including asset depreciation, remeasurement of residual value of PP&E, option for revaluation, *impairment*, and *impairment reversals*.

Financial Accounting Standards (SFAS) No. 121 and No. 144) utilize a two-step process for impairment testing of tangible long-lived assets with definite life, such as property, plant, and equipments (PP&E), and definite-lived intangible assets, such as patent or copyright. In the first step the carrying value of an asset is compared with undiscounted cash flows which the long-lived asset is expected to generate. When the carrying amount is higher, an impairment loss is measured as the difference between the carrying value and fair value of the asset in the second step. By contrast, under IFRS the International Accounting Standards (IAS) No. 36 *Impairment of Assets* applies a one-step model and the carrying amount of an asset is compared with its "recoverable amount" calculated on account of discounted future cash flows[3]. If the recoverable amount is less than the carrying value, then an impairment loss will be recognized. Testing for goodwill impairments is a two-step test under US GAAP with the first step examining the fair value of the reporting unit to which the goodwill is attributed and the second step focusing on the goodwill itself.

The differences in the accounting standards lead to a common view that the reporting of asset impairments under US GAAP is not as timely as that under IFRS and raises the questions of which of the standards is more informative about the firms' future performance or better reflects the firms' underlying economics. The importance of these questions comes from the need of comparable financial information for decision making in global capital markets (SEC 2008) and the potential consequences of adopting IFRS. Several countries have adopted IFRS since 2005 with the goal to provide comparable financial reporting over the world. The U.S. Securities and Exchange Commission (SEC)

[3] Under IFRS, the recoverable amount is the higher of fair value less costs to sell and the value in use (VIU) calculated as the sum of discounted cash flow projections (IAS 36 para. 6, 30).

has also allowed foreign private issuers to use IFRS since 2007 and is considering allowing IFRS for U.S. issuers[4]. Prior literature documents the benefits to IFRS adoption, such as an increase of cross-border investments (Gordon and Shima 2011, Louis and Urcan 2012, etc.), decrease in firms' cost of capital (Daske et al. 2008), and reduction on the returns to insider trades (Brochet et al. 2013). However, some studies also find disadvantages of mandatory adoption of IFRS, such as the increase of income smoothing and aggressive reporting (Ahmed et al. 2013).

Motivated by above concerns I am interested in whether the divergence in impairment accounting standards affects the comparability of financial reporting under US GAAP and IFRS. Accounting information from two systems is comparable if both reflect the same economic outcome similarly. I therefore address this comparability issue from the informativeness, determinants, and market valuation of reported impairment losses under US GAAP and IFRS.

First, following Fairfield et al. (1996) investigating the predictive ability of accounting information for future profitability, I address the predictive content of asset write-offs for firms' future performance under the two standards. I use operating cash flows and different measures of earnings, such as income from bottom-line, income before special items and operating income, as the proxies of firm performance.

Second, I examine the determinants of reported asset write-offs and explore whether asset impairments under the two standards reflect firms' underlying economics and managers' reporting incentives. I analyze different aspects of firms' underlying

[4] Prior to November 2007 non-U.S. cross-listed firms adopting IFRS are required to provide the reconciliation of their financial reporting to US GAAP through Form 20-F filing with SEC. After the amendment of Form 20-F (effective March 2008) the foreign private issuers adopting IFRS can choose to file their financial reporting under IFRS. Kim et al (2012) find none of the IFRS firms continue to provide the reconciliation in Form 20-Fs after the elimination of such requirement.

economics, including macroeconomics, industry trends, and firm- and asset- performance. I examine managers' reporting incentives for earnings management, such as income smoothing, taking a big bath, and avoiding loss. I investigate other reporting incentives, including CEO turnover and executive compensation.

Third, I investigate market valuation of impairment losses and compare the value relevance of asset impairments under US GAAP and IFRS. The incremental explanatory power of asset impairments reporting on stock prices and returns would imply the usefulness of impairment information under each of the two standards.

I employ sample firms using either US GAAP or IFRS from 26 countries and examine the sample period from 2005 through 2011 for following reasons. First, IFRS became mandatory in 2005 for EU member countries and thus using these years expands the sample size. Second, the sample period including the year of financial crisis (2008) may increase the opportunity to observe the events of asset impairments across the world. Third, as IFRS is adopted by several countries with different institutional backgrounds, I can investigate the roles of institutions in financial reporting under the same accounting system. Prior literature shows that in addition to accounting standards the properties of reported numbers are also determined by other factors, such as regulatory system, litigation environment or reporting preparers' incentives (Ball et al. 2000, 2003, Bradshow and Miller 2008, etc.). Similarly, the difference in asset write-offs between US GAAP and IFRS, if any, may come from not only the accounting standards in place but also the implementation of the standards in each IFRS country. It is therefore important to distinguish the effects of institutions from standards in place, such as transitional period or enforcement, and take these factors together into account.

The empirical results for the predictive ability of long-lived asset impairments are in chapter 4. I find negative associations between impairments and measures of future performance, suggesting that reported write-offs are indicative of the loss in assets' economic value. Such associations depend on the type of assets impaired, the accounting standards adopted, and the characters of institutions. Total impairments in general are persistently and negatively associated with future performance, including future cash flows and earnings under IFRS but not under US GAAP, suggesting the different informativeness of impairment accounting between the two standards regimes. The predictive ability of impairments of tangible long-lived assets is more significant and persistent than those from other types of assets under IFRS. The analyses within IFRS adopters show that impairment losses are more informative in high enforcement countries than low enforcement countries. However, legal origin does not affect such predictability significantly.

I investigate the determinants of reported asset write-offs under US GAAP and IFRS in chapter 5. I find the asset impairments under both standards reflect certain economic factors and reporting incentives. Under US GAAP reported asset write-offs strongly reflect GDP growth, unemployment rates, industry trends, and some measures of firm performance. Managers under US GAAP tend to take a big bath or smooth income through asset impairments. Under IFRS asset impairments reflect most economic factors but less reporting incentives in general, but enforcement still has a role in this setting. When enforcement is low, firms under IFRS tend to manage earnings through asset impairments. In summary, long-lived asset impairments reflect more economic factors

and less reporting incentives under IFRS than those under US GAAP, but such differences are also associated with institutional characters.

In Chapter 6, I examine and compare the value relevance of asset impairments under US GAAP and IFRS based on the associations of reported asset write-offs with equity prices and stock returns and have following findings. First, I address the usefulness of long-lived asset impairments under both standards in explaining firm values and document the highest improvement (14.3 percent) in explanatory power of asset write-offs in IFRS reporters with high enforcement whereas a slight but insignificant increase (0.5 percent) under US GAAP, suggesting better value relevance of asset impairments under IFRS. Second, from models with disaggregated impairments the associations of impairment losses on tangible long-lived assets with equity prices between US GAAP and IFRS with high enforcement are significantly different. It suggests that even if the enforcement is similarly high, the implications of asset write-offs are not totally comparable as the result of different standards in place. Third, when examining market returns, I find that asset write-offs under US GAAP are negatively associated with past, current and future stock returns whereas the main effects from impairments in high enforcement countries under IFRS concentrate on past and current stock returns. To sum up, impairments under IFRS in general are more value-relevant and reflected in stock returns than those under US GAAP. The comparability of value relevance of long-lived asset impairments is determined more by the accounting approaches than institutional characteristics.

This work contributes to literature on the informativeness of special items, impairment accounting, and reporting under IFRS. First, most studies on special items

such as impairment losses compare these items with other earnings components, such as cash or general accruals. This study compares asset impairments, a specific special item under two accounting standards. The aggregate impairment amounts and different impairment components are examined. Second, most prior studies address impairment accounting from single country and respective home GAAP, such as the U.S. (Riedl 2004) and Australia (Carlin et al. 2008). Few studies compare impairment accounting in more countries, such as U.K. and Norway (Kvaal 2005), but only for one year. The use of an international setting with 26 countries and multiple years in my study can provide pervasive evidence on the effects of long-lived asset impairments and therefore can address the roles of institutional characteristics on this issue. Third, the study is relevant to the debate on the U.S. adopting IFRS and should be interesting to reporting users, regulators and standard setter. While studies have compared overall properties of US GAAP and IFRS (Barth et al. 2012, Gordon et al. 2010), examining the differences in specific standards is also important as the standard setters (SEC) work toward converging US GAAP and IFRS and express concerns on the significant differences in specific items, including *asset impairment* and subsequent *impairment reversals*[5].

[5] SEC (2011).

CHAPTER 2

INSTITUTIONAL BACKGROUND

2.1 Harmonization and Comparability between US GAAP and IFRS

IFRS is considered a high quality set of principles-based accounting standards designed to measure the underlying economics of reporting entities (SEC 2008). The main objectives of the standards' setter, the International Accounting Standards Board (IASB), are to develop a set of high-quality standards and make it globally accepted[6]. Companies in different countries can therefore provide understandable and comparable accounting information based on the same standards (DeFond et al. 2011, Brochet et al. 2013). Applying the same accounting standards internationally can alleviate cross-border information asymmetries, improve the information relevance to financial reporting users' future decisions (Leuz 2003, Barth et al. 2008, DeFond et al. 2011, etc.) and increase global trading and investments (Yu 2011, Gordon and Shima 2011, Louis and Urcan 2012, etc.).

Adoption of IFRS became mandatory for European Union (EU) member countries in 2005 under amendments to the 4th and 7th Directives as an attempt to standardize Europe's accounting systems. Many other countries pursued this trend in the following years resulting in a total of more than 120 countries that currently use IFRS[7]. The benefits

[6] The objective of IASB. http://www.ifrs.org/The-organisation/Pages/IFRS-Foundation-and-the-IASB.aspx
[7] As of March 2013.

of using standardized accounting principles also inspired related policy debates in the United States, such as whether US GAAP should be replaced by IFRS, whether IFRS was sufficiently comprehensive, and how to introduce IFRS to the US reporting system (SEC 2012).

Proposals for convergence of US GAAP and IFRS can be traced back to the early 2000s when the Financial Accounting Standards Board (FASB) and IASB reached the Norwalk Agreement of 2002, a formal commitment to work together for the convergence of respective accounting systems, including not only accounting standards but also conceptual frameworks[8]. FASB and IASB identified and kept updating several short-term and long-term convergence topics in the memorandum of understanding (MOU) in the following years (FASB 2006, 2008)[9]. As of February 2013, two standard setters have completed most short-term convergence projects, converged the standard for revenue recognition accounting, and developed the proposal for the convergence of accounting for leases. However, there are also challenges for complete convergence, including accounting for impairment and insurance contracts (FASB 2013). In addition, as conceptual framework is the basis of developing new accounting standards and scrutinizing existing standards for both FASB and IASB, the differences in frameworks such as the objectives of financial reporting, qualitative characteristics of accounting

[8] At a joint meeting in Norwalk on September 18, 2002, the FASB and the IASB each acknowledged their commitment to the development of high-quality, compatible accounting standards that could be used for both domestic and cross-border financial reporting. Both standard setters pledged to use their best efforts to (a) make their existing financial reporting standards fully compatible as soon as is practicable and (b) to coordinate their future work programs to ensure that once achieved, compatibility is maintained (Memorandum of understanding, The Norwalk Agreement 2002).

[9] In MOU 2006 there were 7 convergence topics listed on the active agenda, including business combinations, consolidations, fair value measurement guidance, liabilities and equity distinctions, performance reporting, post-retirement benefits (including pensions), and revenue recognition. In the 2008 MOU other topics were added, including financial instruments, financial statement presentation, intangible assets, leases, and derecognition.

information, elements of financial statements, and the recognition and measurement principles, could lead to differences in specific accounting treatments. The standard setters therefore initiated a joint project in 2005 with the task of developing a common conceptual framework to merge and improve their existing frameworks (Bullen and Crook 2005). Phase one of the conceptual framework project was completed in 2010[10].

In addition to the works between FASB and IASB, the U.S. Securities and Exchange Commission (SEC) also considers the convergence of accounting standards between US GAAP and IFRS and has allowed foreign private issuers reporting under IFRS since 2007. Currently, the SEC is considering incorporating IFRS into the financial reporting system for US issuers through a series of work plans that cover specific factors relevant to determining whether, when, and how the current system should be transitioned to a system incorporating IFRS (SEC 2012). Based on SEC's research, although there has been progress toward the convergence of conceptual frameworks and several areas have been converged between US GAAP and IFRS[11], pursuing the designation of the standards of the IASB as authoritative was not supported by the vast majority of participants in the U.S. capital markets is not consistent with the methods of incorporation employed by the other major capital markets around the world[12]. The SEC

[10] FASB and IASB developed a joint project to improve and converge their conceptual frameworks. As a result, FASB released Concepts Statement No. 8 and IFRS issued Conceptual Framework for Financial Reporting 2010.

[11] Based on the update of MOU in 2008 and 2010, 11 convergence topics that FASB and IASB are jointly working on are identified, including business combinations, financial instruments (replacement of existing standards), financial statement presentation, intangible assets, leases, liabilities and equity distinctions, revenue recognition, consolidations, derecognition, fair value measurement, and post-employment benefit (including pensions). FASB and IASB also published the joint progress report and high-level update for the convergence between US GAAP and IFRS in April 2012 and February 2013. See http://www.ifrs.org/Use-around-the-world/Global-convergence/Convergence-with-US-GAAP/Pages/Convergence-with-US-GAAP.aspx

[12] SEC (2012) B. Focus of the staff's work. There are at least two approaches for IFRS adoption (Upton 2010). One is full adoption and another is continuous convergence with IFRS. In later case, countries

therefore focused more on the differences between US GAAP and IFRS in specific accounting issues (e.g., valuation in inventory, remeasurement of property, plants, and equipment, etc.) and examined different methods of incorporating IFRS, such as developing an endorsement mechanism or continued convergence of accounting standards issued by the FASB and the IASB (SEC 2011).

The environment and quality of financial reporting are determined not only by accounting standards in place but also by the application, interpretation, and enforcement of the standards. The SEC therefore is concerned with both the comparability of accounting standards and the comparability of reporting amounts reflecting the application of accounting standards and other institutional characteristics. Barth et al. (2012) examines comparability of US GAAP and IFRS, defining accounting information as being comparable if an economic outcome estimated through the mapping from accounting amounts to that economic outcome of one system is the same as the estimated economic outcome through the mapping of the other system. The study found that firms using IFRS have greater accounting system comparability and value relevance with US firms than firms using domestic accounting standards.

This dissertation compares US GAAP and IFRS on a specific issue (e.g., impairment accounting of long-lived assets) following this stream of literature and is relevant to the SEC's concern about incorporating IFRS into the US financial reporting system.

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decide to make their domestic accounting standards to a point where the reported amounts in financial statements are the same as in IFRS reporting.

2.2 The Development of Impairment Accounting under US GAAP and IFRS

Impairment accounting is applied within the historical cost model in financial accounting[13]. A firm makes investments in long-lived assets to operate in the future. The acquisition values of these assets are recorded at cost, which represents the assets' expected ability to generate future benefit. If the assets have a definite life, the costs are allocated over their economic life through depreciation or amortization, which implies the usage of its profit-generating ability. However, when the assets' current values, namely the expectation of future benefit generated, change due to a change in underlying economics, the variation will not be reflected through depreciation or amortization. In this case, impairment accounting takes the supplementary role to lower an asset's carrying value by recognizing an impairment loss if the carrying amount of the asset is no longer recoverable.

Before the mid-1990s impairment accounting was not specifically addressed by US GAAP and International Accounting Standards (IAS) and managers had substantial flexibility over the timing, calculation, and reporting of impairment losses (Riedl 2004). Responding to the call for enhanced reporting of asset impairments, the FASB issued SFAS No. 121 *Accounting for the Impairment of Long-Lived Assets and for Long-Lived Assets to Be Disposed Of* with a two-step model of impairment testing in March 1995. The International Accounting Standards Committee (IASC) released IAS 36 *Impairment of Assets* addressing the same issue in June 1998 but with a different one-step model.

[13] In SFAS No. 121 para. 71, FASB states that using fair value to measure the amount of an impairment loss is not a departure from the historical cost principle. Rather, it is a consistent application of principles practiced elsewhere in the current system of accounting whenever a cost basis for a newly acquired asset must be determined.

Accounting for long-lived asset impairments separates assets into three categories: (1) tangible long-lived assets and intangible assets with a definite-life[14], (2) intangible assets with an indefinite life other than goodwill, and (3) goodwill[15]. Tangible long-lived assets represent resources with physical substance such as land, buildings, plants, and equipment. Intangible assets with a definite life (e.g., patents or copyrights) are identifiable, non-monetary, and lack physical substance. These intangibles are sometimes protected by law for a certain time period. Intangible assets with indefinite life such as brands are also identifiable, non-monetary, and lack a physical substance. Goodwill is an unidentifiable intangible asset with an indefinite life. A summary and flowcharts of impairment accounting under US GAAP and IFRS are presented in Appendix B.

US GAAP

SFAS No. 121 was the first Statement of Financial Accounting Standards for impairment accounting under US GAAP. It systematically addresses impairment issues for long-lived assets, certain identifiable intangibles, and goodwill related to those assets to be held and used, and for long-lived assets and certain identifiable intangibles to be disposed of (SFAS No. 121 para. 3) in five areas: (1) the criteria for the timing of the impairment test, (2) the level at which to group assets in testing for impairment, (3) the measurement basis for determining the occurrence of an impairment, (4) the recognition and measurement of an impairment, and (5) the presentation of the recognized amount.

[14] Under US GAAP, SFAS No. 121 applies the term 'long-lived assets and identifiable intangibles' to represent such assets. Under IFRS, IAS 36 does not specifically address this category but separates goodwill and intangible assets with indefinite useful lives from other long-lived assets.

[15] Under US GAAP the goodwill impairment was separately included in SFAS No. 142 in the past. After 2009 the related issues are covered by ASC 350 together with other intangible assets.

In this standard an entity should review the long-lived assets for impairment when there are events indicating the carrying amount of an asset may not be recoverable (SFAS NO. 121 para. 4) and a two–step model of impairment testing is adopted. In the first step the occurrence of impairment is examined based on an asset's recoverable cost[16]. If a possible impairment is detected, the second step compares the asset's carrying value with its fair value, which means the amount at which the asset could be bought or sold in a current transaction between willing parties other than in a forced or liquidation sale (SFAS No. 121 para. 7). If the fair value is lower, an impairment loss is taken. Under this approach, an asset's carrying value can be higher than the threshold in the first step, the recoverable cost, but lower than its fair value without reporting an impairment. This model is applied to the three types of long-lived assets discussed in detail below[17].

Tangible and Intangible Assets with Definite-Life

Tangible assets and intangible assets with definite-life are tested for impairment when the related indicators are present, such as a reduction in the extent to which an asset is used or a substantial drop in the market value of an asset (SFAS No. 121 para. 57). The existence of asset impairment is determined in the first step: an impairment is present if the carrying amount of the asset is higher than the sum of the future undiscounted cash flows which is expected to generate. The second step recognizes the impairment loss

[16] Based on SFAS No. 121 para. 77-81, the term 'recoverable cost' is measured as the sum of the undiscounted future cash flows expected to be generated over the life of an asset. IAS 36 adopts a similar term 'recoverable amount' with a different definition. IAS 36 para. 6 states the recoverable amount of an asset or cash-generating unit is the higher of its fair value less costs to sell and its value in use.

[17] SFAS No. 121 should be applied to long-lived assets, certain identifiable intangibles, and goodwill related to those assets to be held and used and to long-lived assets and certain identifiable intangibles to be disposed of. The standard does not apply to financial instruments, long-term customer relationships of a financial institution, mortgage and other servicing rights, deferred policy acquisition costs, and deferred tax assets. It is not applied to assets whose accounting is prescribed by certain industries (SFAS No. 121 para. 3).

when the asset's carrying value is higher than its fair value by lowering the asset's carrying amount to its fair value.

Intangible Assets with Indefinite Life

Intangible assets with indefinite life are tested for impairment at least annually since the indicators of asset impairment are more difficult to observe than those of tangible assets. The carrying amount of the asset is compared with its fair value to determine the impairment loss. If the carrying value is higher than the fair value, an impairment loss is taken.

Goodwill

Goodwill impairment is assessed at least once per year due to its intangibility before September, 2011 (FASB 2011b)[18]. As goodwill cannot be identified alone, the recoverability testing for the value of goodwill is performed based on the reporting unit (RU)[19]. In the first stage, the potential existence of goodwill impairment is assessed by determining whether or not the carrying amount of the RU is less than its fair value. If the carrying value is higher than the RU's fair value, the second step requires comparing the

[18] In September 15, 2011 FASB released the Accounting Standards Update (ASU) No. 2011-08 regarding ASC Topic 350 Intangibles- Goodwill and Other to simplify the tests for goodwill impairment. In the past the two-step model was applied. Goodwill was subject to impairment testing at least annually by comparing the fair value of a reporting unit with its carrying amount including such goodwill as the first step and the impairment loss, if any, was measured as the second step. Under the ASU 2011-08 amendments an entity has the option to first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. In my work the sample period is from 2005 through 2009. Therefore the two-step model for goodwill impairment is required in respective sample firms under US GAAP.

[19] Based on SFAS No. 142 para. 30-36, a reporting unit is an operating segment or one level below an operating segment (referred to as a component). A component of an operating segment is a reporting unit if (1) the component constitutes a business for which discrete financial information is available and (2) segment management regularly reviews the operating results of that component. The definition is applied to subsequent impairment accounting standards under US GAAP (SFAS No. 144).

carrying value of the goodwill to its implied value, which is equal to the difference between the fair value of the RU and such value excluding goodwill. The impairment loss if any is limited to the carrying amount of the goodwill.

SFAS No. 144 Accounting for the Impairment or Disposal of Long-Lived Assets replaced SFAS No. 121 in December 2001 without changing the general provisions[20]. After September 2009, all existing accounting principles were superseded by Accounting Standard Codification (ASC) as a single source of authoritative US GAAP (SFAS No. 168, FASB 2009). The two-step impairment test was retained and applied to tangible long-lived assets (ASC360-10), intangible assets other than goodwill (ASC350-30), and goodwill (ASC350-20).

IFRS

In contrast to US GAAP, IFRS employs a one-step model of impairment testing (IAS 36) for fixed assets with definite useful life, intangible assets with indefinite life, and goodwill[21]. The recoverability of all assets within the scope of IAS 36 should be assessed (at least) annually by comparing the carrying value of an asset and its recoverable amount, defined as the higher of fair value less costs to sell and its value in use (VIU). Owing to the difficulty of identifying the value of goodwill, the impairment testing for goodwill is performed based on the related cash-generating unit (CGU), which

[20] SFAS No, 144, Reasons for Issuing This Statement.

[21] IAS 36 para. 2. IAS 36 should be applied in accounting for the impairment of all assets other than: inventory (IAS 2), assets arising from construction contracts (IAS 11), deferred tax assets (IAS 12), assets arising from employee benefits, financial assets within the scope of IFRS 9 (IAS 9), investment property measured at fair value (IAS 40), biological assets related to agricultural activities (IAS 41), deferred acquisition costs and intangible assets related to insurance contracts (IFRS 4), and non-current assets (or disposal groups) classified as held for sale in accordance with IFRS 5 (IFRS 5).

is defined as the smallest identifiable group of assets generating cash inflows[22]. When the carrying amount of an asset (or a group of assets) is higher than its recoverable amount, impairment loss is recognized as the difference between the two amounts. If goodwill is greater than its carrying amount, such goodwill is first reduced and the remaining loss is prorated to related CGU's other net assets.

The VIU is the net present value (NPV) of a cash flow or other benefits that an asset is expected to generate under a specific use (IAS 36 para. 30-57). IAS 36 also provides guidance for the estimation of VIU, including the elements that should be reflected in such value, the methods of estimating future cash flows to be derived from continuing use of the asset and from its ultimate disposal, and the determination of appropriate discount rates to those cash flows (IAS 36 para. 31). In general, when estimating VIU and future cash flows of an asset, an entity should base cash flow projections on reasonable and supportable assumptions representing management's best estimate of a range of economic conditions that will exist over the remaining useful life of the asset and the greater weight should be given to external evidence (IAS 36, below para. 33). When determining related discount rates, the entity should use a pre-tax rate which reflects current market assessment of the time value of money and other external factors, such as inflation and risks specific to the asset for which the future cash flow estimates have not been adjusted (IAS 36 below para. 57).

In addition, the reversal of previous impairment losses is allowed for assets other than goodwill with the supportive external and internal source of information (IAS 36, para. 109-125). The amount of the reversal is limited based on what the carrying value of

[22] Based on IAS 36 para. 6, a cash-generating unit (CGU) is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or group of assets.

the asset would have been if it had continued to be depreciated (or amortized) as if no impairment loss had occurred.

Differences in impairment accounting under US GAAP and IFRS

The main differences in impairment accounting standards under US GAAP and IFRS are summarized in the following. First, a difference is the use of the two-step model in current US GAAP standards (ASC 350/360). When testing recoverability of long-lived assets and identifiable intangibles with definite life in step one, the sum of undiscounted future cash flows is used as the threshold. Managers do not estimate related discount rates but provide their best estimate of future cash flows based on reasonable and supportable assumptions and projections with evidence that can be verified objectively (SFAS No. 121 para. 9). When testing goodwill and intangibles with indefinite life, the carrying amount of an asset is compared with its fair value and the related selling costs are not estimated.

Therefore, under US GAAP managers' have limited flexibility and discretion in reporting asset impairments (Kvaal 2005) and an asset is not impaired until its ability to generate future cash flows or other benefits decreases.

Conversely under IFRS the one-step impairment model uses only the recoverable amount as the threshold. This requires managers to determine the fair value less cost to sell and the VIU of an asset. The estimation process becomes more complicated since managers must estimate not only an asset's selling cost and future cash flows but also related discount rate. Although this one-step test could tend to report asset write-offs sooner, potential difficulties in implementing the standard exist, such as how to determine discount rates for cash flow projections, how to estimate cost to sell when determining

the recoverability of intangibles, and how to verify the reasonableness of related assumptions.

Second, US GAAP uses the RU when testing goodwill impairment while IFRS uses the CGU. RU is regularly determined by operating segments whereas CGU is determined by the smallest identifiable asset groups of assets generating cash inflows. Managers under IFRS need to determine the scope of asset groups by their professional judgment based on related principles and examples provided by IAS 36 (IAS 36 para. 68). Consequently the implications of equal levels of goodwill impairment under US GAAP and IFRS could be different.

Third, the accounting treatment of asset reversals is different between the two standards. Under US GAAP the subsequent reversal of previous impairment loss is prohibited. The FASB concluded that an impairment loss should result in a new cost basis for impaired asset and should not be adjusted subsequently other than as provided under the current accounting model for depreciation and further impairment loss (SFAS No. 121 para. 105). This approach is retained in the current standards as well (ASC 350/360) [23]. Under IFRS, IAS 36 prohibits the reversal of goodwill impairment but allows the write-up of an asset previously impaired for other long-lived assets. An entity must perform an annual review for indicators of reversal for long-lived assets with definite life and intangibles with indefinite life other than goodwill. If such indicators exist, the asset value should be reversed up to estimated recoverable amount with the ceiling of the initial carrying amount adjusted for depreciation and amortization.

Fourth, the limitations of goodwill impairment are different. Under US GAAP the impairment loss of goodwill is limited to its carrying value. Under IFRS goodwill is

[23] ASC 360-10-35-20 for tangible long-lived assets. ASC 350-30-35-14 for goodwill

impaired based on the recoverable amount of CGU. An impairment loss that is larger than the carrying amount of goodwill will be prorated to other net assets in the CGU.

In summary, the differences in impairment accounting reflect standard setters' concerns and choices among different recognition criteria. FASB considers alternative criteria of recognizing impairment losses, including the economic value (fair value) criterion, the permanence criterion, and the probability criterion. The economic value criterion requires that an asset's fair value is continuously reflected through impairment loss. The permanence criterion avoids asset write-offs until the impairment condition is permanent. The probability criterion calls for loss recognition when it is probable that an asset's value cannot be fully recovered. (SFAS No. 144 B15). However, the FASB rejected these alternative criteria by requiring the two-step model of recoverability tests with undiscounted cash flows and prohibiting impairment reversals. As noted in SFAS 121, the FASB's focus is based on "practical standpoint" making the recognition of impairment loss operational even when uncertain exist (SFAS No. 121 para. 67). By design, the US GAAP standard reports the impairment when there is less uncertainty about the asset's loss of economic value. However, the reporting of the impairment can lag the actual decline in value relative to IFRS

Conversely, the use of one-step impairment model with discounted future cash flows and the emphasis of an asset's economic benefit or performance under IAS 36 imply that IASB's viewpoint in impairment accounting is closer to the economic value criterion. When applying the sum of future cash flows as the threshold for triggering asset impairment, the undiscounted amount (used by US GAAP) is usually higher than the discounted amount (used by IFRS). Hence, for an asset, other than goodwill, with the

same future cash flows the probability of recognizing asset impairment will be higher under IFRS than under US GAAP. This distinction leads to a common view that US GAAP either does not report or delays reporting impairment losses (Brice 2009, PwC 2009, p.2). The counter-view is that IFRS may over-report and overstate impairment losses when using fair value in a one-step test.

CHAPTER 3

LITERATURE REVIEW

3.1 Impairment Accounting Research

Much of the research on impairments examines U.S. firms. These studies show that asset write-offs are associated with different firm characteristics and economic consequences, such as changes in management (Moore 1973, Strong and Meyer 1987, Francis et al. 1996), lower earnings (Elliott and Shaw 1988), higher probability of increased frequency and magnitude of future write-offs, lower earnings response coefficients (Elliott and Hanna 1996), greater unexpected accruals (Rees et al.1996), and lower abnormal returns in the following two years (Bartov 1998).

Research also investigates management reporting incentives related to asset write-offs and the effects of adopting new impairment accounting standards. Zucca and Campbell (1992) focus on "big bath" and "income smoothing" and conclude that 58% are big bathers and 25% are income smoothers in their sample of write-off firms. Riedl's (2004) study of SFAS No. 121's examines the associations between asset impairments, reporting incentives and other economic factors showing weaker effects of economic factors on long-lived asset write-offs. Sloan and Li (2009) find that SFAS No. 142's use of impairment tests instead of the systematic amortization of goodwill allowed management to delay the assessment of goodwill impairments leading to temporary

inflation of earnings and stock prices. Ramanna and Watts (2012) investigate managers' implementation of SFAS No. 142 with a sample of firms with indications of goodwill impairment and conclude that goodwill non-impairment in the sample is not associated with managers' private information on future cash flows.

Most non-U.S. studies on asset impairments use data from a single country. Loh and Tan (2002) use sample firms from Singapore to investigate the determinants for write-off decisions. Their study documents significant macroeconomic factors (e.g., unemployment rate, GDP growth rate, occupancy rate of properties) and firm-specific factors (e.g., return on assets, new chairman). Vanza et al. (2011) address the effects of accounting information on market uncertainty following prior research (Bens and Johnston 2009, Rogers et al. 2009) and study reporting incentives of write-offs under IAS 36 in Australian firms between 2007 and 2009. They find that impairments, which are done based on managers' expectation of future performance, reveal the private information to reduce uncertainty about firm value in the period prior to the 2008 global financial crisis. Ullah et al. (2010) investigate IAS 36's asset impairment policy effect on UK firm analysts' choices of valuation models. They find significant preference for the discounted cash flow method after IAS 36 was applied. Szczesny and Valentincic (2013) address asset write-offs in private firms in Germany during the period of IFRS adoption (between 2003 and 2006). They find the German private firms impair more assets' amount when they are more profitable, have more financial debt, and pay dividends.

Some studies address the impairment accounting in multiple countries. Kvaal (2005) compare the reporting quality and the tax effects of impairment accounting in the U.K and Norway before IFRS period. Amiraslani et al. (2013) examine the compliance of

impairment accounting under IFRS across European countries. They find considerable variation in compliance with certain disclosure requirements of asset impairment, suggesting uneven application of IFRS.

3.2 Predictability

The primary objective of general purpose financial reporting is to provide useful financial information about the reporting entity so that existing and potential investors, lenders, and other creditors can make decisions about providing resources to the entity (FASB 2010, IASB 2010a). Such information, including the classification scheme and amounts, is designed to reflect the underlying economics (Fairfield et al.1996) and the change in economic resources and claims of a reporting entity. It is important for decision makers to properly assess the prospects for future cash flow and predict the entity's future returns on its resources (FASB 2010)[24]. Research can provide insight into this objective by investigating the predictive content of various reporting accounts. Since earnings is the summary amount in financial reporting, prior studies use different approaches, decomposing earnings into cash flows, accruals, and other components to examine their predictive abilities for measures of future performance. They find mixed results with various sample sizes and time horizons. Greenberg et al. (1986) document higher predictability with aggregate earnings than with cash flows. Finger (1994) and Burgstahler et al. (1999) find contradictory results but their studies have shorter prediction horizons and larger samples respectively.

[24] OB15-16 and BC1.27, Statement of Financial Accounting Concepts No.8.

To explore these inconsistencies, studies address earnings predictability by further disaggregating earnings into categories such as: operating cash flows (Wilson 1986), unusual components (Strong and Walker 1993), non-recurring items (Givoly and Hay 1992), different intervals (Lorek and Willinger 1996), and longer predictive horizons. Barth et al. (2001) investigate the association between various accruals and future cash flows and find greater predictability with major disaggregated accruals. They also document that depreciation and amortization expenses are informative about a firm's investments and positively related to future cash flows. Dechow et al. (1998) test the predictability of earnings and cash flows with different time horizons and operating cash cycles. They conclude that current earnings are better than current cash flows in forecasting future cash flows and this forecasting superiority increases with the operating cash cycle.

Asset impairments can be considered as a special or non-recurring item[25]. While the special items and non-recurring items must be reported separately in income statements, they are often viewed as transitory, having zero persistence and lacking the ability to predict future performance and firm value. Prior literature investigates the roles and effects of the aggregate amounts of special items. For instance, Jones and Smith (2011) document that gains and losses from special items exhibit zero persistence under US GAAP. Burgstahler et al. (2002) use quarterly data to examine the whether the special items are associated with future earnings and whether the effects last over time. They find

[25] Under US GAAP special items are defined as items that are unusual or infrequent but not both, such as gains or losses from asset disposals or restructuring charges. Non-recurring items include extraordinary items and discontinued operations. Extraordinary items are items that fulfill both aforementioned conditions (ASC 225-20), such as the loss from earthquake or drastic adverse legislation. However, such extraordinary items are prohibited under IFRS (IAS 1 para. 87). IAS 1 para. 98 regarding exceptional items indicates write-down of property, plant, and equipment to recoverable amount as well as reversals of such write-downs, if material, must be disclosed separately.

the persistence of special items' effects decay rapidly toward zero in the first three quarters. For this reason researchers and analysts often suggest that investors put zero weight on special items when making prediction models for firms' future performance. However, Fairfield et al. (1996) use a one-year ahead model to examine the predictive content of various income statement components including special items and non-recurring items, such as extraordinary items and discontinued operations, and have different conclusions. They find that while special items do not reflect normal business operations, they are significantly associated with future bottom-line return on earnings whereas there is no significant relationship between non-recurring items and future performance measures. In addition, forecast accuracy improves when the prediction model incorporates special items. In summary, their findings suggest that special items are informative about firm future performance.

3.3 Value Relevance and Persistence

The underlying theories of the value-relevance of accounting information are attributed to two streams, "direct valuation theory" and "inputs-to-equity-valuation theory" (Holthausen and Watts 2001). In the "direct valuation theory" the accounting earnings and related components are associated with the change or level of market value. Researchers are interested in the direct association between stock price and alternative accounting earnings or the book value of equity measures. Accounting summary measures, such as different levels of earnings or equity values, are often used. In the "input-to-equity valuation theory", accounting information is used by investors as inputs to valuation models in order to determine a firm's equity. Studies based on this model

investigate whether an accounting number is employed by investors in their valuation model. Although the associations between accounting numbers and a firm's market value, if any, may imply the informativeness of a specific account, the firm's underlying economics are not always reflected and investors' understanding and valuation process are not directly observed. Prior literature addresses the value relevance of accounting components from different perspectives, including whether or how these components are associated with stock prices or market returns and the characteristics of such components, including persistence and predictability.

Market Valuation and Returns

Typical accounting studies in value relevance focus on the association between alternative accounting summary measures and proxies of firm value, including stock price and returns. Bernard and Stober (1989) compare stock price behavior to the release of cash flow and accrual information and find no systematical difference. Bernard and Thomas (1990) find that stock prices do not fully reflect the implications of current earnings for future earnings. Ohlson (1995) develops a model to explain firm value as a function of the book value of equity and earnings. Sloan (1996) shows that the information content of cash flows and accruals is systematically different, but stock prices do not reflect this information fully until these items affect future earnings.

Prior research also examines the value relevance of specific accounts by associating specific accrual components with market valuation. Aboody and Lev (1998) and Zhao (2002) address the value relevance of research and development (R&D) expenditures in the US and international settings. They employ models based on Ohlson (1995) and find that R&D capitalization is significantly associated with stock price and

future earnings. The reporting of total R&D costs and subsequent allocation also improve the relations between stock price and accounting information, including earnings and the book value of equity. Jennings et al. (2001a) address the value relevance of goodwill amortization by comparing pre- and post- adjusted earnings. The results show that earnings before goodwill amortization provide more explanatory power than those after goodwill amortization to stock price and suggest that it is difficult for investors to evaluate the effects of goodwill amortization on firm value similar to findings in prior studies (Duvall et al. 1992, Hopkins et al. 2000). Moehrle et al. (2001) focus on the same topic and do not find significant differences between earnings before and after amortization and their associations with stock returns between 1988 and 1998. Henning and Stock (1997) address the value relevance of goodwill write-offs. They find that goodwill write-offs related to intangible assets valued by the market are associated with both advance and contemporaneous stock price decreases while write-offs of tax-related goodwill are associated with stock price increases. Barth et al. (1992) investigate the relationship between pension-related accounts and firms' market value of equity. They find general difference between pension cost components' coefficients and that pension coefficients are generally larger than non-pension coefficients, suggesting market participants implicitly assign different weight to pension-related information when determining stock prices.

The value relevance literature associates specific accounting items with stock returns over long and short windows. Barth (1994) compares the value relevance of investment securities with different measures by examining the association between related items and annual return. The study finds that fair value estimates of investment securities

provide significant explanatory power beyond that provided by historical costs. Dhaliwal et al. (1999) compare the relationship between alternative summary accounting measures with returns and market value. They find no significant difference between comprehensive income and net income, suggesting the similar usefulness and value relevance of these items. Lev and Sougiannis (1996) examine the capitalization and amortization of R&D investment and document significant inter-temporal association between firms' estimated R&D asset and subsequent returns. This suggests either a systematic mispricing of firms with high R&D intensity or a compensation for extra-market risk factor in terms of R&D investment. Incremental information content studies address whether a particular accounting number adds to the information set available to investors and typically uses event studies to determine if the release of an accounting number is related to value change over a short window (Holthausen and Watts 2001). For instance, Amir et al. (1993) examine the relationship between the release of 20-F reconciliation of foreign and US GAAP earnings numbers and abnormal returns by five-day windows around announcement. They find the aggregate reconciliations of both shareholders' equity and earnings are value-relevant, suggesting that measures under US GAAP provide more information for market valuation than those under non-US GAAP systems.

Prior research also addresses the value relevance of special items, such as asset write-downs, gain or loss from the disposal of assets, restructuring charges, merger costs, or other accrued items (Elliott and Hanna 1996, Bradshaw and Sloan 2002, Cready et al. 2010, etc.). The studies find that although the market responds to these special items, it does not fully understand the implications of special items for future earnings

(Burgstahler et al. 2002) and its reaction magnitude is usually smaller than that of earnings components before special items (Jones and Smith 2011). Elliot and Shaw (1988) report significantly negative one- and two-day stock returns with the announcement of large write-offs and restructurings, such as write-downs of receivables or inventories and nonrecurring profit or loss on the sale of assets. Francis et al. (1996) find that contemporaneous market reactions to special items depend on the items' nature and on the market perception of future performance. For instance, inventory write-offs are associated with negative reactions, restructuring charges with positive reactions. In their study, on average for every 1% of total assets written off, market-adjusted security prices decline by 0.08%.

Persistence

Previous studies also address the issues of value relevance from the perspective of earnings persistence. Persistence is a value-relevance characteristic of earnings that was made explicit in the Ohlson (1995) valuation model (Barth and Hutton 2004). Information implying the persistence of earnings may assist investors in assessing firm value (Hanlon 2005). Lipe (1986) states that persistence of earnings components are different from one another and associated with different market responses. Dechow and Ge (2006) examine investor perceptions of earnings components, including cash flows, pre-special item operating accrual, and special items by Mishkin (1983) tests. They find that investors underweigh the cash flow component, overweight the accrual component, and overweigh special items. Their explanation is that while investors recognize that special items are less persistent than other accrual components, they overweigh their persistence.

CHAPTER 4

LONG-LIVED ASSET IMPAIRMENTS AND FUTURE PERFORMANCE UNDER US GAAP AND IFRS

In this chapter (chapter 4) I compare the predictive ability of the long-lived asset impairments under US GAAP and IFRS for firm future performance. The objective is to understand which of the two impairment accounting standards may provide more relevant information for financial reporting users. I use two types of firm performance measures, including future cash flows and earnings at different levels. I examine the associations between these measures and asset write-offs, including aggregate long-lived asset write-offs and the write-offs of tangible assets, intangible assets with definite life, and goodwill. In section 4.1 and 4.2 I develop four main hypotheses and six research models accordingly. From section 4.3 through 4.5 I report the sample selection, descriptive statistics, and main empirical analyses respectively. In section 4.6 and 4.7 I made additional tests and provide the main conclusions.

4.1 Hypotheses Development

Impairment is the condition that exists when the carrying amount of a long-lived asset or asset group exceeds its fair value.[26]. It implies an asset's ability to generate future benefits is lower than originally expected. Given accounting standards are designed and applied to measure and report this condition timely, we should observe the associations

[26] ASC 360-10-20. IAS 36 is with similar idea but employs the concept of 'recoverable amount' instead of fair value.

between reported asset write-offs and certain summary performance measures in the future, such as future earnings and future cash flows. These associations therefore can reflect the informativeness of specific accounting items, namely asset impairments.

Impairment accounting involves two specific issues: 1.) indicators (occurrence) of asset impairments, and 2.) the measure of impairment losses. An entity assesses whether the indicators that assets may be impaired exist by considering both external factors (such as market interest rates, economic environment, technological breakthrough, or market capitalization) and internal factors (such as the evidence of obsolescence, restructuring activities in the entity, etc.).[27] If there are such indicators, asset impairments should be further assessed and any loss measured and reported, if required.

Both US GAAP and IFRS require a long-lived asset or asset group be tested for recoverability whenever an impairment indicator presents (ASC-360-10-35-21 under US GAAP, IAS 36 IN5 under IFRS), but the recognition and measurement of impairment losses are different based on the model of impairment testing employed under respective standards.

Under US GAAP, the two-step model of impairment testing limits the recognition of impairment losses by defining the recoverability of a long-lived asset (group). The asset's carrying amount is not recoverable if it exceeds the sum of undiscounted cash flows expected to result from the use and eventual disposition of such asset (ASC360-10-35-17). In this setting an asset whose carrying value is higher than its recoverable cost but lower than its fair value may not be written down until the loss of its economic value becomes more significant. The reporting of asset impairments under US GAAP may be lagged and

[27] Ernst and Young (2008). Under US GAAP ASC 360-35-21 lists a series of examples implying the carrying amount of an asset is not recoverable. Under IFRS IAS 36 para. 12-14 describe the indications that an impairment loss may have occurred.

become more transitory. Specifically, if an asset's economic value does not fall drastically in a short time, the impairment loss can be deferred and the related decline of the asset's future benefit or the firm's future performance will not be reflected. When the decrease of such economic value is big enough to trigger impairment loss later, the implication of such reporting is the lower firm performance in the past rather than in the future. However, FASB still believed the two-step model of impairment testing with the use of 'undiscounted cash flows' criteria is an acceptable approach for identifying when to recognize asset impairment as the approach must be operational even in an area of significant uncertainty (SFAS No. 121 para. 66-67, SFAS No. 144 para. B15)[28]. For goodwill, a two-step test is also applied under US GAAP. The first step of the goodwill impairment model does not focus on goodwill but rather compares the fair value of the reporting unit as a whole to its carrying value. The second step focuses on the value of goodwill.

Under IFRS, although the one-step model of impairment testing also employs a specific threshold, the discounted future cash flows, to determine an asset's recoverable amount and the recognition of impairment loss, management is required to make professional judgments with supportable assumptions (IAS 36, IN7) to estimate discount rate. In this setting managers can examine an asset's recoverability based on their best estimation. Impairment losses may therefore be reported timelier comparing with those under US GAAP and more predictive of firm future performance. However, more application of professional judgment also means managers have more discretion on the reporting of asset impairments. If managers misstate impairment losses through

[28] This method is still used under current US GAAP (ASC350/360).

inadequate judgment, asset write-offs may not be indicative of the declining of firm assets' future performance.

In order to assess the informativeness of asset impairments under each standard, in my first hypothesis I investigate the associations between impairments and future performance under US GAAP and IFRS respectively. I examine the aggregate impairments of long-lived assets because all long-lived assets are eligible for impairment testing and firms often take impairments in different asset categories for the same underlying economic reasons such as a decline in market demand or a technological breakthrough. The first hypothesis is:

H1.1(a): Long-lived asset impairments are predictive of future performance under US GAAP.

(b): Long-lived asset impairments are predictive of future performance under IFRS.

Next I compare the informativeness of asset impairments under US GAAP and IFRS. Prior studies address accounting system comparability and define accounting amounts as being comparable if an economic outcome estimated through the mapping from accounting amounts to that economic outcome of one system is the same as the estimated economic outcome through the mapping of the other system (De Franco et al. 2011, Barth et al. 2012). Applying this definition to impairment accounting, the reported impairment losses would be comparable under different accounting systems if such amounts are equally predictive of future economic outcomes.

I hypothesize that asset write-offs have higher ability to predict firm future performance under IFRS than US GAAP for the following reasons. First, the two-step impairment model under US GAAP leads to a common view of delayed reporting of asset

impairments (Brice 2009). The relevance of such information therefore may become lower. Second, IFRS adopts fair value concept for asset impairment and allows impairment reversals. Both are supposed to provide more timely information.

Under US GAAP and IFRS, the impairment testing (mapping) process is based on different models. The distinctions include the application of conceptual frameworks, approaches for impairment testing, and guidance or interpretations for related issues, such as asset reversals, and reflect the different concerns of respective standard setters. Compared with IAS 36, ASC 350/360 uses recoverable cost (undiscounted future cash flows and without interest charges) instead of a recoverable amount (higher of fair value and value in use) as the threshold for impairment testing, employs the two-step model to measure the impairment, and prohibits reversals. Additionally, the goodwill impairment test under US GAAP can delay reporting a goodwill impairment if the value of the reporting unit as a whole is greater than its carrying value. Therefore when applying the two standards to the same event, the amounts of reported write-offs could differ.

In summary, although FASB stated that the potential usefulness of the adopted two-step model was sufficient to overcome the concerns of lag reporting in impairment loss (SFAS No. 121 para. 68), the distinctions in impairment accounting between US GAAP and IFRS still raise the question of whether the reported write-offs under the two accounting systems are comparable and have similar predictive ability for future performance. Finding no difference suggests the two standards are either equally effective in measuring the decline in economic value of an asset or both irrelevant to such event even though alternative approaches are used. Finding a difference could suggest

that despite both being designed to capture the decline of asset value, the informativeness under one standard is better than another. The hypothesis H1.2 is below:

H1.2: The predictive ability of long-lived asset impairments for future performance is higher under IFRS than under US GAAP.

Most prior studies address the occurrence or magnitude of reported write-offs at the aggregate level (Riedl 2004) or focus on impairments of specific asset type, such intangibles (Kohlbeck et al. 2009) or goodwill (Hayn and Hughes 2006, Jennings et al. 2001a, 2001b). However, ASC 350/360 (former SFAS No. 142/144) and IAS 36 separate long-lived assets into three categories and require impairment testing for all of them. When managers have discretion to determine asset impairment at different stages, such as delimiting the composition of reporting units (RU) or cash generating unit (CGU) for impairment testing or evaluating asset recoverability, their reporting incentive and ability may vary with asset components and directly affect the information content of each write-off item. Although long-lived asset components have different properties, both a firm's operation and value are based on all of these components. The impairments of different asset components often occur at the same time, especially in an economic downturn. I therefore follow prior research to investigate the aggregate amounts of long-lived asset write-offs in H1.1 and H1.2 and observe the whole pattern of impairment accounting under US GAAP and IFRS. In the next hypotheses I further examine the write-offs of different long-lived asset components.

The classification of long-lived assets in ASC 350/360 and IAS36 is different. ASC 360 addresses topics in property, plant, and equipment, including the impairment for long-lived tangible assets (ASC 360-10). ASC 350 incorporates impairment testing for

intangible assets with definite life and indefinite life (ASC 350-30) and goodwill (ASC 350-20). IAS 36 covers impairment accounting for both tangible and intangible long-lived assets and specifically addresses intangible asset with an indefinite life (IAS 36, para. 24) and goodwill (IAS 36, para. 65-108).

Combining the different classification methods under US GAAP and IFRS, I follow the general categorization method in practice to identify long-lived operating asset components, including tangible assets, intangible assets with definite life, and goodwill, and examine write-offs of each group separately[29]. I test the predictive ability of write-off components and the comparability of such information between US GAAP and IFRS. The third hypothesis is:

H1.3: The predictive ability of impairments of long-lived asset components for future performance is higher under IFRS than under US GAAP, including:

(a) Tangible assets

(b) Intangible assets with definite life

(c) Goodwill

For firms' future performance I use future operating cash flows and different measures of future earnings.

Reporters' incentives to implement accounting standards depend on the interplay between market's demand of high-quality reporting and political forces in reporting jurisdiction, including the extent of government involvement in codifying and enforcing accounting standards and regulations (Ball et al. 2003). Prior literature documents

[29] In my pilot test with 1,717 observations from main index in France (CAC40), Germany (DAX30), the United Kingdom (FTSE250), and the United States (S&P100), companies infrequently report intangible long-lived assets with indefinite life, such as brand, and often combine them together with goodwill. I therefore follow this stream and do not address intangible long-lived asset with indefinite life separately.

specific determinants of reported amounts other than accounting standards. Ball (2006), Lang et al. (2006), and Bradshaw and Miller (2008) find that accounting standards, regulatory system, and litigation environment together would affect accounting amounts. Using sample countries with home GAAP, prior studies (Ball et al. 2000, Leuz 2003) document different properties of financial reporting amounts by not only accounting standards but also by incentives, enforcement, and attestation.

IFRS has been adopted by more than 120 countries and jurisdictions as of 2013[30]. Although a main objective of the IASB is to develop a set of high-quality and globally accepted accounting standards, accounting quality and comparability under the same standards, IFRS, can still vary with institutions across different countries (Barth et al. 2012). In addition, as IFRS is a set of principle-based standards, different countries may provide guidance and interpretations for their domestic IFRS adopters. Consequently, the quality and implications of reported amounts in companies across countries adopting IFRS are not identical.

Studies compare IFRS adopters internationally based on their institutional characteristics. Using a sample after the mandatory adoption of IFRS in many countries, Barth et al. (2012) predict and find better comparability between IFRS and US GAAP in countries with common law origins and high enforcement. First, this suggests that IFRS adopters in common law countries and high enforcement countries have a more similar institutional setting as the U.S. firms under US GAAP (and therefore the two are more comparable). Second, as the United States is a high enforcement country, the findings imply that US companies and IFRS adopters in common law or high enforcement

[30] Use of IFRS by jurisdiction is available on IAS Plus at http://www.iasplus.com/en/resources/ifrs-topics/use-of-ifrs.

countries are more likely to implement standards as written and reflect the effects of respective accounting standards.

Following this line of studies I investigate whether the implementation of impairment accounting standards also varies with institutions and reporting environment, including legal origins and enforcement. While US GAAP is viewed as a set of high quality standards, it is not broadly adopted or used in different countries. I therefore focus on IFRS adopters to make the fourth hypothesis:

H1.4(a): Under IFRS the predictive ability of long-lived asset impairments for future performance is higher in common law countries than in code law countries.

(b): Under IFRS the predictive ability of long-lived asset impairments for future performance is higher in high enforcement countries then in low enforcement countries.

4.2 Predictability models

4.2.1 Prediction models for future cash flows

I use one-year-ahead measures of firm performance as the dependent variable to examine the predictive ability of asset impairments and two-year-ahead performance measures to investigate the longer-term predictability of such items following prior studies[31]. In each model, I investigate the associations for sample firms using US GAAP

[31] Fairfield et al. (1996) use general accrual components to predict one year ahead of earnings. Barth et al. (2001) use one-year ahead prediction model for disaggregated earnings specification. Dechow et al. (1998) use cash flows to predict one- to three-year ahead cash flows. In my tests of prediction models for multiple years the results (untabulated) and main conclusions are strongly held for three-year ahead and some four-year ahead prediction models even if the sample size becomes smaller due to sample selection procedure. In following sections I report one- and two-year ahead results.

and IFRS separately and use the indicators *US* (*IFRS*) to identify accounting standards adopted. First, I examine future cash flows as the performance measure and develop three models modified from Barth et al. (2001) in the following:

$$OCF_{i,t+\tau} = \alpha_0 + \alpha_1 IBB_{it} + \sum_{m=2}^{n} \alpha_m IMP_{it} + \alpha_{n+1} IROA_{it} + \varepsilon_{it} \quad (1.1)$$

$$OCF_{i,t+\tau} = \alpha_0 + \alpha_1 OCF_{it} + \alpha_2 ACC_{it} + \sum_{m=3}^{n} \alpha_m IMP_{it} + \alpha_{n+1} IROA_{it} + \varepsilon_{it} \quad (1.2)$$

$$OCF_{i,t+\tau} = \alpha_0 + \alpha_1 OCF_{it} + \alpha_2 \Delta AR_{it} + \alpha_3 \Delta AP_{it} + \alpha_4 \Delta INV_{it} + \alpha_5 DEP_{it} + \sum_{m=6}^{n} \alpha_m IMP_{it} + \alpha_{n+1} OTHER_{it} + \alpha_{n+1} IROA_{it} + \varepsilon_{i,t} \quad (1.3)$$

where:

IMP= reported long-lived asset impairments (shows as a positive amount); including *IMP_TOL*, *IMP_TAN*, *IMP_INT*, and *IMP_GW* which represent respective impairments in total, tangible assets, intangible assets other than goodwill, and goodwill.

IBB= income before extraordinary items and discontinued operations (*EARN*) minus long-lived asset write-offs (*IMP_TOL*);

OCF= net cash flow from operation excluding accruals from extraordinary items and discontinued operations;

ACC= accrual components excluding long-lived asset impairments= *EARN*-*OCF*+*IMP*;

ΔAR= change in accounts receivable per the statement of cash flows;

ΔAP= change in accounts payable per the statement of cash flows;

ΔINV= change in inventory;

DEP= depreciation and amortization expense;

OTHER= net of all other accruals, calculated as *EARN*-(*OCF*+*ΔAR*-*ΔAP*+*ΔINV*-*DEP*-*IMP*);

IROA= median in firm *i*'s country-industry return on assets. Industry classification is based on two-digit SIC code

All variables in equations (1.1) through (1.3) are deflated by beginning total assets except *IROA* and the dummy variables for country and time effects

Equation (1.1) examines the incremental informativeness of accruals to earning (excluding long-lived asset write-offs). In equation (1.2) earnings are disaggregated into current cash flows (*OCF*) and aggregate accruals (*ACC)*. The disaggregation is similar to prior research (Dechow et al. 1998) and consistent with the FASB's assertion that earnings components are generally more predictive of future cash flows than current cash flows (FASB 1978). In equation (1.3) accruals related to general operations are further disaggregated. All variables except *IROA* and the indicators for fixed effects in above equations are deflated by total assets at the beginning of period to mitigate scale effect. I include *IROA*, the median of industry return on assets, as the proxy for macroeconomic factors[32].

In tests of the predictive ability of asset impairments under H1.1, I expect the coefficients on the total write-offs under both US GAAP and IFRS to be negative and significant in each model. For H1.2 I compare the coefficients of reported write-offs between US GAAP and IFRS through z-*statistics* to examine the relative informativeness of asset impairments[33]. To investigate the predictive ability of impairments from long-lived asset components regarding H1.3, the total write-offs are further disaggregated into components from tangible long-lived assets, intangible assets with definite life, and goodwill.

While the details of the impairment test of different types of assets are not totally consistent, the main objective of asset impairment is to measure and report the decline in

[32] I also include the level and change of gross domestic product (GDP) as alternative proxies for macroeconomic factors and find consistent results. However, as my subsample under US GAAP only include US firms, the combination of the variables and other indicators for fixed effects make the estimations in some models inconsistent.

[33] I also use *Chow test* (Chow and Gregory 1960) and interaction terms to combine the models for US GAAP and IFRS and test the respective coefficients through *t-statistics* as robustness check. The main results and conclusions are held.

assets' economic value and the decrease in firms' future performance. Therefore, I expect negative associations between impairments in each asset group and future cash flows. The rest of accrual items are disaggregated further from equation (1.1) through (1.3) to examine the incremental explanatory power of earnings components.

For H1.4, I use indicators *LAW* and *ENF* as respective proxies for legal origins and enforcement of sample countries to examine institutional effects within IFRS adopters. *LAW* identifies sample countries with common law origins based on prior studies (La Porta et al. 2006, Djankov et al. 2008). *ENF* identifies countries with high enforcement based on the categorization in La Porta et al. (2006), Leuz (2010) and Barth et al. (2012) [34]. La Porta et al. (2006) investigate the role of institutions on the development of stock market in 49 countries and develop the indices of regulation of securities markets from different perspectives, such as supervisor characteristics, liability standards, and public enforcement. Based on this work I classify countries with scores of public enforcement higher than the mean value (0.52) as countries with high enforcement[35]. Barth et al. (2012) find better comparability of reported amounts between US GAAP and IFRS in countries with common law origins and with high enforcement. Their findings suggest IFRS adopters with common law origins and high enforcement provide accounting information with the quality similar to those reported under US GAAP. In addition, as the United

[34] The sample consists of firms from 26 countries, including Australia, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hong Kong S.A.R., Hungary, Ireland, Italy, Jordan, Kenya, Netherlands, Norway, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Sweden, United Kingdom, United States, and Venezuela. *LAW* is equal to 1 for countries with common law legal origins, including Australia, Hong Kong S.A.R., Ireland, Kenya, Singapore, South Africa, United Kingdom, and United States. *LAW* is equal to 0 for the rest of sample countries, which are categorized as countries with code law legal origins. *ENF* identifies countries with high enforcement, including Australia, France, Hong Kong S.A.R., New Zealand, Portugal, Singapore, United Kingdom, and United States. The rest of sample countries are classified as countries with low enforcement.

[35] Public enforcement data is not available for Czech Republic and Hungary in La Porta et al. (2006). I identify ENF as 0 for these two countries. I also test the sample (untabulated) by excluding them and obtain similar results and conclusions.

States is a high enforcement country and US GAAP is a set of standards with high quality, the results imply that US companies and IFRS adopters in common law or high enforcement countries should implement accounting standards appropriately to reflect the objectives of standards setters.

Following this stream I expect IFRS adopters in common law or high enforcement countries to more appropriately implement the impairment accounting standards relative to those in code law or low enforcement countries and make their reported impairments be more informative about firm future performance. Specifically, I regress the measures of future performance on reported asset write-offs and other accounts and compare whether the coefficients on asset write-offs differ with legal origins or enforcement by *Chow tests* and *z-statistics*.

4.2.2 Prediction models for future earnings

Second, I explore the ability of reported write-offs in predicting firms' future earnings. Prior literature (Fairfield et al. 1996) documents higher predictive content of special items for net income than earnings before special items and nonrecurring items (such as extraordinary items and items in discontinued operations) under US GAAP. Special items are items that are unusual or infrequent but not both and are commonly presented separately in financial reporting. Long-lived asset impairments possess these features, but the presentation is inconsistent between US GAAP and IFRS. Under US GAAP, long-lived asset impairments are required to be presented as a separate line item within income from continuing operations before income taxes (ASC 350-20-45-2 for goodwill, ASC 350-30-45-2 for intangibles other than goodwill, and ASC 360-10-45 for tangibles). Under IFRS, the exceptional items, such as asset impairments, could be

disclosed separately in the statement of income or in the notes, if material (IAS 1 para. 98)[36]. I follow the literature to use different earnings measures including income from bottom-line (*ROE*), income before special items, extraordinary items and discontinued operations (*ROEBSI*) and operating income after depreciation (*OPINC*) as dependent variables. *ROE* represents the summary measure of firm performance from financial statements. *ROEBSI* excludes special and non-recurring items which are not representative of the normal operations of the firms. *OPINC* stands for firms' performance from main operating activities. In order to exclude the relation between current and future impairment, I adjust all earnings measures with contemporaneous impairments from long-lived assets.

Based on Fairfield et al. (1996), I employ following three models based on respective earnings measures:

$$ROE_{i,t+\tau} = \beta_0 + \beta_1 GM_{it} + \beta_2 SGA_{it} + \beta_3 DA_{it} + \sum_{m=4}^{n} \beta_m IMP_{it} + \beta_{n+1} MIN_{it} + \beta_{n+2} NOPIN_{it} + \beta_{n+3} ICTX_{it} + \beta_{n+4} SPEC_{it} + \beta_{n+5} NREC_{it} + \beta_{n+6} IROA_{it} + \varepsilon_{it} \quad (1.4)$$

$$ROEBSI_{i,t+\tau} = \beta_0 + \beta_1 GM_{it} + \beta_2 SGA_{it} + \beta_3 DA_{it} + \sum_{m=4}^{n} \beta_m IMP_{it} + \beta_{n+1} MIN_{it} + \beta_{n+2} NOPIN_{it} + \beta_{n+3} ICTX_{it} + \beta_{n+6} IROA_{it} + \varepsilon_{it} \quad (1.5)$$

$$OPINC_{i,t+\tau} = \beta_0 + \beta_1 GM_{it} + \beta_2 SGA_{it} + \beta_3 DA_{it} + \sum_{m=4}^{n} \beta_m IMP_{it} + \beta_{n+1} MIN_{it} + \beta_{n+2} IROA_{it} + \varepsilon_{it} \quad (1.6)$$

[36] IFRS does not specifically use the term 'exceptional item' in the standards. The term here refers to certain items listed in IAS 1 para.98, including the write-downs of property, plant, and equipment. In addition, extraordinary items are prohibited under IFRS (IAS 1 para.87). The disclosure requirements for the material impairment losses are specified in IAS 36 para. 126-137.

where:

ROE= net income adjusted by long-lived asset impairments;
ROEBSI= income before special items, extraordinary items and discontinued operations adjusted by long-lived asset impairments;
OPINC= operating income after depreciation adjusted by long-lived asset impairments;
GM= gross margin;
SGA= selling, general and administrative expenses;
DA= depreciation and amortization;
MIN= minority interest;
NOPIN= non-operating income;
ICTX= income tax;
SPEC= special item;
NREC= non-recurring items;
IMP= reported long-lived asset impairments (shows as a positive amount); including IMPA, IMPT, IMPI, and IMPG which represent respective impairments in total, tangible assets, intangible assets other than goodwill, and goodwill;
IROA= median in firm *i*'s country-industry return on assets. Industry classification is based on two-digit SIC code

All variables except *IROA* and indicators for fixed effects in equation (1.4) through (1.6) are deflated by beginning shareholders' equity.

To test the ability of asset impairments to predict future earnings, the total write-offs in each model are identified for H1.1 and H1.2 and then decomposed based on long-lived asset types for H1.3. Prior literature (Fairfield et al. 1996) suggests that the predictive content of income statement accounts is different across alternative measures of future performance following the argument that earnings before special items, extra ordinary items, and items of discontinued operations are of great interest to investors because these items tend to be non-recurring. While the predictive ability of the tested variables, asset impairments, may also vary with different earnings measures, with similar logic discussed for equation (1.1) through (1.3) I expect negative associations between all types of reported write-offs and the three earnings measures, *ROE*, *ROEBSI*, and *OPINC*.

4.3 Sample

The sample for this chapter consists of observations from 26 countries between 2005 and 2009. I construct the initial sample for this dissertation and extract the subsample from it for this chapter.

For the initial sample, first I include all available firms in 26 countries requiring US GAAP or IFRS from 2005 through 2011 in *Compustat North America* and *Compustat Global* to obtain 110,111 observations (20,421 firms). I limit the sample to 26 countries with institutional characters available in La Porta et al. (2006) and Barth et al. (2012). Second I combine *Compustat* data with *Datastream* to retrieve the reported amounts of long-lived asset impairments and make the initial dataset of this dissertation with 39,798 observations (6,589 firms) from 2005 through 2011.

Third, as the main models employed in this chapter predict one- and two- year ahead firm performance based on asset impairments, I therefore restrict the sample period to 2005 through 2009. Fourth, I trim the data at upper and lower 0.5% for all explanatory variables under respective accounting standards to obtain the subsample for this chapter with 25,807 observations (6,315 firms) [37]. In the sample 11,857 observations (2,942 firms) are US firms under US GAAP and 13,950 observations (3,373 firms) are IFRS adopters from other 25 countries. The process of sample selection is listed in Table 1.

[37] I follow prior literature to verify statistic results with different techniques and criteria, such as trimming data at upper and lower 0.5% level (Chen et al. 2011) or winsorizing data by upper and lower 1% (DeFond et al. 2007) and 5 % (Barth et al. 2012). The statistic results, findings and main conclusions are held.

Table 1.
Sample Selection: Predictability of Long-Lived Asset Impairments

Panel A: Firms	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	20,421	11,322	9,099
Less: Missing impairment data in *Datastream*	(13,832)	(8,247)	(5,585)
Initial sample firms between 2005 and 2011	**6,589**	**3,075**	**3,514**
Less: Data in 2010 and 2011	(274)	(133)	(141)
Initial sample firms between 2005 and 2009	6,315	2,942	3,373
Less: Data trimming at upper and lower 0.5 % for each variable	(0)	(0)	(0)
Total firms from 2005 through 2009	**6,315**	**2,942**	**3,373**
Panel B: Observations	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	110,111	56,869	53,242
Less: Missing impairment data in *Datastream*	(70,313)	(39,034)	(31,279)
Initial sample observations between 2005 and 2011	**39,798**	**17,835**	**21,963**
Less: Data in 2010 and 2011	9,839	4,232	5,607
Initial sample observations between 2005 and 2009	29,959	13,603	16,356
Less: Data trimming at upper and lower 0.5 % for each variable	(4,152)	(1,746)	(2,406)
Total observations from 2005 through 2009	**25,807**	**11,857**	**13,950**

4.4 Descriptive Statistics

Table 2, Panel A, reports the sample composition by country from 2005 through 2009. In the sample the United States is the only country using US GAAP and the largest proportion, namely 46.59% of sample firms and 45.94% of observations. Firms from other 25 countries consist of sample under IFRS. Australia (11.41%), United Kingdom (8.71%), and Germany (6.00%) make up the highest proportion of observations under IFRS. Panel B of Table 2 provides the composition of ten main industries, which represents 54.28% of the observations in the sample. The industry classification is based on two-digit SIC code. Under IFRS, business service is the main industry whereas the deposit institution takes the highest proportion under US GAAP[38]. The summary reflects the difference of industry distribution across sample countries.

[38] I include financial industry in this study for following reasons. First, I focus on the impairments of long-lived operating assets and expand the sample, including observations and industry compositions as many as possible to provide generalized results. Second, the impairments of certain long-term assets, such as investments, are usually reported separately as impairment of financial assets and not included in my analyses. Third, in additional (untabulated) tests I also obtain similar results and conclusions with sample excluding financial firms.

Table 2.
Sample Composition: Predictability of Long-Lived Asset Impairments

Panel A: Country Composition

Country	FIC	Firm	% of Firm	Observations	% of Obs	Legal Origin	Enforcement
under IFRS							
Australia	AUS	786	12.45	2,944	11.41	Common	High
Austria	AUT	45	0.71	204	0.79	Code	Low
Belgium	BEL	53	0.84	237	0.92	Code	Low
Czech Republic	CZE	7	0.11	26	0.10	Code	Low
Denmark	DNK	59	0.93	261	1.01	Code	Low
Finland	FIN	71	1.12	336	1.30	Code	Low
France	FRA	261	4.13	1,162	4.50	Code	High
Germany	DEU	366	5.80	1,548	6.00	Code	Low
Hong Kong SAR	HKG	90	1.43	396	1.53	Common	High
Hungary	HUN	10	0.16	40	0.15	Code	Low
Ireland	IRL	21	0.33	90	0.35	Common	Low
Italy	ITA	135	2.14	623	2.41	Code	Low
Jordan	JOR	4	0.06	17	0.07	Code	High
Kenya	KEN	3	0.05	8	0.03	Common	High
Netherlands	NLD	61	0.97	263	1.02	Code	Low
Norway	NOR	67	1.06	273	1.06	Code	Low
Peru	PER	22	0.35	95	0.37	Code	High
Philippines	PHL	59	0.93	248	0.96	Code	High
Portugal	PRT	17	0.27	78	0.30	Code	High
Singapore	SGP	352	5.57	1,525	5.91	Common	High
Spain	ESP	53	0.84	238	0.92	Code	Low
South Africa	ZAF	129	2.04	534	2.07	Common	Low
Sweden	SWE	130	2.06	553	2.14	Code	Low
United Kingdom	GBR	570	9.03	2,247	8.71	Common	High
Venezuela	VEN	2	0.03	4	0.02	Code	High
		3,373	53.41	13,950	54.06		
under US GAAP							
United States	USA	2,942	46.59	11,857	45.94	Common	High
Totals		6,315	100.00	25,807	100.00		

Table 2.
(continued)

Panel B: Industry Composition

		Pool	US			
Industry	SIC	% of Obs	Firm	% of Firm	Obs	% of Obs
Business Service	73	11.73	319	10.84	1,159	9.77
Electronic Equipment	36	7.09	247	8.40	1,028	8.67
Chemicals	28	6.16	228	7.75	883	7.45
Mining	35	5.10	150	5.10	622	5.25
Instruments	38	4.77	192	6.53	786	6.63
Mining	10	4.68	21	0.71	62	0.52
Depository Institution	60	4.54	260	8.84	1,171	9.88
Food	20	3.60	54	1.84	245	2.07
Oil and Gas Extraction	13	3.31	126	4.28	467	3.94
Electric, Gas & Sanitary	49	3.28	90	3.06	404	3.41
Others	-	45.72	1255	42.66	5,030	42.42
Total		100.00	2,942	100.00	11,857	100.00

		IFRS			
Industry	SIC	Firm	% of Firm	Obs	% of Obs
Business Service	73	470	13.93	1,869	13.40
Electronic Equipment	36	186	5.51	803	5.76
Chemicals	28	176	5.22	707	5.07
Mining	35	165	4.89	695	4.98
Instruments	38	105	3.11	444	3.18
Mining	10	304	9.01	1147	8.22
Depository Institution	60	-	-	-	-
Food	20	153	4.54	684	4.90
Oil and Gas Extraction	13	100	2.96	388	2.78
Electric, Gas & Sanitary	49	98	2.91	443	3.18
Others	-	1616	47.91	6,770	48.53
Total		3,373	100.00	13,950	100.00

Table 3 exhibits the frequency and magnitude analyses of impairments from aggregate level and components of long-lived assets by sample years and stock returns. In Panel A of Table 3, under US GAAP both the frequency and write-off amounts increase significantly after the year of financial crisis (2008), especially in the impairments of

tangible long-lived assets and goodwill. Under IFRS, the impairment frequency and magnitude also increase after 2008, but the change is relatively small compared with those under US GAAP. Table 3, Panel B, presents the analyses based on annual stock returns starting from six months before fiscal year. The observations are limited by available stock return data in *Compustat North America* and *Compustat Global* and therefore less than those in Panel A of Table 3. Under US GAAP, the frequency and magnitude of impairment losses are increasing with the decreasing firm performance in capital market. Under IFRS, the reporting of asset impairments increase when stock returns are extremely high (above 50%) and low. The impairments from tangible long-lived assets are more frequent and higher than those from other components under both standards. Table 4 presents the descriptive statistics for all explanatory variables, including mean, median, and standard deviation under respective standard regime. Variables in Panel A are used in models predicting future cash flows. All variables (except *AT*) are deflated by total assets at the beginning of the year. Variables in Panel B are used to forecast future earnings. All are deflated by beginning owners' equity (except *SEQ* itself). While IFRS firms have lower cash flows and operating earnings on average, the differences with respect to long-lived assets including depreciation and amortization (*DA*) and the aggregate impairment (*IMP_TOL* and *IMPA*) between US GAAP and IFRS are insignificant.

Table 3.
Frequency and Magnitude of Long-lived Asset Impairments

Panel A: Classification by Sample Years

US GAAP									
		IMP_TOL		*IMP_TAN*		*IMP_INT*		*IMP_GW*	
Year	N	#	Mean	#	Mean	#	Mean	#	Mean
2005	2,699	634	0.004	431	0.001	153	0.000	133	0.001
2006	2,569	642	0.004	416	0.001	148	0.000	153	0.001
2007	2,386	601	0.005	373	0.001	161	0.000	150	0.001
2008	2,154	891	0.013	473	0.002	211	0.000	427	0.004
2009	2,049	812	0.010	456	0.002	191	0.000	331	0.003
Total	11,857	3,580	0.007	2,149	0.001	864	0.000	1,194	0.002

IFRS									
		IMP_TOL		*IMP_TAN*		*IMP_INT*		*IMP_GW*	
Year	N	#	Mean	#	Mean	#	Mean	#	Mean
2005	3,033	1173	0.007	852	0.003	213	0.000	397	0.001
2006	2,896	1119	0.006	779	0.003	271	0.000	387	0.001
2007	2,792	1044	0.006	745	0.002	284	0.000	320	0.001
2008	2,652	1133	0.008	797	0.003	335	0.000	397	0.001
2009	2,577	1249	0.010	898	0.004	377	0.000	424	0.001
Total	13,950	5,718	0.008	4,071	0.003	1,480	0.000	1,925	0.001

All variables are defined in APPENDIX A.

(continued.)

Table 3.
(continued)

Panel B: Classification by Stock Returns[39]

US GAAP

Raw Return	N	*IMP_TOL*		*IMP_TAN*		*IMP_INT*		*IMP_GW*	
		#	Mean (%)	#	Mean (%)	#	Mean (%)	#	Mean (%)
above 50%	1,145	316	0.662	207	0.149	81	0.029	69	0.158
40%~50%	271	81	0.596	49	0.122	22	0.033	17	0.158
30~-40%	383	128	0.566	88	0.161	28	0.030	24	0.161
20%~30%	554	184	0.632	120	0.128	47	0.027	44	0.213
10%~20%	724	237	0.747	146	0.168	58	0.026	72	0.266
0%~10%	872	287	0.749	169	0.135	88	0.037	85	0.248
-10%~0%	900	313	0.895	190	0.167	86	0.037	98	0.282
-20%~-10%	807	304	1.099	167	0.162	82	0.044	121	0.423
-30%~-20%	655	313	1.722	161	0.217	82	0.058	129	0.669
-40%~-30%	603	311	2.001	145	0.201	91	0.073	144	0.772
-50%~-40%	499	264	2.304	128	0.285	68	0.060	126	0.849
below -50%	1,047	585	2.561	292	0.326	165	0.080	288	0.910
Total	8,460	3,323	1.246	1,862	0.189	898	0.046	1,217	0.436

IFRS

Raw Return	N	*IMP_TOL*		*IMP_TAN*		*IMP_INT*		*IMP_GW*	
		#	Mean (%)	#	Mean (%)	#	Mean (%)	#	Mean (%)
above 50%	2,607	1,136	1.370	828	0.596	239	0.039	322	0.088
40%~50%	524	249	0.893	172	0.383	56	0.033	92	0.115
30~-40%	668	303	0.882	223	0.403	74	0.037	99	0.087
20%~30%	832	422	0.870	310	0.355	110	0.041	144	0.109
10%~20%	983	490	1.063	343	0.409	139	0.052	162	0.126
0%~10%	1,035	491	0.969	356	0.383	125	0.037	170	0.121
-10%~0%	1,053	552	1.175	389	0.475	166	0.058	190	0.143
-20%~-10%	1,000	530	1.318	367	0.477	151	0.059	199	0.161
-30%~-20%	843	382	1.314	260	0.448	112	0.055	158	0.169
-40%~-30%	738	403	1.795	276	0.549	112	0.074	148	0.205
-50%~-40%	667	354	1.726	228	0.477	133	0.091	138	0.226
below -50%	1,308	746	2.253	517	0.677	258	0.091	269	0.240
Total	12,258	6,058	1.345	4,269	0.496	1,675	0.054	2,091	0.143

All variables are defined in APPENDIX A.

[39] The raw returns are annual stock returns starting from six months before fiscal year end. The observation numbers are limited by data availability in stock returns in *Compustat North America* and *Compustat Global*. Means of impairment losses from long-lived asset components are presented in percentage.

Table 4.
Descriptive Statistics: Predictability of Asset Impairments

	US GAAP				IFRS			
Variables	N	Mean	Median	SD	N	Mean	Median	SD
Panel A: Variables for predicting future cash flows								
IBB	11,857	-0.01	0.03	0.24	13,950	0.02	0.04	0.17
OCF	11,857	0.06	0.07	0.10	13,950	0.05	0.07	0.10
ACC	11,857	-0.06	-0.04	0.17	13,950	-0.03	-0.03	0.12
ΔAR	11,857	-0.01	0.00	0.03	13,950	-0.01	0.00	0.04
ΔAP	11,857	0.01	0.00	0.04	13,950	0.01	0.00	0.04
ΔINV	11,857	0.00	0.00	0.02	13,950	0.00	0.00	0.02
DEP	11,857	0.04	0.03	0.03	13,950	0.04	0.03	0.03
IMP_TOL	11,857	0.01	0.00	0.02	13,950	0.01	0.00	0.02
IMP_TAN	11,857	0.00	0.00	0.00	13,950	0.00	0.00	0.01
IMP_INT	11,857	0.00	0.00	0.00	13,950	0.00	0.00	0.00
IMP_GW	11,857	0.00	0.00	0.01	13,950	0.00	0.00	0.00
OTHER	11,857	0.00	0.00	0.19	13,950	0.03	0.02	0.17
IROA	11,857	0.02	0.02	0.03	13,950	0.01	0.03	0.15
AT	11,857	2.42	0.53	4.59	13,950	2.54	0.18	21.08
Panel B: Variables for predicting future earnings								
ROE	11,857	0.04	0.09	0.58	13,853	0.05	0.09	0.39
ROEBSI	11,857	0.03	0.09	0.58	13,943	0.05	0.09	0.39
OPINC	11,857	0.14	0.17	0.56	13,924	0.13	0.14	0.40
GM	11,857	0.71	0.59	0.55	13,842	0.88	0.67	0.78
SGA	10,604	0.56	0.41	0.47	13,842	0.49	0.31	0.51
DA	11,857	0.08	0.06	0.07	13,943	0.09	0.07	0.08
IMPA	11,857	0.02	0.00	0.04	13,943	0.02	0.00	0.04
IMPT	11,857	0.00	0.00	0.01	13,943	0.01	0.00	0.02
IMPI	11,857	0.00	0.00	0.00	13,943	0.00	0.00	0.00
IMPG	11,857	0.01	0.00	0.02	13,943	0.00	0.00	0.01
MIN	11,857	0.00	0.00	0.01	13,943	0.03	0.00	0.05
NOPIN	11,855	0.00	0.01	0.04	13,943	0.01	0.01	0.08
ICTX	11,857	0.04	0.03	0.06	13,943	0.04	0.02	0.05
SPEC	11,857	-0.03	0.00	0.07	13,943	-0.01	0.00	0.05
NREC	11,857	0.00	0.00	0.00	13,943	0.00	0.00	0.00
SEQ	11,857	1.19	0.19	4.49	13,946	1.43	0.08	15.76

All variables are defined in APPENDIX A.

4.5 Empirical Results

Table 5, Panel A, reports the empirical results of one-year ahead cash flow prediction models from equation (1.1) through (1.3) under US GAAP and IFRS respectively. The predictive ability of write-offs for future performance between the two standards is compared through *z-statistic* and *Chow test* for regression coefficients[40].

In the US GAAP sample the associations between aggregate impairments (*IMP_TOL*) and one-year ahead cash flows are negatively significant in model (1.1), but in model (1.2) and (1.3) the coefficients of impairments become significantly positive and inconsistent with the prediction. In summary, the inconsistent results under US GAAP do not support H1.1(a). Conversely, under IFRS the negative associations between aggregate impairments and future operating cash flows are consistent in all models, confirming my expectation and supporting H1.1(b). The *z-statistic* results for coefficients of asset impairments present significant differences between IFRS and US GAAP across all models, indicating the impairments under the two standards are not equally informative about firms' future cash flows as economic outcomes to support H1.2. The absolute values of estimated coefficients on impairments under IFRS are stronger than those under US GAAP, suggesting the (downward) variation of future cash flows is more sensitive to the occurrence of current impairments in long-lived assets under IFRS.

The significance and signs of estimated coefficients on most control variables are consistent as expected, supporting the effective identification for the determinants of future cash flows. The R-squared values increase from 0.283 to 0.527 under US GAAP and from 0.232 to 0.442 under IFRS with further disaggregation of earnings components

[40] By combining the models under US GAAP and IFRS by indicators *US (IFRS)* and interactions terms I compare the equality of coefficients through *t-statistics* and find similar results (untabulated).

in models (1.1) to (1.3). Table 5 Panel B presents the results of same models with the two-year ahead operating cash flows as the dependent variables. The results for model (1.1) through (1.3) again demonstrate negative and significant associations between asset impairments and future cash flows under IFRS, consistent with my expectation that reported write-offs reflect the decline in economic value of an asset and firm performance and suggesting the persistent predictive ability of reported amounts. The results under US GAAP are insignificant in model (1.1) and inconsistent with my prediction in model (1.2) and (1.3). Taken together, the results of two-year ahead prediction models again do not support H1.1(a) but H1.1(b). The tests of group difference show significant difference ($p<0.01$) in aggregate impairments (*IMP_TOL*) between IFRS and US GAAP for both one- and two- year ahead prediction models suggesting different predictive content in asset impairments under US GAAP and IFRS to confirm H1.2. While R-squared values across models increase with earnings disaggregation again under both standards, they are consistently lower than the values in respective models predicting one-year ahead cash flows, confirming the predictability of accounting items decreases with time horizon. In summary, the results in Table 5 imply better and more persistent predictive ability of aggregate impairments in terms of aggregate impairments generated under IFRS than under US GAAP.

Table 5.
Regressions of Future Cash Flows on Aggregate Impairments of Long-Lived Assets

Panel A: Predict one-year ahead future cash flows by aggregate impairment

	Exp.	US GAAP			IFRS		
Variables	Sign	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
IBB_{it}	+	0.236***			0.297***		
		(61.535)			(59.410)		
ACC_{it}	+		0.089***			0.103***	
			(19.704)			(17.293)	
OCF_{it}	+		0.749***	0.738***		0.699***	0.689***
			(98.722)	(95.236)		(92.038)	(89.140)
ΔAR_{it}	+			-0.376***			-0.285***
				(-13.465)			(-12.471)
ΔAP_{it}	-			-0.455***			-0.502***
				(-20.425)			(-24.798)
ΔINV_{it}	+			-0.405***			-0.320***
				(-11.627)			(-10.477)
DEP_{it}	+			0.232***			0.326***
				(8.489)			(11.560)
IMP_TOL_{it}	-	-0.094*	0.082*	0.094**	-0.507***	-0.173***	-0.110***
		(-1.855)	(1.927)	(2.219)	(-11.256)	(-4.349)	(-2.824)
$OTHER_{it}$	?			0.065***			0.063***
				(14.508)			(10.999)
$IROA_{it}$	+	0.323***	0.103***	0.041*	0.043***	0.020***	0.017***
		(12.655)	(4.782)	(1.927)	(7.393)	(3.960)	(3.436)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		11,129	11,129	11,129	13,329	13,329	13,329
Adj R^2		0.283	0.499	0.527	0.232	0.408	0.442

Difference between US GAAP and IFRS

Variables	(1.1)	(1.2)	(1.3)
IMP_TOL_{it}	0.413***	0.255***	0.204***
	[29.23]	[16.31]	[10.57]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 5.
(continued)

Panel B: Predict two-year ahead future cash flows by aggregate impairment

	Exp.	US GAAP			IFRS		
Variables	Sign	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
IBB_{it}	+	0.202***			0.254***		
		(50.11)			(48.96)		
ACC_{it}	+		0.074***			0.089***	
			(14.85)			(13.67)	
OCF_{it}	+		0.648***	0.630***		0.598***	0.574***
			(78.86)	(74.11)		(72.19)	(67.39)
ΔAR_{it}	+			-0.208***			-0.098***
				(-6.84)			(-3.91)
ΔAP_{it}	-			-0.334***			-0.325***
				(-13.68)			(-14.55)
ΔINV_{it}	+			-0.362***			-0.397***
				(-9.66)			(-11.86)
DEP_{it}	+			0.293***			0.394***
				(9.93)			(12.64)
IMP_TOL_{it}	-	-0.017	0.114**	0.102**	-0.465***	-0.185***	-0.143***
		(-0.32)	(2.48)	(2.22)	(-9.87)	(-4.26)	(-3.32)
$OTHER_{it}$	?			0.058***			0.062***
				(11.51)			(9.93)
$IROA_{it}$	+	0.339***	0.144***	0.094***	0.040***	0.022***	0.020***
		(13.07)	(6.28)	(4.11)	(6.77)	(3.99)	(3.65)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		10,402	10,402	10,402	12,724	12,724	12,724
Adj R^2		0.226	0.407	0.427	0.179	0.309	0.335

Difference between US GAAP and IFRS			
Variables	(1.1)	(1.2)	(1.3)
IMP_TOL_{it}	0.448***	0.299***	0.245***
	[30.67]	[17.62]	[11.81]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.
All variables are defined in APPENDIX A.

In Table 6 the total impairments are disaggregated by asset categories, including the write-offs from tangible assets (*IMP_TAN*), intangible assets with definite-life (*IMP_INT*) and goodwill (*IMP_GW*). Panel A of Table 6 reports the results of one-year ahead models with impairment components following equation (1.1) through (1.3). Under IFRS the negative associations between impairments of tangible assets and future cash flows are consistent and significant across models, but most coefficients for write-offs from intangibles and goodwill are insignificant. One of the possible explanations is that the value of intangible assets, such as brand or trademark is difficult to determine for lack of public market and pricing information. The value of certain intangibles, such as patient or technology, can be affected by competitors or legal process and fluctuate dramatically. As a result, firms are more difficult to evaluate certain and precise amounts of future benefit available from these intangibles, and do not timely and adequately impair intangible assets. Another possibility is that the misclassification of intangibles or goodwill may cause noise in the models. Under US GAAP the impairments of long-lived tangible assets are positively associated with future cash flows in some models. This result may suggest the reporting of asset write-offs do not reflect the decline of assets' economic value or future cash flows as the objective of standard setters. Although goodwill impairment under US GAAP is negative in some models, such results are not consistent across different model combinations. When comparing coefficients of write-off components, the results of z-*statistics* consistently show significant differences in the impairments from tangible long-lived assets between US GAAP and IFRS to confirm hypothesis H1.3(a). However, the differences regarding other intangibles and goodwill are not significant and H1.3(b) and (c) are not supported. Similar to other regressions

presented, R-squared values under both groups increase steadily with earnings disaggregation in models but the relations between impairments and future cash flows vary with asset categories.

Panel B of Table 6 provides the results of two-year ahead models with respect to impairment components and confirms the findings with one-year ahead models. Only the write-offs from tangible long-lived assets under IFRS are persistently and negatively associated with future cash flows and significantly different from those under US GAAP. The impairments from intangible long-lived assets with definite life are positively associated with two-year ahead future cash flows under both US GAAP and IFRS and imply such impairment loss cannot reflect the value loss of corresponding assets timely. Overall, the finding suggests while assets being impaired depend on standards in place, managers' ability to estimate intangible write-offs may be similar regardless adopted accounting standards perhaps due to the difficulty in estimating fair values. The conclusions regarding H1.3 do not change with longer forecasting period and only H1.3(a) is supported consistently.

The findings in summary provide the following implications. First, even under the same accounting standards, the write-offs from different types of long-lived assets are not equally informative about future performance. Compared with tangible long-lived assets, the economic value and cash flows generated from intangibles and goodwill could be more difficult to assess and then determine respective impairments. Second, the results imply that under IFRS the write-offs of tangible assets could be a better predictor comparing with other write-off components. Third, for write-offs from tangible long-lived asset, the reported amounts under IFRS are more informative about firms' future

than those under US GAAP, implying the effects of different impairment models used in the two standards. Fourth, for intangible assets and goodwill, US GAAP and IFRS both incorporate fair value concept to determine asset impairments. The insignificant differences in coefficients suggest the information content in write-offs from intangibles and goodwill between the two standards regimes are similar. This result may be attributed to the similar fair value concept applied in both standards or the common difficulties of identifying the value of intangible assets. From the comparison between standards, the impairments from intangible assets and goodwill under US GAAP and IFRS are "equally not informative" about firms' future cash flows.

Table 7 and 8 present the results of predicting future earnings. Table 7 presents the associations between aggregate write-offs under both standards and respective future earnings using different earnings disaggregation: bottom-line income (*ROE*), income before special items, extraordinary items and discontinued operations (*ROEBSI*) and operating income after depreciation (*OPINC*). In Panel A of Table 8, the associations between reported aggregate write-offs and earnings measures are negatively significant in all models under US GAAP and IFRS to support H1.1(a) and (b). However, in Panel B of Table 7 predicting two-year ahead earnings through impairments, the results under US GAAP are either insignificant or inconsistent with the expectation. But the impairments under IFRS are consistently associated with two-year ahead adjusted earnings. Comparing the coefficients of asset write-offs (*IMPA*) between the two standards results by *Chow tests* and *z-statistics*, asset impairments under IFRS significantly differ from those under US GAAP to support H1.2.

Table 6.
Regressions of Future Cash Flows on Components of Assets Impairments

Panel A: Predict one-year ahead future cash flows by write-off components

	Exp.	US GAAP			IFRS		
Variables	Sign	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
IBB_{it}	+	0.236***			0.298***		
		(61.56)			(59.59)		
ACC_{it}	+		0.089***			0.103***	
			(19.69)			(17.29)	
OCF_{it}	+		0.749***	0.738***		0.701***	0.690***
			(98.59)	(95.44)		(92.50)	(89.61)
ΔAR_{it}	+			-0.380***			-0.290***
				(-13.61)			(-12.67)
ΔAP_{it}	-			-0.452***			-0.503***
				(-20.32)			(-24.83)
ΔINV_{it}	+			-0.409***			-0.323***
				(-11.73)			(-10.58)
DEP_{it}	+			0.232***			0.324***
				(8.43)			(11.47)
IMP_TAN_{it}	-	0.975***	0.491**	0.215	-0.973***	-0.356***	-0.258***
		(3.99)	(2.40)	(1.06)	(-9.01)	(-3.75)	(-2.78)
IMP_INT_{it}	-	1.019	0.705	0.686	1.905*	1.647*	1.366
		(0.55)	(0.46)	(0.46)	(1.95)	(1.93)	(1.64)
IMP_GW_{it}	-	-0.358***	0.188*	0.357***	-0.540	-0.116	0.250
		(-2.77)	(1.74)	(3.35)	(-1.57)	(-0.38)	(0.85)
$OTHER_{it}$	?			0.065***			0.063***
				(14.41)			(10.94)
$IROA_{it}$	+	0.323***	0.104***	0.042**	0.044***	0.021***	0.017***
		(12.65)	(4.81)	(2.00)	(7.56)	(4.02)	(3.46)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		11,129	11,129	11,129	13,329	13,329	13,329
Adj R^2		0.284	0.499	0.527	0.229	0.408	0.442

Difference between US GAAP and IFRS

Variables	(1.1)	(1.2)	(1.3)
IMP_TAN_{it}	1.948***	0.847***	0.473**
	[48.62]	[13.66]	[4.29]
IMP_INT_{it}	-0.886	-0.942	-0.680
	[-0.18]	[0.27]	[-0.14]
IMP_GW_{it}	0.182	0.304	0.107
	[0.25]	[0.87]	[0.11]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.
All variables are defined in APPENDIX A.

Table 6.
(continued)

Panel B: Predict two-year ahead future cash flows by write-off components

	Exp.	US GAAP			IFRS		
Variables	Sign	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
IBB_{it}	+	0.202***			0.256***		
		(50.18)			(49.16)		
ACC_{it}	+		0.075***			0.089***	
			(14.94)			(13.68)	
OCF_{it}	+		0.646***	0.630***		0.600***	0.575***
			(78.64)	(74.21)		(72.63)	(67.75)
ΔAR_{it}	+			-0.210***			
				(-6.93)			
ΔAP_{it}	-			-0.332***			-0.300***
				(-13.60)			(-13.97)
ΔINV_{it}	+			-0.366***			-0.398***
				(-9.75)			(-11.91)
DEP_{it}	+			0.288***			0.392***
				(9.70)			(12.55)
IMP_TAN_{it}	-	1.297***	0.781***	0.435**	-0.856***	-0.341***	-0.308***
		(5.17)	(3.55)	(1.97)	(-7.61)	(-3.30)	(-3.03)
IMP_INT_{it}	-	3.635*	3.377**	3.201**	3.090***	2.818***	2.333**
		(1.94)	(2.06)	(1.98)	(3.03)	(3.01)	(2.54)
IMP_GW_{it}	-	-0.386***	0.053	0.187	-0.539	-0.137	0.068
		(-2.89)	(0.45)	(1.61)	(-1.49)	(-0.41)	(0.21)
$OTHER_{it}$	?			0.058***			0.076***
				(11.48)			(14.24)
$IROA_{it}$	+	0.338***	0.144***	0.095***	0.041***	0.022***	0.020***
		(13.05)	(6.29)	(4.17)	(6.97)	(4.09)	(3.77)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		10,402	10,402	10,402	12,724	12,724	12,724
Adj R^2		0.229	0.407	0.427	0.177	0.309	0.334

Difference between US GAAP and IFRS

Variables	(1.1)	(1.2)	(1.3)
IMP_TAN_{it}	2.153***	1.122***	0.743***
	[54,59]	[19.13]	[7.40]
IMP_INT_{it}	0.545	0.559	0.868
	[0.06]	[0.08]	[0.16]
IMP_GW_{it}	0.153	0.190	0.119
	[0.16]	[0.29]	[0.02]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 7.
Regressions of Future Earnings on Aggregate Impairments of Long-Lived Assets

Panel A: Predict one-year ahead future earnings by aggregate impairment

	Exp.	US GAAP			IFRS		
Variables	Sign	ROE_{it+1}	$ROEBSI_{it+1}$	$OPINC_{it+1}$	ROE_{it+1}	$ROEBSI_{it+1}$	$OPINC_{it+1}$
GM_{it}	+	0.399***	0.399***	0.548***	0.117***	0.114***	0.212***
		(38.40)	(39.31)	(71.70)	(24.76)	(25.44)	(50.44)
SGA_{it}	-	-0.406***	-0.409***	-0.504***	-0.110***	-0.106***	-0.168***
		(-39.03)	(-40.22)	(-62.84)	(-18.38)	(-18.67)	(-29.87)
DA_{it}	-	-0.492***	-0.486***	-0.325***	-0.181***	-0.178***	-0.035
		(-12.04)	(-12.16)	(-9.40)	(-6.01)	(-6.23)	(-1.20)
$IMPA_{it}$	-	-0.386***	-0.433***	-0.218***	-0.660***	-0.558***	-0.562***
		(-5.54)	(-7.88)	(-4.49)	(-10.74)	(-10.01)	(-10.41)
MIN_{it}	+	-0.473**	-0.629***	0.410**	0.013	-0.002	0.298***
		(-1.97)	(-2.68)	(1.97)	(0.34)	(-0.05)	(8.42)
$NOPIN_{it}$	?	0.254***	0.234***		0.197***	0.094***	
		(3.94)	(3.72)		(5.68)	(3.84)	
$ICTX_{it}$	?	0.602***	0.591***		1.392***	1.374***	
		(11.81)	(11.95)		(31.82)	(33.00)	
$SPEC_{it}$	?	0.053			-0.276***		
		(1.15)			(-4.29)		
$NREC_{it}$	?	1.286**			5.514***		
		(2.02)			(4.42)		
$IROA_{it}$	+	-0.040	-0.032	-0.049	0.113***	0.115***	0.148***
		(-0.58)	(-0.47)	(-0.81)	(8.18)	(8.77)	(11.19)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		9,927	9,927	9,929	13,200	13,234	13,208
Adj R^2		0.266	0.273	0.388	0.214	0.220	0.235

Difference between US GAAP and IFRS			
Variables	(1.1)	(1.2)	(1.3)
$IMPA_{it}$	0.274**	0.125	0.344***
	[4.79]	[1.53]	[13.74]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 7.
(continued)

Panel B: Predict two-year ahead future earnings by aggregate impairment

	Exp.	US GAAP			IFRS		
Variables	Sign	ROE_{it+2}	$ROEBSI_{it+2}$	$OPINC_{it+2}$	ROE_{it+2}	$ROEBSI_{it+2}$	$OPINC_{it+2}$
GM_{it}	+	0.328***	0.336***	0.471***	0.094***	0.092***	0.169***
		(27.37)	(28.44)	(53.84)	(18.04)	(18.81)	(38.15)
SGA_{it}	-	-0.329***	-0.337***	-0.429***	-0.089***	-0.086***	-0.127***
		(-27.45)	(-28.48)	(-46.52)	(-13.53)	(-13.86)	(-21.51)
DA_{it}	-	-0.331***	-0.352***	-0.255***	-0.137***	-0.125***	0.042
		(-7.22)	(-7.78)	(-6.57)	(-4.12)	(-4.00)	(1.38)
$IMPA_{it}$	-	0.004	0.028	0.186***	-0.490***	-0.371***	-0.411***
		(0.05)	(0.45)	(3.37)	(-7.18)	(-6.08)	(-7.22)
MIN_{it}	+	-0.558**	-0.602**	0.250	0.064	0.037	0.297***
		(-2.09)	(-2.28)	(1.08)	(1.58)	(0.96)	(8.06)
$NOPIN_{it}$	?	0.205***	0.185***		0.045	-0.082***	
		(2.84)	(2.59)		(1.16)	(-3.08)	
$ICTX_{it}$	?	0.558***	0.535***		1.235***	1.214***	
		(9.75)	(9.53)		(25.65)	(26.75)	
$SPEC_{it}$	?	-0.041			-0.319***		
		(-0.78)			(-4.48)		
$NREC_{it}$	?	0.278			3.882***		
		(0.39)			(2.82)		
$IROA_{it}$	+	-0.382***	-0.343***	-0.317***	0.112***	0.112***	0.132***
		(-4.90)	(-4.46)	(-4.69)	(7.58)	(8.00)	(9.72)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		9,259	9,259	9,261	12,592	12,630	12,606
Adj R^2		0.160	0.167	0.267	0.141	0.147	0.169

Difference between US GAAP and IFRS			
Variables	(1.1)	(1.2)	(1.3)
$IMPA_{it}$	0.494***	0.399***	0.597***
	[12.66]	[13.05]	[38.04]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 8 reports the predictive ability of impairment components for future earnings. The write-offs from tangible long-lived assets under IFRS are persistently and negatively associated with all earnings measures (*ROE*, *ROEBSI*, and *OPINC*) and differ from those under US GAAP in all model combinations to support hypothesis of H3.3(a). For one-year ahead prediction, in some models (*ROE* and *ROEBSI*) the coefficients of write-offs from intangibles under US GAAP are negative and different from those under IFRS to support H3.3(b). For goodwill impairment the difference under US GAAP and IFRS are not significant in general. Therefore H1.3(c) is not supported. In summary, the impairments of tangible assets under IFRS and the write-offs of intangibles under US GAAP provide predictive content about firms' future earnings under IFRS, justifying the unequal informativeness of such items between US GAAP and IFRS.

Table 9 shows the comparison summaries of long-lived asset impairments based on legal origin and enforcement. Most means and variances in aggregate write-offs and impairments from long-lived asset components are significantly different across both characteristics, especially in the write-offs from tangible long-lived assets. In general, the sample countries with common law legal origin and with high enforcement recognize more impairment losses, but the variations of such reported amounts are also larger.

Table 8.
Regressions of Future Earnings on Components of Asset Impairments

Panel A: Predict one-year ahead future earnings by impairment components

	Exp.	US GAAP			IFRS		
Variables	Sign	ROE_{it+1}	$ROEBSI_{it+1}$	$OPINC_{it+1}$	ROE_{it+1}	$ROEBSI_{it+1}$	$OPINC_{it+1}$
GM_{it}	+	0.401***	0.401***	0.548***	0.118***	0.115***	0.213***
		(38.63)	(39.50)	(71.87)	(24.98)	(25.60)	(50.57)
SGA_{it}	-	-0.407***	-0.410***	-0.505***	-0.111***	-0.108***	-0.170***
		(-39.08)	(-40.31)	(-63.02)	(-18.55)	(-18.85)	(-30.17)
DA_{it}	-	-0.509***	-0.509***	-0.319***	-0.183***	-0.181***	-0.037
		(-12.27)	(-12.56)	(-9.10)	(-6.07)	(-6.30)	(-1.28)
$IMPT_{it}$	-	-0.457	-0.504*	-0.861***	-0.922***	-0.914***	-1.186***
		(-1.48)	(-1.68)	(-3.23)	(-7.01)	(-7.37)	(-9.53)
$IMPI_{it}$	-	-8.849***	-9.283***	0.584	-1.028	-0.493	1.414
		(-3.70)	(-4.02)	(0.28)	(-0.87)	(-0.44)	(1.27)
$IMPG_{it}$	-	-0.499***	-0.629***	-0.375***	-1.109***	-0.675**	0.074
		(-3.22)	(-4.83)	(-3.25)	(-3.20)	(-2.11)	(0.23)
MIN_{it}	+	-0.477**	-0.636***	0.413**	0.015	-0.002	0.300***
		(-1.98)	(-2.71)	(1.98)	(0.42)	(-0.07)	(8.46)
$NOPIN_{it}$	?	0.265***	0.245***		0.197***	0.127***	
		(4.12)	(3.90)		(5.64)	(5.20)	
$ICTX_{it}$	?	0.606***	0.603***		1.395***	1.375***	
		(11.89)	(12.21)		(31.81)	(32.97)	
$SPEC_{it}$	?	0.087*			-0.183***		
		(1.96)			(-2.83)		
$NREC_{it}$	?	1.269**			5.536***		
		(2.00)			(4.43)		
$IROA_{it}$	+	-0.043	-0.030	-0.043	0.115***	0.116***	0.150***
		(-0.62)	(-0.45)	(-0.72)	(8.32)	(8.84)	(11.30)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		9,927	9,927	9,929	13,200	13,234	13,208
Adj R^2		0.266	0.273	0.388	0.210	0.218	0.234

Difference between US GAAP and IFRS

Variables	(1.1)	(1.2)	(1.3)
$IMPT_{it}$	0.465*	0.410*	0.325*
	[3.26]	[2.98]	[3.52]
$IMPI_{it}$	-7.821***	-8.790***	-0.830
	[-6.70]	[-9.29]	[-0.06]
$IMPG_{it}$	0.610	0.046	-0.449**
	[0.76]	[0.32]	[-5.10]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 8.
(continued)

Panel B: Predict two-year ahead future earnings by impairment components

	Exp.	US GAAP			IFRS		
Variables	Sign	ROE_{it+2}	$ROEBSI_{it+2}$	$OPINC_{it+2}$	ROE_{it+2}	$ROEBSI_{it+2}$	$OPINC_{it+2}$
GM_{it}	+	0.329***	0.337***	0.471***	0.096***	0.094***	0.169***
		(27.51)	(28.51)	(53.92)	(18.37)	(19.07)	(38.31)
SGA_{it}	-	-0.329***	-0.337***	-0.430***	-0.091***	-0.088***	-0.129***
		(-27.47)	(-28.52)	(-46.65)	(-13.74)	(-14.06)	(-21.86)
DA_{it}	-	-0.338***	-0.356***	-0.240***	-0.145***	-0.135***	0.037
		(-7.26)	(-7.77)	(-6.09)	(-4.35)	(-4.28)	(1.23)
$IMPT_{it}$	-	0.319	0.167	-0.029	-0.409***	-0.369***	-0.944***
		(0.91)	(0.49)	(-0.09)	(-2.82)	(-2.72)	(-7.21)
$IMPI_{it}$	-	-2.300	-2.042	6.235***	1.165	1.371	3.668***
		(-0.86)	(-0.78)	(2.70)	(0.89)	(1.13)	(3.11)
$IMPG_{it}$	-	0.327*	0.315**	0.481***	-0.841**	-0.474	0.513
		(1.86)	(2.11)	(3.66)	(-2.20)	(-1.35)	(1.54)
MIN_{it}	+	-0.559**	-0.607**	0.242	0.063	0.032	0.294***
		(-2.10)	(-2.30)	(1.04)	(1.55)	(0.85)	(8.00)
$NOPIN_{it}$	?	0.215***	0.192***		0.043	-0.050*	
		(2.97)	(2.69)		(1.12)	(-1.86)	
$ICTX_{it}$	?	0.560***	0.543***		1.241***	1.218***	
		(9.78)	(9.69)		(25.71)	(26.79)	
$SPEC_{it}$	?	0.004			-0.215***		
		(0.09)			(-3.01)		
$NREC_{it}$	?	0.316			3.922***		
		(0.44)			(2.85)		
$IROA_{it}$	+	-0.381***	-0.338***	-0.309***	0.116***	0.114***	0.134***
		(-4.90)	(-4.40)	(-4.57)	(7.80)	(8.16)	(9.85)
Country FE		Yes	Yes	Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Obs		9,259	9,259	9,261	12,592	12,630	12,606
Adj R^2		0.161	0.167	0.268	0.138	0.145	0.169

Difference between US GAAP and IFRS

Variables	(1.1)	(1.2)	(1.3)
$IMPT_{it}$	0.728**	0.536**	0.915***
	[5.53]	[3.98]	[9.74]
$IMPI_{it}$	-3.465	-3.413	2.567
	[-1.06]	[-1.16]	[1.00]
$IMPG_{it}$	1.168*	0.789	-0.032
	[3.63]	[1.32]	[-1.10]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

Table 9.
Comparison of Long-Lived Asset Write-offs under IFRS[41]

Panel A: Comparison of aggregate asset write-offs by legal origin and enforcement

	Legal System[42]			Enforcement[43]	
	Mean	SD		Mean	SD
Common	0.010	0.021	High	0.000	0.020
Code	0.005	0.014	Low	0.000	0.014
Difference	0.005***	0.008***	Difference	0.000***	0.006***

Panel B: Write-offs of asset components between common law and code law system

Legal Systems	*IMP_TAN*		*IMP_INT*		*IMP_GW*	
	Mean	SD	Mean	SD	Mean	SD
Common	0.004	0.009	0.000	0.001	0.001	0.002
Code	0.002	0.005	0.000	0.001	0.001	0.002
Difference	0.002***	0.004***	0.000***	0.000***	0.000*	0.000

Panel C: Write-offs of asset components between high and low enforcement

Enforcement	*IMP_TAN*		*IMP_INT*		*IMP_GW*	
	Mean	SD	Mean	SD	Mean	SD
High	0.003	0.009	0.000	0.001	0.001	0.002
Low	0.002	0.006	0.000	0.001	0.001	0.002
Difference	0.001***	0.003***	0.000***	0.000***	0.000***	0.000***

*** p<0.01, ** p<0.05, * p<0.1. All variables are defined in APPENDIX A.

[41] I report aggregate impairments and impairment components deflated by total assets at the beginning of the year. The findings and results of asset write-offs deflated by beginning shareholders' equity are similar.

[42] IFRS countries with common law legal origins in the sample include Australia, Hong Kong S.A.R., Ireland, New Zealand, Singapore, South Africa, and United Kingdom. IFRS sample countries with code law origins include Belgium, Germany, Denmark, Spain, Finland, France, Greece, Italy, Netherlands, Norway, Portugal, and Sweden.

[43] IFRS countries with high enforcement in the sample include Australia, France, Hong Kong S.A.R., New Zealand, Portugal, Singapore, and United Kingdom. IFRS sample countries with low enforcement include Belgium, Germany, Denmark, Spain, Finland, Greece, Ireland, Italy, Netherlands, Norway, South Africa, and Sweden.

Table 10 reports the regression results for aggregate long-lived asset impairments under IFRS for one-year ahead cash flows and earnings with different institutional characters. Panel A of Table 10 provides the comparison of IFRS adopters between common law and code law countries. The reported write-offs in common law and code law countries are negatively associated with two-year and one-year ahead cash flows respectively. Such write-offs are consistently and negatively associated with future earnings measures in both settings. However, the coefficient differences are not significant in each model and H1.4(a) are rejected. Panel B of Table 10 reports similar comparisons between high and low enforcement. Asset impairments under IFRS with high enforcement are persistently and negatively associated with firm future performance and significantly differ from those with low enforcement in two-year ahead models to support H1.4(b). In short, the results show that under IFRS the predictive ability of impairment is lower in low enforcement than high enforcement countries. Taken together, asset impairments under IFRS in general are more informative about future performance than those under US GAAP, but such informativeness under IFRS also varies with the institutional characteristics among different IFRS countries. Enforcement takes more important roles than legal origins to determine the information content of long-lived asset impairments.

Table 10.
Regressions of Future Performance on Asset Impairments under IFRS

Panel A: Regression summary of future performance on long-lived assets impairments under IFRS by legal origins

Prediction	Variable	Common Law	Code Law	Difference
OCF_{it+1}	IMP_TOL_{it}	-0.055	-0.163**	0.108
		(-1.12)	(-2.38)	[1.37]
OCF_{it+2}	IMP_TOL_{it}	-0.150***	-0.029	-0.121
		(-2.72)	(-0.40)	[1.37]
$ROEBSI_{it+1}$	$IMPA_{it}$	-0.524***	-0.553***	0.029
		(-7.43)	(-5.86)	[0.04]
$ROEBSI_{t+2}$	$IMPA_{it}$	-0.365***	-0.277***	-0.088
		(-4.72)	(-2.69)	[0.30]

Panel B: Regression summary of future performance on long-lived assets impairments under IFRS by enforcement

Prediction	Variable	High Enforcement	Low Enforcement	Difference
OCF_{it+1}	IMP_TOL_{it}	-0.097**	-0.093	-0.004
		(-2.07)	(-1.27)	[-0.31]
OCF_{it+2}	IMP_TOL_{it}	-0.193***	0.072	-0.265***
		(-3.70)	(0.90)	[-9.72]
$ROEBSI_{it+1}$	$IMPA_{it}$	-0.542***	-0.539***	-0.003
		(-8.11)	(1.35)	[-1.26]
$ROEBSI_{t+2}$	$IMPA_{it}$	-0.415***	-0.184	-0.231**
		(-5.66)	(0.91)	[-6.18]

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in APPENDIX A.

4.6 Robustness Analyses

I further test the robustness of empirical results and main findings. Prior literature (Dechow et al. 1998) documents that operating cash cycle is an important indicator of the predictability of earnings and related components. As asset impairment is one earnings component, I expect similar trend. Given impairment accounting is designed and reported timely as a negative indicator of firm future performance, I expect the negative associations between reported asset write-offs and future earnings and cash flows will increase with the length of operating cash cycle. I estimate the operating cash cycle, δ,

following prior literature as average days in accounts receivables and inventories minus average days in account payable and retrieve operating cash cycle days by multiplying δ by 360 for δ is explained as a fraction of one year[44]. Then I make sample quartile based on δ under US GAAP and IFRS respectively. I employ model (1.3) to regress one- and two-year ahead operating cash flows on asset write-offs, cash flows, and general accrual components for each quartile. In addition, taking the significant difference between high and low enforcement in the informativeness of asset write-offs under IFRS into account, I partition IFRS sample based on the enforcement in respective IFRS countries and report the results in Table 11, Panel A[45]. I find better predictive ability of aggregate impairments of long-lived assets for IFRS firms in countries with high enforcement whereas most coefficients for IFRS firms in low enforcement countries and US GAAP reporters are insignificant with coefficient signs inconsistent with expectation. In the longest operating cash cycle (*Quartile4*) the negative associations between write-offs and future cash flows are persistently significant in IFRS firms with high enforcement, implying the informativeness of asset impairments increases with the length of operating cash cycle. However, such associations are opposite to my expectation in IFRS firms with low enforcement and disappear for US GAAP reporters.

[44] The operating cash cycle (δ) is estimated by the equation in accordance with Dechow et al. (1998). δ= target operating cash cycle $=\alpha_t+(1-\pi)\gamma_1-\beta_t(1-\pi)$, where $\alpha_t= (AR_t+AR_{t-1})/2S_t$, $\beta_t= (AP_t+AP_{t-1})/2S_t(1-\pi)$, $\pi= E_t/S_t$= contribution margin on sales, $\gamma_1==g_1/(1-\pi)$=target inventory as a fraction of forecasted cost of sales, AR_t= accounts receivables, AP_t= accounts payables, E_t= earnings per share before extraordinary items and discontinued operations, all at the end of year *t*, and *St*= sales during the year *t*. The term g1 is the estimated coefficient of S_t in the regression: $INV_t= g_1 S_t+\gamma_2 \Delta S_t+\varepsilon$. INV_t=Inventories at the end of year *t*. After the estimation, δ is described as a portion of a year and the operating cash cycle in terms of days is retrieved by multiplying δ and 360.

[45] I also identify the quartile based on δ under US GAAP, under IFRS with high enforcement, and under IFRS with low enforcement separately The results (untabulated) are consistent with my findings and conclusions.

Table 11.
Analyses of the Predictive Ability of Asset Impairments on Future Cash Flows by Operating Cash Cycles and Years

Panel A: Coefficients Summary of Aggregate Write-offs by Operating Cash Cycle[46]

Operating Cash Cycle[47]	IFRS				US GAAP	
	High Enforcement		Low Enforcement			
	CFO_{t+1}	CFO_{t+2}	CFO_{t+1}	CFO_{t+2}	CFO_{t+1}	CFO_{t+2}
Quartile1	-0.119	0.001	-0.264*	0.157	0.167*	0.085
	(-1.11)	(0.01)	(-1.68)	(0.88)	(1.71)	(0.79)
Quartile2	0.142	-0.100	-0.178	0.017	-0.079	0.014
	(1.16)	(-0.73)	(-1.07)	(0.10)	(-0.85)	(0.14)
Quartile3	-0.138	-0.358**	-0.164	0.124	0.064	0.141
	(-0.92)	(-2.10)	(-1.01)	(0.67)	(0.72)	(1.40)
Quartile4	-0.362**	-0.337**	0.501**	0.384	0.036	0.089
	(-2.26)	(-1.98)	(2.55)	(1.52)	(0.37)	(0.83)

t-statistics in parentheses.*** p<0.01, ** p<0.05, * p<0.1.
All variables are defined in APPENDIX A.

Panel B of Table 11 presents the year-by-year regressions results as additional check. For IFRS firms with high enforcement the impairments are negatively associated with future cash flows and most relations are significant. For firms adopting IFRS with low

[46] Parameter estimates are based on the model (1.3) in the following:

$$OCF_{i,t+\tau} = \alpha_0 + \alpha_1 OCF_{it} + \alpha_2 \Delta AR_{it} + \alpha_3 \Delta AP_{it} + \alpha_4 \Delta INV_{it} + \alpha_5 DEP_{it} + \sum_{m=6}^{n} \alpha_m IMP_{it} + \alpha_{n+1} OTHER_{it} + \alpha_{n+1} IROA_{it} + \varepsilon_{it}$$

where τ=1 and 2 to predict one- and two-year ahead operating cash flows.
The operating cash cycle (δ) is estimated by the equation in accordance with Dechow et al. (1998).
δ= target operating cash cycle = $\alpha_t+(1-\pi)\gamma_1-\beta_t(1-\pi)$
where:
AR_t= accounts receivables, AP_t= accounts payables, INV_t= Inventories, E_t= earnings per share before extraordinary items and discontinued operations, all at the end of year t, S_t= sales during the year t and Δ represents the annual change of corresponding variable.
$\alpha_t = (AR_t+AR_{t-1})/2S_t$;
$\beta_t = (AP_t+AP_{t-1})/2S_t(1-\pi)$;
$\pi = E_t/S_t$= contribution margin on sales;
$\gamma_1 == g_1/(1-\pi)$= target inventory as a fraction of forecasted cost of sales;
γ_2= speed with which inventory adjusts to the target level;
where g_1 is the estimated coefficient of S in the regression below:
$INV_t = g_1S_t+\gamma_2 \Delta S_t+\varepsilon$;
δ is described as a portion of a year and the operating cash cycle in terms of days is retrieved by multiplying δ and 360.

[47] *Quartile1* to *Quartile4* are the first through fourth quartiles of the firms in IFRS and US GAAP groups based on the corresponding operating cash cycle.

enforcement or US GAAP the coefficients are sporadically significant with signs opposite to my predictions.

Table 11.
(continued)

Panel B: Coefficients Summary of Aggregate Write-offs by Year

	IFRS				US GAAP	
	High Enforcement		Low Enforcement			
Year	CFO_{t+1}	CFO_{t+2}	CFO_{t+1}	CFO_{t+2}	CFO_{t+1}	CFO_{t+2}
2005	0.056	-0.226*	-0.078	0.245	-0.144	-0.166
	(0.55)	(-1.91)	(-0.38)	(1.08)	(-1.17)	(-1.25)
2006	-0.231**	-0.370***	-0.185	0.283	0.180*	0.183
	(-1.94)	(-2.86)	(-1.03)	(1.48)	(1.64)	(1.40)
2007	0.041	0.019	-0.039	-0.098	-0.007	0.360***
	(0.36)	(0.15)	(-0.23)	(-0.56)	(-0.06)	(2.77)
2008	-0.207**	-0.085	-0.097	0.015	-0.001	-0.021
	(-2.06)	(-0.76)	(-0.69)	(0.10)	(-0.02)	(-0.28)
2009	-0216**	-0.286***	-0.171	0.001	0.045	-0.027
	(-2.34)	(-2.86)	(-1.18)	(0.04)	(0.53)	(-0.29)

t-statistics in parentheses.*** p<0.01, ** p<0.05, * p<0.1.
All variables are defined in APPENDIX A.

4.7 Conclusions

Prior literature compares the effects of adopting different accounting standards on summary accounting measures (Barth et al. 2012). In this chapter I extend this research to compare a specific issue, asset impairment, which significantly differs between US GAAP and IFRS. I provide evidence on the predictive ability of long-lived asset impairments for future firm performance under US GAAP and IFRS. I find that impairments are negatively associated with future cash flows and future earnings, but the relation depends on the type of asset that is impaired, the accounting standard used, and the institutional characteristics. On average total impairments are consistently related to future cash flows and future earnings under IFRS but not US GAAP. Under IFRS the

impairments of tangible long-lived assets are often related to firms' future cash flows and earnings. In the US GAAP sample while there are sometimes such relations and the write-offs from intangibles are also informative to future earnings in some models, the results as a whole are mixed and the related coefficient signs are often inconsistent with my expectations.

I further explore the predictive content of reported write-offs under IFRS in different institutional settings, including legal origins and enforcement. I find impairment losses under IFRS are more informative in high enforcement countries than low enforcement countries. But legal origin does not significantly affect the predictive ability of asset write-offs. These results on a specific accounting issue extended prior studies on aggregate accounting measures (Ball 1995, 2006, Lang et al. 2006) suggesting that the accounting standards are informative only when investor protection and enforcement are high.

This paper contributes to literature on the predictability of future performance, asset impairments, and IFRS. It extends prior studies addressing the predictive content of earnings components to show that long-lived asset impairments, in certain cases, are also informative about future performance. In summary, I find that asset impairments under US GAAP are less informative than IFRS. First, this suggests the informativeness of accounting will vary with differences in standards. Second, considering U.S. reporters are in a country with common law system and high enforcement, it suggests that even in high enforcement countries a poorly written standard cannot provide accounting information with predictive content. Considering IFRS is viewed as a set of high quality accounting standards, the findings suggest the informativeness also depends on certain institutional

characteristics. Only when the enforcement is high, the asset write-offs under IFRS provide most informative content for predicting future performance. Overall, this implies the importance of joint effects of the specific accounting standard and financial reporting environment.

While the results are informative, there are some research caveats. First, I cannot provide direct evidence whether how the standards are written affects their usefulness to users. Second, I assume that financial reporting users would find accounting measures to be more useful when they are informative about the measures of future performance to offer indirect evidence on the US GAAP and IFRS standards.

CHAPTER 5

DETERMINANTS OF LONG-LIVED ASSET IMPAIRMENTS UNDER US GAAP AND IFRS

In chapter 4, I address whether long-lived asset impairments under US GAAP and IFRS are indicative of firm future performance. I find in general the reported asset write-offs under IFRS are more associated with future cash flows and earnings measures than those under US GAAP. Additionally, write-offs of tangible long-lived assets are more informative about future performance than those of other asset components. Enforcement takes more important role than legal origin to determine the predictive ability of this accounting information.

In this chapter (chapter 5) I am interested in the determinants of long-lived asset impairments under US GAAP and IFRS, including different types of economic factors and reporting incentives, and develop three main hypotheses in section 5.1. In section 5.2 and 5.3 I present the research design and sample selection process. In section 5.4 and 5.5 I report descriptive statistics and main empirical results. I also provide additional tests in section 5.6 and summarize the conclusions in section 5.7.

5.1 Hypotheses Development

Based on historical cost model, the historical cost of a long-lived asset, which is usually measured by its fair value at the acquisition date, is allocated to expense by depreciation or amortization through its useful life. However, based on this model the

variation of an asset's economic value is not necessarily reflected. Asset impairments take the supplementary role of adjusting the asset's carrying amount to reflect the decline of an assets' ability of generating profits and a firm's underlying economics in the future. After such adjustment the fair value of the firm asset would form a new cost basis similar to the value determined for a newly acquired asset. As long-lived assets are mainly used for firms' operations, there are often no public market or fair value information available. Asset write-offs would therefore be recorded when there are *signals* of deterioration indicating the economic value of firm asset is lower than their carrying value and the write-off amounts can imply the *degree* of such deterioration. As a result, with a well-designed accounting standard the impairment reporting should reflect reporters' understanding of firms' underlying economics and be associated with these signals, such as the variation in macroeconomic factors, industries, firm characters and specific types or groups of assets.

Before the mid-1990s there was no specific impairment accounting standards under US GAAP and managers had discretion when recognizing asset write-offs. FASB issued SFAS No. 121 in 1995 with two-step testing model to standardize impairment testing and required the review of asset impairment whenever events indicate that the carrying amount of an asset may not be recoverable. The two-step testing model determines the occurrence and measurement of asset impairments with different thresholds. This difference brings into question whether the loss of an asset's economic value is reflected in reported asset write-offs and whether the factors with regard to underlying economics are weighed differently in impairment decision and amounts even under the same standards.

Given there are signals that an asset may be impaired, the first step of testing model under US GAAP relies on undiscounted future cash flows to determine whether an asset (group) should be written down whereas the second step is more related to fair value by measuring impairment losses as the difference between this value and the carrying amount of an asset (group). The threshold in the first step may limit reflecting the underlying economics in a timely manner. Riedl (2004) investigates accounting for impairments under US GAAP and finds the relation between reported asset write-offs and economic indicators, such as the change of gross domestic product (GDP) or firm sales, became weaker after the issuance of SFAS No. 121, suggesting the standards do not well reflect firms' underlying economics. Although SFAS No. 121 is replaced by subsequent standards (SFAS No. 144, ASC Topic 350/360), the two-step model is still kept for impairment accounting under US GAAP. For goodwill, a two-step test is also applied under US GAAP. The first step of the goodwill impairment model does not focus on goodwill but rather compares the fair value of the reporting unit as a whole to its carrying value. The second step focuses on the value of goodwill.

Similar to US GAAP, IFRS also released the first specific accounting standards for asset impairment in 1990s. IAS 36, released in 1998, states the main objective of impairment accounting is to prescribe the procedures that an entity applies to ensure that its assets are carried at no more than their recoverable amount[48]. However, unlike SFAS No. 121 under US GAAP, IAS 36 employs a one-step model for impairment testing. It does not apply the threshold for the determination of whether an impairment might exist and requires comparing carrying amount of an asset with its fair value or discounted

[48] IAS 36, para. 1. Under US GAAP, ASC 350/360 and SFAS No. 121/144 do not explicitly address the reasons for impairment accounting.

future cash flows, which is usually lower than the undiscounted future cash flows, to measure asset write-offs. As a result, asset impairments under IFRS can be reported and reflect underlying economics timelier than those under US GAAP. On the other hand, IFRS as principle-based standards provides more flexibility for managers to determine asset write-offs than US GAAP. It brings into question the overstatement of asset impairments if managers do not estimate discounted future cash flows precisely.

Impairment accounting standards under US GAAP and IFRS are different in several ways. I therefore examine whether they capture economic factors signaling the decline in economic value of firm assets differently one another. As a previous study (Riedl 2004) documents the weak ability of asset impairment to reflect economic factors under US GAAP, I hypothesize the asset write-offs under IFRS are more related to economic factors and make H2.1 below:

H2.1: Long-lived asset impairments are more associated with economic factors under IFRS than under US GAAP.

While accounting standards provide a series of principles and guidelines for impairment testing, the observations of the signals implying the decrease in economic value of firm asset and the projection of future cash flows still depends on managers' expectation. Before the issuance of formal impairment accounting standards (1995 under US GAAP, 1998 under IAS), managers had flexibility to use write-offs to manage earnings. Zucca and Campbell (1992) document that in their sample firms of write-downs in all kinds of assets, including inventories, marketable securities, and investment assets, over 58 per cent of sample firms wrote down assets when the pre-writedown earnings were already below the expected earnings (taking a big bath) and over 25 per cent of

sample firms use asset write-offs to normalize their earnings (income smoothing). Conversely, Riedl (2004) finds after the release of SFAS No. 121 in 1995, the relation between asset write-offs and reporting incentives become stronger, suggesting that managers opportunistically report asset write-offs rather than provide private information regarding firms' underlying economics.

Compared to US GAAP, IFRS follows the fair value approach and requires managers to determine the occurrence and magnitude of asset impairments in one step by estimating the fair value or present value of an asset (group). Therefore managers under IFRS have to determine discount rate and future cash flows together based on reasonable and supportable assumptions that represent management's best estimate of the economic conditions that will exist over the remaining useful life of the asset[49] whenever making impairment testing. In addition, the reversals of impairment loss are allowed (IAS36, para. 109-) and managers have to measure the amounts with supportive evidence. Although managers under US GAAP also have to estimate (undiscounted) future cash flows, the estimation of fair value or discount rate for an asset (group) is not required if the first step of impairment testing is not passed. Similarly, there is a two-step test for goodwill impairments. Under US GAAP the impairment reversals are prohibited and managers do not determine whether or how to recognize the recovery of asset value. As a result, managers under IFRS may have to apply professional judgments more frequently than those under US GAAP when reporting asset write-offs and related reversals. The opportunities to make inadequate estimation or for earnings management under IFRS therefore may be more than those under US GAAP.

[49] IAS 36, IN7.

On the other hand, more application of professional judgments under IFRS than US GAAP may also help managers to release private information easily through asset impairments. For instance, Vanza et al. (2011) use Australia setting and find that managers are motivated by uncertainty about firm value to recognize asset impairments. In this case the associations between asset impairments and managers' earnings management behavior under IFRS may decrease or not differ from those under US GAAP. Hence, I do not predict the asset write-offs incorporate more reporting incentives under one accounting system than another and make H2.2 in null form:

H2.2: The association between long-lived asset impairments and reporting incentives is the same under US GAAP and IFRS

Accounting numbers reflect the combined effects of accounting standards in place, management's incentive, the reporting environment, and other factors. The significance and weight of each determinant for reported write-offs under the same accounting standards may vary with institutional characters across adopting countries. Prior literature documents that accounting standards in place, regulatory system, litigation environment and other institutions together affect accounting amounts (Ball 2006, Lang et al. 2006, Bradshaw and Miller 2008, etc.) and should also affect the extent of accounting amounts reflecting underlying economics. Reporters' earnings management behavior or other reporting incentives may also be limited when there is strict enforcement. In this case the reported numbers will better reflect the effects of accounting standards' design and standard setters' objectives. Institutions also affect the comparability of accounting numbers across different standards regimes. Barth et al. (2012) document better comparability of accounting amounts between US GAAP and IFRS in countries with

common law origins and high enforcement than those with code law and low enforcement. As US GAAP is not widely adopted in countries other than the United States, I focus on IFRS firms[50]. Similar to the discussion in H1.4 I classify IFRS adopters based on the enforcement of sample countries following previous studies (La Porta et al. 2006, Barth et al. 2012) and compare the role of institutions on the determinants of asset write-offs. I make the following hypotheses:

H2.3(a): Under IFRS the long-lived asset impairments are more associated with economic factors in high enforcement countries than in low enforcement countries.

(b): Under IFRS the long-lived asset impairments are more associated with reporting incentives in low enforcement countries than in high enforcement countries.

5.2 Research Design

I use a logistic model to investigate the determinants of asset impairment decisions and a tobit regression model following prior literature (Francis et al. 1996, Riedl 2004, Kvaal 2005) to examine the associations between the magnitude of asset write-offs and different factors. In the logistic model (model 2.1) the dependent variable $Pr(IMP_{it})$ is an indicator to represent the decision of asset impairment. In the tobit model (model 2.2) IMP_{it} represents the amounts of long-lived asset write-offs (reversals) reported as positive (negative) numbers.

[50] Some non-US countries allow the use of US GAAP. For instance, in the past Canadian Securities Administrators (CSA) allow Canadian public firms to report under US GAAP if they meet certain requirement and register with the SEC based on the perspective that both Canadian GAAP and US GAAP are of the highest standard and comparable (National Instrument 52-107, CSA 2004).

The tobit model assuming censored distribution of data is used instead of OLS regressions with following reasons. First, under US GAAP the reversals of long-lived asset impairments are prohibited and the asset write-offs (recorded as positive numbers) become nonnegative (censored). Second, with different models and thresholds of impairment testing under US GAAP and IFRS the reporting of asset write-offs under both standards may not have a similar distribution. Third, while under IFRS the fair value approach is adopted and impairment reversals are allowed, the disclosure and recognition process are more onerous and these unequal conditions to impair and to reverse an asset's value make the impairment reversals less than asset write-offs[51]. Fourth, although impairment reversals are allowed under IFRS, the reversals of goodwill impairment are still prohibited. Fifth, prior literature (Riedl 2004) investigates long-lived asset impairments with US data and finds similar results between tobit and OLS specifications.

A firm's underlying economics reflect the combined effects of both external and internal forces and determine the variation of the firm value. In this study I examine whether asset write-offs reflect the (downside) variation and capture these forces. In the research design I employ multiple proxies of underlying economics, such as the trend of macroeconomics, the growth of different industries, or the performance and characters at different levels of firm assets. While managers can form their expectation of the declining in asset values by these economic factors and record respective asset impairments, the identification of appropriate economic factors is difficult for following reasons. First, managers' expectation is unobservable and may be biased by other incentives, such as earnings management, or their compensation and tenure. Second, different factors for

[51] For instance, IAS 36 para. 111 lists the requirements of recognizing asset reversal, including the external and internal sources of information.

macroeconomics and firm underlying performance may be used when evaluating different types or groups of assets, cash-generating-units (under IFRS) or reporting units (under US GAAP). Taken together, I incorporate both economic factors and reporting incentives into the research model and classify the independent variables into following three groups, including proxies for macroeconomic factors, firm performance and characters, and reporting incentives. The main structure of the model is as follows:

$$Pr\ (IMP)\ or\ IMP = Macroeconomic\ Factors + Firm\ Performance\ \&\ Characters + Reporting\ Incentives + Controls \quad (2.0)$$

In each group I include different variables as proxies. I discuss each of them below.

Macroeconomic Factors

I use three proxies (ΔGDP_{it}, UER_{it}, and $\Delta IROA_{it}$) to capture the effects of macroeconomics on management's decision to asset impairments following prior studies. ΔGDP_{it} is the percent change of gross domestic product (GDP) in respective country-year of sample firms. UER_{it} is the unemployment rate based on the total labor force in respective country-year. Riedl (2004) finds significant and negative associations between U.S. GDP growth and reported asset write-offs before the adoption of SFAS No. 121. Loh and Tan (2002) document the negative associations between unemployment rate and write-off decision in Singapore in the period before adopting IFRS. The decline of GDP and the increase of unemployment rate both imply a period of recession. In this case there is a higher probability that the future cash flows generated from an asset are lower than originally expected. Therefore I predict negative effects of GDP growth and positive effects of unemployment rate on the decision and magnitude of asset write-offs.

However, the broad macroeconomic trends do not necessarily mean similar variation in each industry. The emergence of new technology or products, for instance, may trigger development of high-tech firms but decrease the business in traditional industries at the same time. Therefore I include $\Delta IROA_{it}$ as the median change of industry return-on-assets based on two-digit SIC code similar to Francis et al. (1996). When there are pervasive events shocking the market, the effects on firms in the same industry, such as the value declining of firm assets, may be systematic. For similar reasons discussed with macroeconomic factors, I expect negative associations between the industry-specific factors and the reporting of asset write-offs.

Firm Performance and Characters

I use the change of operating cash flows (ΔOCF_{it}), past earnings adjusted for asset write-offs (E_{it-1}) as the proxies of firm underlying performance. Prior literature uses cash flows as an economic outcome because forecasting future cash plays a key role in economic model of firm and equity value (Barth et al. 2012). The impairment testing under IFRS and US GAAP both require the estimation of future cash flows and impairment loss as a reduction of asset and firm value may be captured by ΔOCF_{it}. I also include the past earnings, $E_{it-1,}$ as the proxy of a firm's summary performance in the past since past performance could imply the probability of asset write-offs in the future. Both $\Delta OCF_{it,}$ and E_{it-1} are expected to negatively associate with the dependent variables.

I introduce the two variables, FA_{it} and $VOL_{it,,}$ to capture specific firm characters. FA_{it} is the proportion of foreign assets to total assets in a firm, employed as a proxy of firm complexity and international diversification following prior studies (Duru and Reeb 2002). On the one hand, a firm with high international diversification may have better

strategies of risk allocation to avoid value declining of firm assets at the moment of economic downturn in a country. On the other hand, managers' control on foreign segments and operations in a firm may be lower and increase the risk of asset impairments. I therefore do not predict the coefficient sign of this variable.

VOL_{it}, the average annual price movement from mean to high and low price, is a measure of risk and uncertainty with regards to firm and asset values. When adopting different models of impairment testing, US GAAP and IFRS both require managers estimating future cash flows based on reasonable assumptions and economic conditions with supportive evidence[52]. When managers construct their projections of firm future cash flows and performance to determine assets' fair value or value in use through their professional judgment, risk and uncertainty incorporated in the asset or discount rate should also be taken into account (IAS 36 para. 30, 55). Research find the expectation of firm's future performance is affected by the risk and uncertainties of its performance in the past from analysts' perspective and document negative associations between the variability of firm performance in the past and the accuracy of forecast in earnings and cash flows (Lim 2001, Duru and Reeb 2002, Givoly et al. 2009). With similar logic I include VOL_{it} to examine whether risk and uncertainty affect managers' assumptions or projection of future cash flows and thereby associate with the reporting of asset impairment. Higher volatility representing higher risk in the firm may increase the probability of impairing asset values. However, high uncertainty also makes it more

[52] ASC 350 permits the use of either a probability-weighted approach or a best-estimation approach in developing estimates of future cash flows used to test for asset recoverability. But the assumption used shall be reasonable and with all available evidence. IAS 36 also requires cash flow projections be based on reasonable and supportable assumptions that reflect management's best estimation of economic conditions (IAS36 IN7).

difficult for managers to provide unbiased estimation of future cash flows and adequate asset write-off decisions. Therefore, I do not predict the coefficient sign for $VOL_{it.}$

Reporting Incentives

Next, I follow a stream of prior literature to construct proxies capturing reporting incentives related to asset impairments, including taking a big bath ($BH_{it,}$) and earnings smoothing (SM_{it}) (Zucca and Campbell 1992, Bartov 1993, Francis et al. 1996, and Riedl 2004, etc.) Kirschenheiter and Melumad (2002) argue that a larger earnings surprise will reduce the inferred precision of the earnings number, mitigating its effects on firm value, and therefore creating managers' motivation for "taking a big bath" and "earnings smoothing" in an analytical model. When there is a negative earnings surprise, "taking a big bath" increases the surprise, lowers the inferred precision of earnings, and decreases the negative effects on firm value. Conversely, when there is a surprise on positive earnings, managers tend to do "earnings smoothing" by using asset impairments or other discretionary accruals to lower the (positive) earnings surprise, increase the inferred precision of the reported earnings, and maintain the effects of accounting numbers (earnings) on firm value. In the end, both behaviors are expected to maximize the value of the firm.

Following Riedl (2004) the proxies for "taking a big bath" and "income smoothing" are constructed based on the change of pre-write-off earnings deflated by total assets at the beginning of the year. When the value is lower than the median of non-zero negative pre-write-off earnings, suggesting the existence of negative earnings surprise, it is included in BH_{it}. If the value is non-negative, BH_{it} is coded as 0. Similarly, if the pre-write-off earnings is higher than the median of non-zero positive number of this value,

implying positive earnings surprise, it is included in SM_{it}. Otherwise SM_{it} is equal to 0. As BH_{it} represents negative earnings surprise and asset write-off is reported as positive numbers in dependent variable, I predict negative relation between BH_{it} and the decision or magnitude of asset impairment following prior argument and literature. Similarly, I expect positive effects of SM_{it} on the dependent variables[53].

Interaction

I include the interaction terms between firms' international diversification (FA_{it}) and the proxies of reporting incentive (BH_{it} and SM_{it}) in research models. With the "home bias" phenomenon investors prefer to hold disproportionate large share of their equity portfolio in home country stocks because the investment barriers and information asymmetry is higher in foreign country than in domestic regions. The "home bias" phenomenon suggests that investors focus more on financial reporting of domestic than foreign firms. Extending this implication and the fact that investors have more difficulties in understanding the operation in foreign segments of a firm as the result of distance and other barriers, I examine whether managers have more incentive to "take a big bath" or "smooth earnings" through impairments of foreign assets. I predict that asset impairments (the decision as well as magnitude) are negatively associated with the interaction term $FA_{it}*BH_{it}$ and positively related to $FA_{it}*SM_{it}$.

[53] I also use indicators to identify firm's taking a big bath and income smoothing behavior in sample periods. In this case both indicators are expected to be positively associated with dependent variables. The results (untabulated) also support the conclusions in this work.

Controls

I employ ΔCEO_{it}, $SIZE_{it-1}$, LEV_{it-1}, and $LOSS_{it-1}$ as control variables. I examine the effect of management turnover on asset impairment by using an indicator for the change of CEO (ΔCEO_{it}). In the year of management turnover, new managers may restructure existing assets, adjust firm strategies, or adopt reporting policy of taking a big bath to lower the difficulties of achieving growth targets in the future. All of these would result in more reporting of asset impairments. Prior literature also documents the change of senior executive or management is associated with more asset impairment (Strong and Meyer 1987, Francis et al. 1996, Riedl 2004, Guler 2006, etc.). Hence I predict positive effects of ΔCEO_{it} on dependent variables. I control for firm size ($SIZE_{it}$) as the natural log of total asset at the beginning of year *t*. Larger firm with broader business scope will have more chance to experience recession in specific industries. Better corporate governance in large firms may lead to more conservative reporting behavior. Both will increase the probability of reporting asset write-offs. Therefore the coefficient of $SIZE_{it}$ is expected to be positive.

Firm leverage (LEV_{it}) is defined as the debt-to-asset ratio. Prior studies document asset impairers (Strong and Meyer 1986, Elliot and Shaw 1988) tend to have higher leverage than non-impairers. However, managers may attempt to avoid the cost of violation in debt covenants through accounting discretion and decrease the frequency or magnitude of reporting asset impairments. Hence I do not predict the coefficient sign of LEV_{it}. $LOSS_{it-1}$ is the indicator for firms' loss in year *t-1*. As studies document firms with bad performance and reporting asset write-offs have higher probability of future write-offs in both frequency and magnitude (Elliott and Hanna 1996), I expect $LOSS_{it-1}$ is

positively associated with the dependent variables. In order to compare the differences in the determinants of reported write-offs between US GAAP and IFRS, the test and control variables are interacted with respective indicators of accounting standards (*US* and *IFRS*).

First, I use the logistic model examining the determinants for the occurrence of asset impairment[54]:

$$Pr(IMP_{it}) = \alpha_0 + \alpha_1 \Delta GDP_{it} + \alpha_2 UER_{it} + \alpha_3 \Delta IROA_{it} + \alpha_4 \Delta OCF_{it} + \alpha_5 E_{it-1} + \alpha_6 BH_{it} + \alpha_7 SM_{it} + \alpha_8 FA_{it} + \alpha_9 VOL_{it} + \alpha_{10} FA_{it} * BH_{it} + \alpha_{11} FA_{it} * SM_{it} + \alpha_{12} \Delta CEO_{it} + \alpha_{13} SIZE_{it-1} + \alpha_{14} LEV_{it-1} + \alpha_{15} LOSS_{it-1} + Country\ Effect + Time\ Effect + \varepsilon_{it} \quad (2.1)$$

where:

$Pr(IMP_{it})$ = the dummy variable for IMP_{it}, equal to 1 to indicate the occurrence of respective asset write-offs in year *t* for firm *i*, and 0 otherwise.

ΔGDP_{it} = the percent growth of gross domestic product in respective countries of firm *i* from year *t-1* to *t*.

UER_{it} = the unemployment rate based on the total labor force in respective countries where firm *i* is incorporated in year *t*.

$\Delta IROA_{it}$ = the median change in firm *i*'s country-industry return on assets from *t-1* to *t*. Industry classification is based on 2-digit SIC code.

[54] When comparing the differences between standards by a whole model, the complete equation is to interact the main body of the model with respective indicators of *US* and *IFRS* identifying firm-year observations adopting respective standards following the model structures of prior literature (Francis et al. 1996, Riedl 2004, etc.) For instance, the complete model structure here is: *Pr(IMP) =US* (Macroeconomic Factors+ Firm Performance+ Reporting Incentives+ Controls)+ IFRS*(Macroeconomic Factors+ Firm Performance+ Reporting Incentives+ Controls)+ u*. Subsequent equations are transformed with similar structure.

ΔOCF_{it} = the change of operating cash flows from *t-1* to *t* deflated by total assets at the beginning of year *t*.

E_{it-1} = earnings adjusted form long-lived asset write-offs in *t-1* deflated by total assets at the beginning of *t*.

BH_{it} = the measure of "taking a big bath", equal to the change in firm *i*'s pre write-off earnings from *t-1* to *t* deflated by total assets at the beginning of *t* if below the median of nonzero negative values of this variable, and 0 otherwise.

SM_{it} = the measure of "earnings smoothing", equal to the change in firm *i*'s pre- write-off earnings from *t-1* to *t* deflated by total assets at the beginning of *t* if above the median of non-zero positive values of such value, and 0 otherwise.

FA_{it} = the proportion of foreign assets to total assets for firm *i* in year *t*.

VOL_{it} = volatility of firm value measured as firm *i*'s average annual price movement from mean to high and low price in year *t*.

ΔCEO_{it} = an indicator equal to 1 if firm experiences a change in chief executive officer (CEO) from year *t-1* to *t*, and 0 otherwise.

$SIZE_{it-1}$ = the natural log of total assets of firm *i* at the beginning of year *t*.

LEV_{it-1} = total debt-to-asset ratio of firm *i* at the beginning of year *t*.

$LOSS_{it-1}$ = an indicator to identify firms having net loss in year *t-1*.

Second I use the tobit model to investigate the determinants of reported asset write-off amounts and consider the endogeneity issues between impairment decision and impairment amounts. Prior studies assume the choices of asset write-off decisions and amounts are simultaneous (Riedl 2003) or apply the two-stage design to control for potential selection bias (Szczesny and Valentincic 2013). I employ a two-stage model. At

the first stage I construct a logistic model (model 2.2) to develop the *inverse Mill's ratio* (*IMR*). I assume the impairment decision is more related to the macroeconomic trend and certain indicators of past performance than the reporting of impairment amounts and estimate model (2.2) below:

$$Pr(IMP_{it}) = \gamma_0 + \gamma_1 \Delta GDP_{it} + \gamma_2 UER_{it} + \gamma_3 \Delta IROA_{it} + \gamma_4 \Delta CFO_{it} + \gamma_5 E_{it-1} + \gamma_6 SIZE_{it-1} + \gamma_7 LEV_{it-1} + \gamma_8 LOSS_{it-1} + Country\ Effect + Time\ Effect + v_{it} \quad (2.2)$$

All variables are defined above with respect to model (2.1). After controlling for the *inverse Mill's ratio* I develop the tobit model (model 2.3) as the second stage. I include the main test variables in model (2.1) to keep the consistency of research design except the leverage (LEV_{it-1}) and loss ($LOSS_{it-1}$) in the past year incorporated at the first stage. Model (2.3) is:

$$IMP_{it} = \beta_0 + \beta_1 \Delta GDP_{it} + \beta_2 UER_{it} + \beta_3 \Delta IROA_{it} + \beta_4 \Delta OCF_{it} + \beta_5 E_{it-1} + \beta_6 BH_{it} + \beta_7 SM_{it} + \beta_8 FA_{it} + \beta_9 VOL_{it} + \beta_{10} FA_{it} * BH_{it} + \beta_{11} FA_{it} * SM_{it} + \beta_{12} \Delta CEO_{it} + \beta_{13} SIZE_{it-1} + \beta_{14} Mills_{it} + Country\ Effect + Time\ Effect + u_{it} \quad (2.3)$$

where:

IMP_{it} = aggregate long-lived asset impairments for firm *i* in year *t* reported as positive numbers.

$Mills_{it}$ = the *inverse Mill's ratio* developed from model (2.2).

All other variables follow the definitions above with respect to model (2.1).

In summary, I use the proxies for underlying economics, including macroeconomic factors, firm performance, and firm characteristics to examine H2.1. I employ proxies for

reporting incentives and executive incentives to examine H2.2. I also investigate the interactions between economic factors and reporting incentives in determining asset impairment. To test H2.3 I identify the high and low enforcement of IFRS adopters based on the indicator of high enforcement, *ENF* and compare the difference in the associations between determinants and asset impairments across respective groups. *ENF* is constructed based on the classification in Barth et al. (2012) and the public enforcement scores in La Porta et al. (2006)[55]. If the information content of accounting amounts, such as reported asset write-offs, under the same accounting standards varies with institutional characters, it implies reporters put different weights on determinants or incorporate different factors to report such amounts.

5.3 Sample

Table 12 presents the selection procedure of my initial sample with respect to long-lived asset impairments. First I include all available firms requiring the adoption of US GAAP and IFRS from 2005 through 2011 across 26 countries from *Compustat North America* and *Compustat Global* to obtain 11,322 firms (56,869 observations) under US GAAP and 9,099 firms (53,242) under IFRS. I limit the sample to 26 countries with available data of enforcement and institution from La Porta et al. (2006) and Barth et al. (2012). Second, I combine the data with *Datastream* to obtain the information of long-lived asset impairment, including the impairments from tangible long-lived assets, intangibles, and goodwill. As a result, the initial sample includes 3,075 firms (17,835 observations) under US GAAP and 3,514 firms (21,963 observations) under IFRS.

[55] Based on the public enforcement scores in La Porta et al. (2006), I classify countries higher than the mean scores (0.52) as high enforcement and low enforcement otherwise.

In my additional test I include the variables of chief executive officers' compensation. Hence, I combine the initial sample with executive compensation data retrieved from *Capital IQ*. After deleting the missing data, I obtain the dataset including 2,939 firms (16,546 observations) under US GAAP and 3,442 firms (20,386 observations) under IFRS.

Table 12.
Sample Selection: Determinants of Long-lived Asset Impairments

Panel A: Firms	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	20,421	11,322	9,099
Less: Missing impairment data in *Datastream*	(13,832)	(8,247)	(5,585)
Initial sample firms under US GAAP & IFRS	**6,589**	**3,075**	**3,514**
Less: Missing data in variables and compensation from *Capital IQ*	(208)	(136)	(72)
Total firms from 2005 through 2011	**6,381**	**2,939**	**3,442**
Panel B: Observations	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	110,111	56,869	53,242
Less: Missing impairment data in *Datastream*	(70,313)	(39,034)	(31,279)
Sample observations under US GAAP & IFRS	**39,798**	**17,835**	**21,963**
Less: Missing data in variables and compensation from *Capital IQ*	(2,866)	(1,289)	(1,577)
Total observations from 2005 through 2011	**36,932**	**16,546**	**20,386**

5.4 Descriptive statistics

I construct the sample of long-lived asset impairments under US GAAP and IFRS from 2005 through 2011 across 26 countries and economic areas. Table 13, Panel A exhibits the sample composition by countries. US firms as the only country under US GAAP make up the greatest proportion (44.81%) of observations. Under IFRS the sample from Australia (12.81%) represents the highest proportion followed by the United Kingdom (8.40%), Germany (6.02%), Singapore (5.85%), and France (4.40%). Panel B of Table 13 present the industry breakdown of sample composition by two-digit SIC code for ten main industries under the two standards. Although business service has the highest proportion of observations both under US GAAP (9.59%) and IFRS (13.14%), industry combination in each group is different, suggesting diversified industrial advantage across sample countries and standards regimes.

Table 13.
Sample Composition: Determinants of Long-Lived Asset Impairments

Panel A: Country Composition

Country	FIC	Firm	% of Firm	Observations	% of Obs
under IFRS					
Australia	AUS	818	12.41	5,098	12.81
Austria	AUT	47	0.71	300	0.75
Belgium	BEL	57	0.87	359	0.90
Czech Republic	CZE	10	0.15	63	0.16
Denmark	DNK	62	0.94	422	1.06
Finland	FIN	72	1.09	494	1.24
France	FRA	269	4.08	1,752	4.40
Germany	DEU	386	5.86	2,396	6.02
Hong Kong	HKG	97	1.47	667	1.68
Hungary	HUN	14	0.21	84	0.21
Ireland	IRL	25	0.38	143	0.36
Italy	ITA	140	2.12	911	2.29
Jordan	JOR	5	0.08	33	0.08
Kenya	KEN	3	0.05	20	0.05
Netherlands	NLD	61	0.93	364	0.91
Norway	NOR	70	1.06	416	1.05
Peru	PER	26	0.39	178	0.45
Philippines	PHL	64	0.97	443	1.11
Portugal	PRT	18	0.27	124	0.31
Singapore	SGP	356	5.40	2,330	5.85
South Africa	ZAF	132	2.00	838	2.11
Spain	ESP	54	0.82	347	0.87
Sweden	SWE	132	2.00	822	2.07
United Kingdom	GBR	594	9.02	3,345	8.40
Venezuela	VEN	2	0.03	14	0.04
		3,514	53.33	21,963	55.19
under US GAAP					
United States	USA	3,075	46.67	17,835	44.81
Totals		6,589	100.00	39,798	100.00

Table 13.
(continued)

Panel B: Industry Composition

		Pool	US			
Industry	SIC	% of Obs	Firm	% of Firm	Obs	% of Obs
Business Service	73	11.55	340	11.06	1,711	9.59
Electronic Equipment	36	6.96	257	8.36	1,512	8.48
Chemicals	28	6.37	241	7.84	1,431	8.02
Mining	10	5.52	21	0.68	137	0.77
Industrial Machinery	35	4.91	156	5.07	912	5.11
Instruments	38	4.63	200	6.50	1,148	6.44
Depository Institution	60	3.94	261	8.49	1,568	8.79
Oil and Gas Extraction	13	3.60	131	4.26	766	4.29
Food	20	3.48	54	1.76	350	1.96
Electric, Gas & Sanitary	49	3.26	91	2.96	588	3.30
Others	-	45.80	1,323	43.02	7,712	43.24
Total		100.00	3,075	100.00	17,835	100.00

		IFRS			
Industry	SIC	Firm	% of Firm	Obs	% of Obs
Business Service	73	490	7.44	2,886	13.14
Electronic Equipment	36	194	2.94	1,256	5.72
Chemicals	28	179	2.72	1,103	5.02
Mining	10	318	4.83	2,058	9.37
Industrial Machinery	35	172	2.61	1,041	4.74
Instruments	38	108	1.64	694	3.16
Depository Institution	60	-	-	-	-
Oil and Gas Extraction	13	102	1.55	665	3.03
Food	20	158	2.40	1,035	4.71
Electric, Gas & Sanitary	49	105	1.59	708	3.22
Others	-	4,763	72.29	10,517	47.89
Total		6,589	100.00	21,963	100.00

Table 14 reports the analyses for the likelihood of impairment decisions under US GAAP and IFRS based on the prediction model (2.2). The Chi-square value of likelihood ratio (809.94) is significant, showing the prediction model as a whole fits significantly better than an empty model. The pseudo R^2 value (0.045) of the model is comparable with prior literature (Francis et al. 1996, Riedl 2004). The table includes the proportion and accumulated percentage of reporting asset impairments under respective standards regimes across ten quantiles. In most quantiles (below 60%) the percentage of recording impairments in each subsample is comparable. But the cumulative percent of impairment is relatively higher under IFRS (41.64%) than under US GAAP (31.35%), supporting the argument that with one-step model under IFRS asset write-offs are reported more frequently than under US GAAP.

The descriptive statistics for variables are reported in Table 15, including the whole sample and respective standards regimes. The probability of reporting an asset impairment is higher under IFRS, but on average the reported amounts are similar between US GAAP and IFRS. In general, the standard deviation of variables is larger under IFRS provided more sample countries are included in this group. The factors for underlying economics, such as the growth of industry and the change of operating cash flows are still comparable.

Table 14.
Likelihood Analyses of Asset Impairments from 2005 through 2011

$Pr(IMP_{it}) = \Delta GDP_{it} + UER_{it} + \Delta IROA_{it} + \Delta IROA_{it} + E_{it-1} + SIZE_{it-1} + LEV_{i-1} + LOSS_{it} + Country\ Effect + Time\ Effect + \varepsilon$

Likelihood of an Impairment	US GAAP		IFRS	
(based on predicted value)	Percent of Impairment	Cumulative Percent of Impairment	Percent of Impairment	Cumulative Percent of Impairment
90% and above	33.33%	31.35%	0.00%	41.64%
80%	50.00%	31.35%	85.71%	41.64%
70%	100.00%	31.34%	69.60%	41.62%
60%	60.00%	31.34%	68.80%	41.19%
50%	54.13%	31.28%	52.69%	38.36%
40%	44.50%	30.55%	44.52%	34.68%
30%	34.60%	27.87%	35.41%	30.42%
20%	25.03%	23.12%	26.54%	24.45%
10%	16.92%	16.82%	16.70%	16.50%
0%	13.21%	13.21%	14.10%	14.10%

The structure of the logistic model is to interact the main body of the model with respective indicators of *US* and *IFRS* identifying firm-year observations adopting US GAAP and IFRS respectively The complete prediction model is: $Pr(IMP_{it}) = US*(\Delta GDP_{it} + UER_{it} + \Delta IROA_{it} + \Delta IROA_{it} + E_{it-1} + SIZE_{it-1} + LEV_{i-1} + LOSS_{it})$+ IFRS*($\Delta GDP_{it} + UER_{it} + \Delta IROA_{it} + \Delta IROA_{it} + E_{it-1} + SIZE_{it-1} + LEV_{i-1} + LOSS_{it}$)+ *Country Effect* + *Time Effect* + ε where: $Pr(IMP_{it})$ is the indicator for the occurrence of long-lived asset write-offs in year *t* for firm *i*. ΔGDP_{it} represents the percent growth of gross domestic product in respective countries of firm *i* from year *t-1* to *t*. UER_{it} is the unemployment rate based on the total labor force in respective countries where firm *i* is incorporated in year *t*. $\Delta IROA_{it}$ is the median change in firm *i*'s country-industry return on assets from *t-1* to *t*. Industry classification is based on 2-digit SIC code. ΔOCF_{it} represents the change of operating cash flows from *t-1* to *t* deflated by total assets at the beginning of year *t*. E_{it-1} is the earnings adjusted form long-lived asset write-offs in *t-1* deflated by total assets at the beginning of *t*. $SIZE_{it-1}$ is the natural log of total assets of firm *i* at the beginning of year *t*. LEV_{it-1} shows the total debt-to-asset ratio of firm *i* at the beginning of year *t*. $LOSS_{it-1}$ = an indicator to identify firms having net loss in year *t-1* and ε is the error term.

Table 15.
Descriptive Statistics: Determinants of Asset Impairments

	Pool			US GAAP			IFRS		
Variable	N	Mean	SD	N	Mean	SD	N	Mean	SD
$Pr(IMP_{it})$	39,798	0.37	0.48	17,835	0.31	0.46	21,963	0.41	0.49
IMP_{it}	39,690	0.02	0.18	17,798	0.02	0.11	21,892	0.03	0.22
ΔGDP_{it}	39,798	0.02	0.03	17,835	0.01	0.02	21,963	0.02	0.03
UER_{it}	39,702	0.07	0.03	17,832	0.07	0.02	21,870	0.07	0.04
$\Delta IROA_{it}$	39,778	0.00	0.47	17,835	0.00	0.03	21,943	0.00	0.63
ΔOCF_{it}	39,326	0.01	0.60	17,731	0.01	0.21	21,595	0.01	0.79
E_{it-1}	39,558	-0.01	0.80	17,762	-0.04	0.55	21,796	0.01	0.95
BH_{it}	39,798	-0.01	0.80	17,835	0.00	0.12	21,963	-0.02	1.08
SM_{it}	39,798	0.05	0.48	17,835	0.06	0.44	21,963	0.05	0.51
FA_{it}	39,798	0.12	0.34	17,835	0.06	0.16	21,963	0.17	0.43
VOL_{it}	37,486	0.38	0.15	16,714	0.39	0.16	20,772	0.37	0.13
SAL_{it}	26,985	0.52	0.30	16,534	0.44	0.30	10,451	0.63	0.26
BON_{it}	26,985	0.12	0.18	16,534	0.09	0.16	10,451	0.17	0.20
EQT_{it}	26,985	0.35	0.32	16,534	0.46	0.33	10,451	0.18	0.21
ΔCEO_{it}	39,798	0.08	0.27	17,835	0.10	0.30	21,963	0.05	0.23
$SIZE_{it}$	39,690	5.57	2.39	17,798	5.95	2.33	21,892	5.27	2.39
LEV_{it-1}	39,631	0.56	0.81	17,739	0.62	0.87	21,892	0.51	0.76
$LOSS_{it-1}$	39,731	0.35	0.48	17,832	0.35	0.48	21,899	0.36	0.48

See APPENDIX A for variable definitions.

5.5 Empirical Results

Panel A of Table 16 reports the results of logistic regressions associating the occurrence of asset impairment with determinants in macroeconomics, firm performance and characters, and reporting incentives under US GAAP and IFRS. Under US GAAP, most economic factors, proxies for reporting incentives, and controls are significant and consistent with my expected signs. Only E_{it-1} and FA_{it} *BH_{it}, are not significant. Under IFRS, all variable are significant and follow the predictions in addition to BH_{it}, FA_{it} *BH_{it}, and FA_{it} *SM_{it} suggesting IFRS adopters on average do not manage earnings or take a big bath through impairment loss. The differences in determinants of impairment decision

between US GAAP and IFRS mainly come from macroeconomic factors, including ΔGDP_{it} and $\Delta IROA_{it}$, and the reporting incentives (BH_{it} and SM_{it}). The controls including firm size ($SIZE_{it}$) and leverage (LEV_{it}) are significantly different across the two standard regimes although the coefficient signs are both consistent as predicted.

Panel B of Table 16 is the results of logistic analyses within IFRS adopters, including the comparisons between high and low enforcement. Under IFRS with low enforcement, the variables for reporting incentives follow the predicted coefficient signs. The coefficient magnitude of SM_{it} is also higher and significantly different from those with high enforcement, implying the roles of institutions in impairment accounting. When the enforcement is low the impairment decision is more associated with earnings management behavior under IFRS.

Table 16.
Logistic Model for the Determinants of Asset Impairment Decisions under US GAAP and IFRS

	Exp.	Panel A: Between Standards			Panel B: Within IFRS		
Variables	Sign	US	IFRS	Difference	High Enforcement	Low Enforcement	Difference
ΔGDP_{it}	-	-5.671***	-0.924***	-4,747***	-1.119**	-0.573	-0.546
		(-9.939)	(-2.716)	(-49.30)	(-2.514)	(-1.045)	(-0.60)
UER_{it}	+	5.284***	3.221***	2.063	5.928***	2.878***	3.050*
		(9.809)	(4.105)	(4.62)	(3.975)	(3.058)	(2.97)
$\Delta IROA_{it}$	-	-3.478***	-0.076***	-3.402***	-0.032	-1.187***	1.155***
		(-7.572)	(-2.741)	(-28.24)	(-1.118)	(-4.365)	(13.03)
ΔOCF_{it}	-	-0.112**	-0.202***	0.090	-0.160***	-0.326**	0.166
		(-2.090)	(-3.848)	(-1.37)	(-2.838)	(-2.139)	(0.97)
E_{it-1}	-	-0.021	-0.067***	0.046	-0.023	-0.056	0.033
		(-0.830)	(-2.714)	(-1.96)	(-0.886)	(-0.567)	(0.11)
FA_{it}	?	0.127*	0.207***	-0.080	0.167***	0.217***	-0.050
		(1.903)	(5.816)	(-1.13)	(3.907)	(3.149)	(-0.38)
VOL_{it}	?	0.720***	0.525***	0.195	0.232**	0.754***	-0.522***
		(7.231)	(5.711)	(-2.10)	(2.020)	(4.794)	(-7.16)
BH_{it}	-	-0.685**	0.001	-0.686*	0.060	-0.418	0.478*
		(-2.230)	(0.002)	(-3.01)	(0.643)	(-1.583)	(3.22)
SM_{it}	+	0.048*	0.189***	-0.141***	0.122***	1.049***	-0.927**
		(1.846)	(4.980)	(-8.24)	(3.078)	(5.165)	(-19.66)
$FA_{it} * BH_{it}$	-	-6.268	-0.012	-6.256	-0.384	-3.056	2.672
		(-1.047)	(-0.128)	(-1.44)	(-0.948)	(1.237)	(-1.10)
$FA_{it} * SM_{it}$	+	1.215**	0.340	0.875	0.398*	0.002	0.396
		(1.993)	(1.542)	(1.71)	(1.755)	(0.002)	(0.15)
ΔCEO_{it}	+	0.146***	0.222***	-0.076	0.224***	0.220***	0.004
		(4.398)	(5.553)	(-2.12)	(4.696)	(2.993)	(0.00)
$SIZE_{it-1}$	+	0.130***	0.179***	-0.049***	0.133***	0.262***	-0.129***
		(19.524)	(30.233)	(-30.40)	(17.963)	(25.255)	(-14.87)
LEV_{it-1}	?	-0.032**	-0.098***	0.066*	-0.138***	0.167**	-0.305***
		(-2.129)	(-3.051)	(2.72)	(-3.848)	(2.083)	(-11.86)
$LOSS_{it-1}$	+	0.280***	0.287***	-0.007	0.353***	0.143***	0.210***
		(10.584)	(12.478)	(-0.04)	(11.941)	(3.680)	(18.69)
Country FE		Included			Included		
Time FE		Included			Included		
Obs		36,932			20,239		
LR Chi-sq		2148.84			2526.27		
Pr.>Chi-sq		0.00			0.00		
Pseudo R^2		0.06			0.05		

z-statistics in parentheses.*** p<0.01, ** p<0.05, * p<0.1
See APPENDIX A for variable definitions.

Table 17, Panel A, presents the results of tobit regressions addressing the determinants of the magnitude of asset impairment under different accounting standards and institutions along with the comparisons of coefficient difference. Under US GAAP, most macroeconomic factors including GDP growth (ΔGDP_{it}) and the growth of industry return-on-asset ($\Delta IROA_{it}$) are negatively associated with asset impairment as predicted. The results are inconsistent with Riedl's (2004) finding in post SFAS No. 121 period and suggest the ability of impairment accounting to reflect underlying economics. However, the relation between asset write-offs and unemployment rate (UER_{it}) is not significant in this setting. The results for the proxies of firm performance and characters are mixed. Although past earnings (E_{it}) is significant, its coefficient sign is not the same as expected. One of the potential explanations is the timing of reporting the asset impairment does not match that of the loss of the asset's economic value. Another possible explanation is based on earnings management. With good performance in last period managers do not mind reporting more impairment amounts. The volatility of firm value (VOL_{it}), are significantly and positively associated with asset write-offs under US GAAP while such write-offs do not capture the change of operating cash flows (ΔOCF_{it}) and the ratio of foreign assets (FA_{it}) as the proxy of firm complexity and international diversification. For reporting incentives, under US GAAP the proxies of taking a big bath (BH_{it}) and income smoothing (SM_{it}) are both significantly associated with asset impairments and the coefficient signs are consistent with the expectation, suggesting that under US GAAP the reporters tend to use the impairment losses for earnings management. The interaction term regarding FA_{it} and SM_{it} is positively associated with asset write-offs as predicted, implying firms under US GAAP tend to impair more foreign assets for income smoothing.

ΔCEO_{it} is significantly positive and consistent with prior literature (Meyer 1987, Francis et al. 1996, etc.) suggesting that firms may impair more assets when there are changes in chief executive officers (CEOs). By reporting more impairment loss at the beginning, the new executive may 'clean up' the bad performance, attribute these issues to his predecessors, and be able to achieve future operational target easier. The explanatory power (adjusted R-squared value) of the model is 0.10 and is comparable to prior studies (Francis et al. 1996, Riedl 2004).

Under IFRS, all variables for macroeconomic factors and firm performance and characters, are significantly associated with reported asset write-offs. The coefficient signs are all consistent with the prediction. In this setting the ratio of foreign assets (FA_{it}) and the volatility of firm value (VOL_{it}) are positive and significant. When managers' control of foreign assets is lower than domestic assets or when the risk and uncertainty of firm value is high, the probability and amounts of asset impairment become higher. For reporting incentives, under IFRS asset impairment is related to income smoothing (SM_{it}) but not taking a big bath (BH_{it}). For interaction terms, the positive results of FA_{it}*SM_{it} support the argument that firms may impair more foreign assets to smooth their earnings. ΔCEO_{it} is positive and consistent with the results under US GAAP and prior studies.

This study focuses on the difference of impairment accounting between US GAAP and IFRS in reflecting economic factors and reporting incentives. Both standards reflect certain macroeconomic factors, such as ΔGDP_{it}, $\Delta IROA_{it}$, and VOL_{it}, and some reporting incentives, including SM_{it}, FA_{it} *$SM_{it,}$ and $\Delta CEO_{it.}$ The tests of coefficients differences between US GAAP and IFRS show significant results for UER_{it}, $\Delta IROA_{it}$, ΔCFO_{it}, and E_{it-1} to support H2.1 and reveal the significant differences in BH_{it}, SM_{it}, and the

interaction term FA_{it} *BH_{it} to reject H2.2. In general, comparing with US GAAP the asset impairment under IFRS captures more macroeconomic factors and reflects less behavior of earnings management.

Panel B of Table 17 presents the results of tobit analyses between high and low enforcement within IFRS adopters. The reported asset write-offs in high enforcement countries reflect the change of industry performance, $\Delta IROA_{it}$, better than other macroeconomic factors. The associations between the write-offs and most variables of firm characters and reporting incentives are significant and follow my predictions except the measure of taking a big bath (BH_{it}) and the interaction term FA_{it} *SM_{it} . In low enforcement countries asset write-offs are related to all macroeconomic factors (ΔGDP_{it}, UER_{it}, and $\Delta IROA_{it}$), all measures of firm performance (ΔOCF_{it} and E_{it-1}). and one proxy of firm character (VOL_{it}). They also reflect all proxies of reporting incentives (BH_{it} and SM_{it}), related interaction terms (FA_{it} *BH_{it} and FA_{it} *SM_{it}) and controls following my expectations. The results imply that under IFRS reporters have more flexibility and opportunities to manage earnings through impairment loss when the enforcement is lower.

I further examine this implication by the comparison of coefficients between high and low enforcement under IFRS. The analyses show significant difference in some economic factors, including one of macroeconomic factors ($\Delta IROA_{it}$), and two variables regarding firm performance and characters (E_{it-1}, and FA_{it}) to support H2.3 (a). The results also present significant difference in both indicators of reporting incentives (BH_{it} and SM_{it}) and the interaction term (FA_{it} *BH_{it}). To summarize, asset impairments in IFRS countries with low enforcement are more associated with reporters' behavior of taking a big bath and income smoothing than those with high enforcement to support H2.3(b).

When the foreign asset ratio is high, the behavior of taking a big bath through asset impairment becomes more significant in low enforcement countries.

Table 17.
Tobit Model for the Determinants of Reported Asset Impairments under US GAAP and IFRS

Variables	Exp. Sign	Panel A: Between Standards			Panel B: Within IFRS		
		US	IFRS	Difference	High Enforcement	Low Enforcement	Difference
ΔGDP_{it}	-	-0.317**	-0.155*	-0.162	-0.212	-0.108**	-0.104
		(-2.265)	(-1.822)	[1.10]	(-1.548)	(-2.062)	[0.89]
UER_{it}	+	0.010	0.413**	-0.403**	0.668	0.152*	0.516
		(0.077)	(2.076)	[4.05]	(1.385)	(1.689)	[1.47]
$\Delta IROA_{it}$	-	-0.481***	-0.058***	-0.423***	-0.050***	-0.242***	0.192**
		(-5.042)	(-8.584)	[8.85]	(-5.688)	(-9.533)	[5.80]
ΔOCF_{it}	-	-0.003	-0.131***	0.128*	-0.119***	-0.084***	-0.035
		(-0.270)	(-9.989)	[3.36]	(-6.801)	(-5.650)	[0.12]
E_{it-1}	-	0.011**	-0.034***	0.045**	-0.036***	0.038***	-0.074***
		(2.224)	(-5.150)	[6.19]	(-4.302)	(4.756)	[9.92]
FA_{it}	?	0.005	0.033***	-0.028*	0.039***	-0.004	0.043**
		(0.393)	(3.808)	[2.93]	(3.046)	(-0.569)	[5.58]
VOL_{it}	?	0.193***	0.155***	0.038	0.112***	0.097***	0.015
		(9.457)	(6.595)	[1.07]	(3.066)	(6.419)	[0.13]
BH_{it}	-	-0.212***	-0.009	-0.203**	0.014	-0.221***	0.235***
		(-3.658)	(-0.726)	[4.78]	(0.522)	(-9.854)	[4.54]
SM_{it}	+	0.025***	0.148***	-0.123**	0.125***	0.508***	-0.383***
		(5.392)	(15.911)	[4.30]	(10.531)	(34.649)	[9.09]
$FA_{it} * BH_{it}$	-	-1.022	-0.009	-1.013*	-0.480***	-0.272***	-0.208***
		(-1.093)	(-0.500)	[3.03]	(-4.547)	(8.941)	[12.34]
$FA_{it} * SM_{it}$	+	0.461***	0.138***	0.323	0.071	0.656***	-0.585
		(4.654)	(2.588)	[1.35]	(1.010)	(8.354)	[1.35]
ΔCEO_{it}	+	0.036***	0.048***	-0.012	0.059***	0.021***	0.038*
		(5.299)	(4.975)	[0.65]	(4.038)	(3.208)	[3.84]
$SIZE_{it-1}$	+	0.002	-0.007***	0.009**	-0.012***	0.009***	-0.021***
		(1.041)	(-2.814)	[5.42]	(-3.601)	(3.239)	[14.50]
Mills	?	-0.136***	-0.167***	0.031	-0.223***	-0.036***	-0.187***
		(-13.595)	(-15.341)	[0.92]	(-11.719)	(-3.392)	[34.30]
Country FE		Included			Included		
Time FE		Included			Included		
Obs		36,932			20,386		
LR Chi-sq		2412.88			1971.08		
Pr.>Chi-sq		0.00			0.00		
Adj R^2		0.10			0.08		

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.
See APPENDIX A for variable definitions.

5.6 Additional Analyses: Executive Incentives

In addition to the three groups of variables in model (2.0), I also include certain executive factors in model (2.3) to examine whether the chief executive officer (CEO)'s compensation takes any parts in reporting asset impairment as additional tests. Prior literature documents the associations between executive compensations and goodwill impairment under SFAS No. 142 (Beatty and Weber 2006, Guler 2006). Following this stream I test the effects of executive compensation on reporting asset write-offs in additional analyses. Executive compensation components include CEO's salary (SAL_{it}), bonus (BON_{it}), and other equity-based compensation (EQT_{it}). All three components are deflated by total compensation. Salary is the fixed payment regardless of firm performance. Executives with higher payment of salaries may be more willing to report asset write-offs. Hence, I expect a positive coefficient on the salary variable, SAL_{it}. Bonus is a form of incentive compensation reflecting managers' performance in the past. Executives with greater bonus incentive may attempt to achieve earnings targets by decreasing or deferring the reporting of impairment loss. Therefore the coefficient on BON_{it} is expected to be negative. Equity-based compensation is more related to firm performance in the future. Following the logic of "taking a big bath" executives may write-off more assets to improve future growth of the firm. However, executives may receive the equity-based compensation in the past and would like to maintain current and future firm value by decreasing the reporting of asset impairments. Taken together I do not predict the coefficient sign of EQT_{it}. The variables for additional tests are summarized below:

SAL_{it} = salary of firm i's CEO in year t deflated by total CEO compensation in year t.

BON_{it} = bonus of firm *i*'s CEO in year *t* deflated by total CEO compensation in year *t*.

EQT_{it} = equity and other compensation of firm *i*'s CEO in year *t* deflated by total CEO compensation in year *t*.

Table 18 presents the results of tobit regressions between US GAAP and IFRS (Panel A) and between high and low enforcement within IFRS regime (Panel B) examining the effects of CEOs compensation on asset impairment amounts. The explanatory power of the model and variables in each group are comparable with the results in Table 17. For Panel A, under US GAAP the bonus (BON_{it}) and (EQT_{it}) equity compensation are negatively related to asset impairment. Under IFRS, the coefficients signs for BON_{it} and EQT_{it} are respectively negative and positive. Bonus reflects executives' performance in the past year. The executives therefore tend to report less loss and impair less asset values at the end of the period. Equity compensation is an incentive for managers' future performance. Executives may write down more assets at present rather than postpone such impairment losses to the future. However, if executives received equity-based compensation in the past, they may keep firms' value by decreasing the impairment losses. The difference in executive compensation between US GAAP and IFRS are not significant except EQT_{it}. When focusing on IFRS adopters with different enforcement, BON_{it} is negative in high enforcement and significant different from low enforcement, suggesting that even in high enforcement countries managers' compensation incentives may still affect the reporting of asset impairments.

Table 18.
Tobit Model for the Executive Incentives of Reporting Asset Impairments under US GAAP and IFRS

Variables	Exp. Sign	Panel A: Between Standards			Panel B: Within IFRS		
		US	IFRS	Difference	High Enforcement	Low Enforcement	Difference
ΔGDP_{it}	-	-0.316**	-0.150*	-0.166	-0.219	-0.094*	-0.125
		(-2.189)	(-1.765)	[1.05]	(-1.599)	(-1.744)	[1.27]
UER_{it}	+	0.021	0.414**	-0.393*	0.757	0.176*	0.581
		(0.151)	(2.080)	[3.74]	(1.566)	(1.905)	[1.80]
$\Delta IROA_{it}$	-	-0.476***	-0.062***	-0.414***	-0.050***	-0.254***	0.204**
		(-4.975)	(-9.365)	[8.75]	(-5.797)	(-9.808)	[5.24]
ΔOCF_{it}	-	-0.001	-0.130***	0.129*	-0.123***	-0.087***	-0.036
		(-0.099)	(-10.116)	[3.55]	(-7.031)	(-5.685)	[0.13]
E_{it-1}	-	0.010**	-0.036***	0.046**	-0.035***	0.043***	-0.078***
		(2.051)	(-5.446)	[6.06]	(-4.134)	(5.316)	[8.52]
FA_{it}	?	0.026**	0.039***	-0.013	0.050***	0.014**	0.036***
		(1.964)	(4.566)	[0.82]	(4.001)	(2.197)	[7.28]
VOL_{it}	?	0.200***	0.154***	0.046	0.111***	0.102***	0.009
		(9.788)	(6.563)	[1.50]	(3.056)	(6.525)	[0.06]
BH_{it}	-	-0.219***	-0.015***	-0.204**	-0.010	-0.012***	0.002
		(-3.814)	(-2.944)	[5.38]	(-0.609)	(-4.722)	[0.01]
SM_{it}	+	0.027***	0.154***	-0.127**	0.129***	0.564***	-0.435***
		(5.739)	(17.133)	[4.75]	(11.045)	(41.944)	[7.35]
SAL_{it}	+	0.006	0.000	0.006	-0.009	0.013**	-0.022
		(0.635)	(0.044)	[0.16]	(-0.803)	(2.398)	[2.10]
BON_{it}	-	-0.058***	-0.025	-0.033	-0.072***	-0.009	-0.063***
		(-3.443)	(-1.550)	[2.32]	(-2.706)	(-0.970)	[7.62]
EQT_{it}	?	-0.029***	0.028*	-0.057***	0.038*	-0.005	0.043
		(-2.948)	(1.944)	[8.32]	(1.748)	(-0.537)	[2.56]
ΔCEO_{it}	+	0.038***	0.048***	-0.010	0.060***	0.021***	0.039**
		(5.627)	(4.799)	[0.34]	(4.085)	(3.063)	[4.00]
$SIZE_{it}$	+	0.005**	-0.006**	0.011***	-0.010***	0.009***	-0.019***
		(2.523)	(-2.482)	[8.04]	(-2.812)	(3.238)	[10.29]
$Mills_{it}$	?	-0.133***	-0.165***	0.032	-0.221***	-0.034***	-0.187
		(-13.264)	(-15.111)	[1.00]	(-11.550)	(-3.128)	[34.09]
Country FE		Included			Included		
Time FE		Included			Included		
Obs		36,932			20,386		
LR Chi-sq		2414.27			1922.49		
Pr.>Chi-sq		0.00			0.00		
Adj R^2		0.10			0.08		

t-statistics in parentheses. z-statistics in brackets.*** p<0.01, ** p<0.05, * p<0.1.
See APPENDIX A for variable definitions.

5.7 Conclusions

In this chapter I examine the determinants of long-lived asset impairments, including macroeconomic factors, firm performance and characters, reporting incentives, and executive incentives under US GAAP and IFRS. With the international settings I also address the roles of institutions in countries adopting IFRS on the determinants of reported asset write-offs. My findings are summarized as follows. First, although adopting different impairment models for long-lived assets, ASC 350/360 and IAS 36 both reflect certain economic factors and reporting incentives. In general under US GAAP asset impairments strongly reflect GDP growth, unemployment rates, and the change of industry return-on-assets and capture certain indicators of firm performance. These findings are inconsistent with Riedl (2004) regarding asset write-offs in post-SFAS No. 121 periods. Under US GAAP reporters tend to manage earnings, including taking a big bath and income smoothing through the impairment decision and its reported amounts. Under IFRS, asset impairments reflect most economic factors but less reporting incentives. The increasing ratios of foreign assets intensify the probability of smoothing income through asset write-offs under both standards. Second, with inconsistent approaches the impairments under US GAAP and IFRS reflect economic factors differently in unemployment rates, the change of industry return on assets, the change of operating cash flows, and past earnings to support H2.1. The differences also exist between the two standards in reporting incentives, both for income smoothing and taking a big bath to reject H2.2. Third, different enforcement in IFRS reporters affect the determinants of asset write-offs. With high enforcement the impairment amounts are more associated with indicators of firm performance and characters while such amounts

reflect more macroeconomic factors in countries with low enforcement. In addition, reporters in low enforcement countries tend to take a big bath and smooth income through asset impairments. In summary, I conclude that long-lived asset impairments reflect more economic factors and less reporting incentives under IFRS than those under US GAAP, but such differences are also determined by the institutional characters. When IFRS is adopted in low enforcement countries, reporters can still manage earnings through asset impairments with the flexibility and principle guidance in IAS 36.

CHAPTER 6

MARKET VALUATION OF LONG-LIVED ASSET IMPAIRMENTS UNDER US GAAP AND IFRS

In chapter 4, I address the informativeness and the predictive ability of long-lived asset impairments under US GAAP and IFRS. In chapter 5, I investigate whether and how the asset write-offs under the two standards reflect firms' underlying economics and reporting incentives. In this chapter, I compare the market valuation of long-lived asset impairments under US GAAP and IFRS to examine how investors' understand or explain such accounting information under different accounting standards or institutions. First, I investigate the relations between equity price and reported asset write-offs, including the aggregate amounts and write-off components. Second, I test the effects of asset write-offs on stock returns. In sections 6.1 and 6.2, I develop four main hypotheses and three empirical models accordingly. In sections 6.3 and 6.4, I describe the sample selection and descriptive statistics. Sections 6.5 and 6.6 report the main and additional results. Section 6.7 presents the conclusions.

6.1 Hypotheses Development

Research in value relevance addresses how the firm value is reflected by accounting numbers. Kothari and Zimmerman (1995) find earnings reflect information about expected future cash flows. Ohlson (1995) suggests that book value of equity is a value-relevant proxy for expected future normal earnings and develops a model explaining firm

value (price) as a function of two main financial reporting summary measures, book value of firm equity from balance sheet and earnings from income statement. Many studies employ this model to specific accounting issues, such as R&D investment (Aboody and Lev 1998), goodwill amortization (Moehrle et al. 2001), brand assets (Kallapur and Kwan 2004), and identifiable intangibles (Dahmash et al. 2009).

I extend this model to the impairment of long-lived assets and examine whether the reporting of asset write-offs is associated with equity prices. The basic assumption of the Ohlson (1995) model is that investors incorporate all public information to form the expectation of firm future performance and determine the firm price. If asset impairments faithfully reflect managers' downward projections of future cash flows and firm performance in a timely manner, this information should also be reflected in a firm's market valuation. Although the magnitude of market reaction and value changes for special items tends to be smaller than those for earnings measures (Jones and Smith 2011), prior literature does document the value relevance of special items, including general asset write-offs (Francis et al. 1996) and goodwill impairment (Chen et al. 2008, Henning and Stock 1997). Provided the loss of the firm's economic value is not observed until the report of asset write-offs, I would expect a negative association between the related accounting amounts (reported as positive amounts) and equity prices.

Prior literature shows the usefulness and comparability of accounting numbers are determined by accounting standards and institutional characters, such as regulatory system, litigation environment, and enforcement (Ball et al. 2003, Lang et al. 2006, Bradshaw and Miller, 2008). The effects of institutional characters on capital market are also documented in different areas, such as the ownership structure of firms (La Porta et

al. 1998), investors' valuation process, and financial reporting quality. La Porta et al. (1997) find countries with poor investor protections and enforcement tend to have smaller and narrower capital markets. Barth et al. (2012) find that the summary accounting measures under IFRS are more comparable with those under US GAAP in common law or high enforcement countries than in code law or low enforcement countries. Hence, when addressing the value relevance of asset write-offs under different accounting systems I also take the institutions into account.

In chapter 4 of this dissertation I document that the enforcement matters more than the legal system does in determining the predictive ability of asset write-off amounts under IFRS. In this setting asset impairments are more informative about future performance in countries with high enforcement than low enforcement while this informativeness is not significantly different between code law and common law countries. As a result I make hypotheses in this chapter based on respective accounting standards and enforcement.

The Ohlson (1995) model tests the associations between equity price and two accounting summary measures, namely book value of equity and earnings. In the first hypothesis, I examine whether the associations and explanatory power are improved if the long-lived asset impairments are disaggregated from the accounting measures under respective standards setting and enforcement. The improvement, if any, can imply whether or how investors incorporate asset write-offs information into their valuation model. The first hypothesis is:

H3.1(a): Under US GAAP, disaggregated reporting of long-lived asset impairments increases the explanatory power of accounting information for equity price.

(b): Under IFRS, disaggregated reporting of long-lived asset impairments increases the association of equity price with accounting earnings and book value in high enforcement countries.

(c): Under IFRS, disaggregated reporting of long-lived asset impairments increases the association of equity price with accounting earnings and book value in low enforcement countries.

Most studies in impairment accounting focus on asset write-offs at the aggregate level with supplementary tests for related components (Francis et al. 1996, Riedl 2004) or focus on specific type of write-offs, such as goodwill (Jennings et al. 2001a, Chen et al. 2008) and intangibles (Kohlbeck et al. 2009). For instance, Henning and Stock (1997) find that the goodwill write-offs lack value relevance when the source of goodwill is ignored under US GAAP. The goodwill write-offs related to intangible assets valued by the market are associated with both advance and contemporaneous stock price decrease whereas the write-offs of tax-related goodwill are associated with stock price increase. However, comparing the impairment accounting standards between US GAAP and IFRS, ASC 350/360 and IAS 36 both apply respective thresholds for different types of long-lived assets in impairment testing. As the valuation for intangible assets with indefinite life and goodwill is difficult to determine and often cannot be identified independently, both standards require the use of fair value for the recoverability assessment. Conversely, for tangible assets and intangibles with definite life, managers are required to estimate the sum of expected future cash flows as the threshold for impairment testing. I therefore associate different types of asset impairment with stock price separately under respective accounting standards and institutions.

As asset impairment implies the loss of economic value of a firm or an asset, it should have negative effects on investors' valuation models. If such event is not predicted and incorporated in advance, the negative associations between reported write-offs and stock prices would be observed when such information is released. Therefore I hypothesize the negative associations in each standard and enforcement regime and propose H3.2 in the following:

H3.2(a): Under US GAAP, the impairment of long-lived asset components is negatively associated with equity price.

(b): Under IFRS in countries with high enforcement, the impairment of long-lived asset components is negatively associated with equity price.

(c): Under IFRS in countries with low enforcement, the impairment of long-lived asset components is negatively associated with equity price.

Information under two systems is comparable when both of them reflect an economic event or outcome similarly. In this case if investors' reactions are similar, it would imply the value relevance of specific accounts under the two systems is comparable.

The comparability of the value relevance in write-off components may vary with the types of long-lived assets. As previously discussed, the setting with different impairment thresholds for long-lived assets with definite life under US GAAP and IFRS may affect the timing of reporting asset write-offs and lead to different market valuation. However, for intangibles with indefinite life and goodwill, the fair value is applied to assess assets' recoverability under both standards. The similar requirements in accounting standards and the common difficulties in determining their values may make the related market

valuation similar. Therefore I make the null hypotheses to compare the value relevance of asset write-offs between different groups.

H3.3(a): The association between the impairment of long-lived asset components and equity price is the same under US GAAP and IFRS with high enforcement.

(b): The association between the impairment of long-lived asset components and equity price is the same under IFRS with high and low enforcement.

In addition to testing the effects of accounting items on equity prices, studies in value relevance often include stock return analyses to investigate the investors' response to the release of specific accounting information during a period. Different measures of stock returns are used. For instance, Aboody and Lev (1998) employ size-adjusted returns to examine the value relevance of software capitalization. Moehrle et al. (2001) associate market-adjusted stock returns with earnings excluding goodwill amortization. Riedl (2004) includes value-weighted stock market return, industry stock return, and firm return in the analysis of long-lived asset impairment before and after SFAS No. 121. He finds firm returns are negatively associated with asset impairments, but the associations become weaker after the adoption of SFAS No. 121.

Prior literature also uses different periods of stock return measures to examine whether or how accounting information is impounded into price. Elliot and Shaw (1988) document significant negative one- and two-day stock returns after the announcement of asset write-offs. Burgstahler et al. (2002) investigate different periods of cumulative abnormal returns around or after the announcement of earnings and special items based on quarterly data. They find significant relations between special items in quarter *t* and abnormal returns in quarter *t+4* and interpret them as evidence that predictable effects of

special items are not fully impounded in (current) prices. Francis et al. (1996) investigate discretionary asset write-offs and find that the cumulative abnormal returns over the year before the announcement of asset write-offs and those beginning from past five years to one year before the announcement are both negatively associated with reported asset write-offs. Following the similar logic I investigate the timeliness of impairment reporting and how investors understand this information by examining the associations between asset impairments and different periods of firm performance in capital market. I employ past, current, and future stock returns relative to asset write-offs as proxies of firm performance in different periods. As asset write-off is a specific special item, its effect on market valuation should be transitory in a scenario of perfect efficient market. In this case, if asset write-offs reflect the loss of assets' economic value and are reported in a timely manner, I would expect the negative associations between asset impairments and firm performance only for current stock returns.

However, if the impairment reporting is lagged or does not fully reflect the downside change of a firm or an asset's underlying economics, we should observe negative relations between asset write-offs and stock returns other than in the current period. If past stock return is significant, the implication is that investors understand a firm's economic loss before the impairment is reported. An association with past returns can imply that the reporting is lagged either due to the accounting standards in place or their enforcement. A significant association with future returns suggests that the reported asset write-offs do not fully reflect the loss of a firm's economic value and investors cannot retrieve related information through other sources in current period. Therefore in the next (future) period when investors understand this issue, the stock returns are lower.

I compare the associations between different accounting standards and institutions. With similar reasons discussed in H3.3, I make the null hypotheses to compare the associations between investors' change of valuation and the reporting of long-lived asset impairment between different groups:

H3.4(a): The association between long-lived asset impairment and stock return is the same under US GAAP and IFRS with high enforcement.

(b): The association between long-lived asset impairment and stock return is the same under IFRS with high and low enforcement.

6.2 Research Design

I modify the models of value relevance from prior studies (Lang et al. 2006, Barth et al. 2008, 2012) to examine whether the long-lived asset impairments are incrementally informative in explaining firm value based on the explanatory power of regressions, including the comparisons of R-squared values across research models and Vuong's (1989) tests following prior literature (Dechow 1994)[56]. With an international setting, market efficiency may vary with different countries, industries, and other exogenous factors. In order to control these issues of heterogeneity, I first regress stock price (P_{it}) on country and industry fixed effects to obtain respective residuals, P^*_{it} under US GAAP and IFRS following Barth et al. (2008). I employ stock price six months after fiscal year end

[56] Vuong's (1989) likelihood ratio test examines the equivalence of explanatory power in non-nested models by comparing the sum of squared residuals from alternative non-nested regressions with the same dependent variables. The z-statistic compares earnings and earnings before long-lived asset impairments as competing non-nested models.

to ensure the accounting information is publicly available for investors similar to Lang et al. (2003, 2006)[57]. The first model is below:

$$P_{it} = \theta_0 + \sum \theta_{1i} C_{it} + \sum \theta_{2j} I_{jt} + P^*_{it} \qquad (3.0)$$

where:

P = stock price six months after the fiscal year-end;
C = indicators of firm countries;
I = indicators of firm industries; Industry is classified based on 2-digit SIC code;
P^*_{it} = error term;

I use the residuals, P^*_{it}, from the model in equation (3.0) in my main regressions. In the first model, I address the value relevance of summary accounting measures:

$$P^*_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 E_{it} + \sum_{Y=06}^{09} \alpha_{3Y} YR_{it} + \varepsilon_{it} \qquad (3.1)$$

where:

P^* = residuals from regressing stock price (P) on country and industry fixed effects;
BV = book value of equity per share;
E = income before extraordinary items per share;
YR = indicators for respective fiscal years;
ε = error term;

Following prior studies addressing the value relevance of specific items based on the accounting-based valuation model (Collins et al. 1999, Lapointe-Antunes et al. 2009), I develop the second model by decomposing asset impairments and related long-lived assets from summary accounting measures to investigate the value relevance and incremental informativeness of reported asset write-offs:

$$P^*_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 Ea_{it} + \beta_3 IMPPS_{it} + \sum_{Y=06}^{09} \beta_{5Y} YR_{it} + u_{it} \qquad (3.2)$$

where :

[57] I also use the stock price three month after fiscal year as an alternative measure and the results (untabulated) are robust.

BV = book value of equity per share.
Ea = earnings before extraordinary items adjusted by long-lived asset impairments per share.
IMPPS = items for long-lived asset impairment per share, including aggregate impairments (*IMPSA*), reported write-offs from tangible assets (*IMPST*), intangibles (*IMPSI*), and goodwill (*IMPSG*).
u = error term;

Other variables follow the definitions with regard to model (3.1).

The variables in models (3.1) and (3.2) are constructed on a per share basis and corrected for heteroscedasticity using White's heteroscedasticity-corrected variances and standard errors (White 1980). All variables except indicators are converted to US dollars based on exchange rate in respective country-years.

I employ Vuong's (1989) tests to compare the percent of explained variation (R-squared value) between non-nested model (3.1) and (3.2) to examine H3.1, namely whether the separate reporting of asset impairment increases the explanatory power of accounting information for stock price. As the value relevance of accounting measures is determined by not only accounting standards in place but also institutional characters (Barth et al. 2012), such as the protection of investors and enforcement of regulations in capital market (La Porta et al. 1996, 1997), I examine the variation of explanatory power of regressions under US GAAP, IFRS with high enforcement, and IFRS with low enforcement separately.

Accounting information is value relevant if it can serve as an indicator of firm value and facilitate the comparison across the firms (Ohlson and Penman 1992). Under the market-efficiency hypothesis, the stock price incorporates (and therefore can reflect) all information available for the public that is relevant for valuing equity shares. As earning and equity reflect firms' current performance and ability to generate future benefit, I predict positive coefficient signs for all related variables, including *BV*, *E*, and *Ea*.

Conversely, as asset impairment is an event relating to the loss of an asset's economic value, in H3.2 I predict negative association between asset impairment components (*IMPPS*) and the stock price residuals (*P**) from model (3.1). In addition, in H3.3, I address the effects of asset impairments on equity prices under US GAAP and IFRS by comparing the coefficients of asset impairment in model (3.3) under respective standards regimes trough *Chow tests* and *t-statistics*.

Prior studies addressing impairment accounting under US GAAP also associate the reported write-offs with market based measures, including the cumulative abnormal returns in current year and five years preceding the announcement of asset write-offs (Francis et al. 1996), value-weighted market return, industry stock return, and firm return (Riedl 2004). They find that firms' current and prior stock returns are negatively associated with reported write-offs whereas the association does not hold for industry or market returns. I follow similar logic in H3.4 to examine the relation between stock returns in different period and long-lived asset impairment under US GAAP and IFRS. I construct the tobit model as follows:

$$IMP_{it} = \gamma_0 + \gamma_1 FRET_{it} + \gamma_2 RET_{it} + \gamma_3 BRET_{it} + \gamma_4 MTB_{it} + \gamma_5 ROA_{it} + \gamma_6 SIZE_{it} + \gamma_7 IROA_{it} + \gamma_8 IRET_{it} + \gamma_9 C_{it} + \gamma_{10} YR_{it} + v_{it} \quad (3.3)$$

where:

IMP = reported write-offs from total long-lived assets (*IMPA*), tangible assets (*IMPT*), identifiable intangibles (*IMPI*), and goodwill (*IMPG*). All aforementioned variables are deflated by total assets at the beginning of period;

FRET = future return, constructed as the market-adjusted annual return starting from six months after fiscal year end. The raw return is adjusted by the value-weighted average annual market return in respective sample country;

RET = contemporaneous return, constructed as the market-adjusted annual return starting from six months before fiscal year end. The raw return is adjusted by the value-weighted average annual market return in respective sample country;

BRET = past return, constructed as the market-adjusted annual return ending at six

months after the beginning of the fiscal year. The raw return is adjusted by the value-weighted average annual market return in respective sample country;

MTB = market-to-book ratio;

ROA = return on assets;

SIZE = logarithm of market value;

IROA = mean of industry return on assets under respective accounting standards. Industry is classified based on 2-digit SIC code;

IRET = industry stock return under respective accounting standards. Industry is classified based on 2-digit SIC code;

v = error term;

All variables are converted to US dollars based on exchange rates in respective country-years. Stock return reflects the variation of firm value over a period, capturing the expectation of future firm performance and may incorporate more comprehensive measures of firm's economics (Riedl 2004).

In the model *FRET*, *RET*, and *BRET* are employed to capture a firm's future, current, and past performance in stock market[58]. The coefficients and associations between the three variables and reported write-offs also reflect whether the information of such write-off event can be retrieved from sources other than financial report and whether the event is reported timely. If the write-off is made in the same period as the decline in the asset's economic value, then stock price will drop in the same period of write-off. Similarly, if the market cannot determine the decline in an assets value from other sources, then the stock price will also decline when the impairment is recognized. Both cases lead to a negative relation between the current stock return and asset impairment. Therefore I predict negative sign for *RET*.

[58] To control the heterogeneity of different capital markets, I adjust firms' past, current, and future annual returns by the value-weighted average annual market return in respective sample countries. I also use the residuals from the regression of stock returns in different periods on country and industry fixed effects as alternative stock return metrics in the robustness analyses. The empirical results (untabulated) are similar to my main analyses. In addition, I test past and future returns in separate models and the results are supportive to the conclusions.

Given a firm reports asset impairments to take a big bath in one period, earnings and stock price tend to become higher in the subsequent period. A current impairment loss therefore may be positively associated with future stock return. However, if asset impairments are reported timely and the current stock price fully incorporates all information and investor's expectation about the impairment, the relation should be insignificant. Taken together, I do not predict specific coefficient sign for *FRET*.

As asset impairment implies the loss of an asset's ability to generate future cash flows or other benefit, I will not predict the relation between *BRET* and *IMP*. Nevertheless, if asset impairment is recognized in the financial statements later than the loss of economic value, the coefficient for *BRET* will be negative.

In model (3.3) the characteristics and relative performance of a firm are controlled through a series of control variables. Market-to-book ratio (*MTB*) is employed to capture the growth opportunity of the firm. With better performance and potential of growth in the future, I predict negative sign for *MTB*. Return on assets (*ROA*) is used to control the firm's current performance. A firm with high performance should have less probability to impair assets. Therefore I expect negative associations between return on assets and reported asset write-offs. Firm complexity may increase with firm size. The broader business scope for a large firm may increase the opportunity of asset impairment in different industries. Accordingly the coefficient for *SIZE* is predicted to be positive. The mean change of industry return on asset (*ΔIROA*) and the level of industry stock return are signals for boom of respective industries. Consistent with prior literature (Francis et al. 1996, Riedl 2004) I predict negative coefficient signs for both variables.

6.3 Sample

Table 19 lists the process of sample selection. First, I include firms requiring the adoption of IFRS since 2005 from 26 countries with available data of institutions from prior literature (La Porta et al. 2006, Barth et al. 2012) through *Compustat North America* and *Compustat Global*. The initial sample has 20,421 firms (110,111 observations) from 2005 through 2011, including 11,322 (56,869 observations) under US GAAP and 9,099 firms (53,242) under IFRS. Second, I incorporate long-lived asset impairment data from *Datastream* and drop 13,832 firms (70,313 observations) with missing data. Third, as previous studies show that market reactions to special items tend to be smaller than those for general accruals (Jones and Smith 2011), the change of firm values due to the reporting of asset impairments may not be observed easily. Prior research (Ramanna and Watts 2012) therefore apply certain criteria of materiality to examine the effects of asset write-offs. I follow this stream and limit the sample to firms experiencing long-lived asset impairments higher than 0.1% of total long-lived assets during the sample period[59]. Through this procedure I find 71.80% of sample firms (71.51% of observations) meet the criteria, including 64.36% and 78.32% of firms (63.55% and 77.98% of observations) under US GAAP and IFRS respectively. As a consequence I obtain a dataset with 4,731 firms (11,337 observations) from 25 countries, including 1,979 firms (11,335 observations) under US GAAP and 2,752 firms (17,126 observations) under IFRS[60]. All variables except indicators are converted to US dollars based on the exchange rates at

[59] I also use different thresholds of material reporting in long-lived asset impairments as robustness checks, such as 1% and 0.05% of total long-lived assets or respective asset components. Most results are supportive of the main conclusions.

[60] In the initial sample there are only 2 firms (14 observations) from Venezuela. Based on the selection criteria both of them do not report material asset impairments and are deleted.

fiscal-year end and winsorized at 5% and 95% levels in respective countries to alleviate the effect of extreme values[61].

Table 19.
Sample Selection: Market Valuation of Long-lived Asset Impairments

Panel A: Firms	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	20,421	11,322	9,099
Less: Missing impairment data in *Datastream*	(13,832)	(8,247)	(5,585)
Initial sample firms under US GAAP & IFRS	**6,589**	**3,075**	**3,514**
Less: Firms without material impairments between 2005 and 2011[62]	1,858	1,096	762
Totals	**4,731**	**1,979**	**2,752**
Panel B: Observations	Total	US GAAP	IFRS
Firm-year observations across 26 countries requiring IFRS from 2005 through 2011 in *Compustat North America* & *Compustat Global*	110,111	56,869	53,242
Less: Missing impairment data in *Datastream*	(70,313)	(39,034)	(31,279)
Initial sample observations under US GAAP & IFRS	**39,798**	**17,835**	**21,963**
Less: Observations from firms without material impairments between 2005 and 2011	(11,337)	(6,500)	(4,837)
Totals	**28,461**	**11,335**	**17,126**

[61] Barth et al. (2008) and Barth et al. (2012) use the same threshold for value relevance studies.

[62] Here I limit the sample to firms experiencing long-lived asset impairments higher than 0.1% of total long-lived assets during the sample period. I also use different thresholds of material reporting in long-lived asset impairments as robustness checks, such as 1% and 0.05% of total long-lived assets or respective asset components. Most results are supportive of the main conclusions.

6.4 Descriptive Statistics

Table 20, Panel A presents the sample composition from 25 countries. US firms are the only components in the group of US GAAP and make up the highest proportion of observations (39.83%). The rest of 24 countries adopt IFRS and take 60.17% of the whole sample. In this group, Australia accounts for 14.02%, followed by the United Kingdom (9.19%), Singapore (6.40%), Germany (6.11%), and France (4.69%). Panel B of Table 20 exhibits ten main industries in the whole sample observations and their distributions under US GAAP and IFRS by two-digit SIC code. The ten main industries take 54.12% of the pooled sample and are comparable with each group (57.40% under US GAAP, 51.91% under IFRS). Although business service (SIC 73) is the industry with most observations under the two standards (9.19% under US GAAP, 11.89% under IFRS), the distributions in industry composition are different.

Table 21 reports the descriptive statistics of variables, including the pooled sample and the sample under US GAAP and IFRS. Comparing the two groups, the mean of security prices is higher under US GAAP, but the mean of stock returns is higher under IFRS. The standard deviations of stock prices and returns are higher under IFRS as this group consists of firms from different countries. In general, the asset impairment variables on per share bases are higher under US GAAP than IFRS, but the proportion of write-off amounts to total assets or long-lived assets are similar.

Table 20.
Sample Composition

Panel A: Country Composition

Country	FIC	Firm	% of Firm	Observations	% of Obs
under IFRS					
Australia	AUS	647	13.68	3,991	14.02
Austria	AUT	39	0.82	249	0.87
Belgium	BEL	42	0.89	272	0.96
Czech Republic	CZE	8	0.17	44	0.15
Denmark	DNK	53	1.12	364	1.28
Finland	FIN	59	1.25	407	1.43
France	FRA	222	4.69	1,429	5.02
Germany	DEU	289	6.11	1,780	6.25
Hong Kong	HKG	73	1.54	492	1.73
Hungary	HUN	12	0.25	76	0.27
Ireland	IRL	17	0.36	99	0.35
Italy	ITA	115	2.43	735	2.58
Jordan	JOR	1	0.02	7	0.02
Kenya	KEN	1	0.02	7	0.02
Netherlands	NLD	52	1.10	317	1.11
Norway	NOR	55	1.16	337	1.18
Peru	PER	21	0.44	139	0.49
Philippines	PHL	35	0.74	238	0.84
Portugal	PRT	14	0.30	90	0.32
Singapore	SGP	303	6.40	1,918	6.74
South Africa	ZAF	111	2.35	699	2.46
Spain	ESP	45	0.95	287	1.01
Sweden	SWE	103	2.18	659	2.32
United Kingdom	GBR	435	9.19	2,490	8.75
		2,752	58.17	17,126	60.17
under US GAAP					
United States	USA	1,979	41.83	11,335	39.83
Totals		4,731	100.00	28,461	100.00

Table 20.
(continued)

Panel B: Industry Composition

		Pool	US			
Industry	SIC	% of Obs	Firm	% of Firm	Obs	% of Obs
Business Service	73	10.82	197	9.95	1,042	9.19
Electronic Equipment	36	7.20	179	9.04	1,072	9.46
Mining	10	6.10	10	0.51	61	0.54
Chemicals	28	6.00	149	7.53	859	7.58
Industrial Machinery	35	5.10	103	5.20	610	5.38
Instruments	38	4.74	130	6.57	736	6.49
Food	20	3.83	43	2.17	268	2.36
Depository Institution	60	3.73	183	9.25	1,061	9.36
Oil and Gas Extraction	13	3.52	86	4.35	442	3.90
Electric, Gas & Sanitary	49	3.08	56	2.83	355	3.13
Others	-	45.88	843	42.6	4,829	42.60
Total		100.00	1,979	100	11,335	100

		IFRS			
Industry	SIC	Firm	% of Firm	Obs	% of Obs
Business Service	73	348	12.65	2,037	11.89
Electronic Equipment	36	152	5.52	978	5.71
Mining	10	261	9.48	1,676	9.79
Chemicals	28	138	5.01	848	4.95
Industrial Machinery	35	136	4.94	842	4.92
Instruments	38	95	3.45	612	3.57
Food	20	127	4.61	821	4.79
Depository Institution	60	-	-	-	-
Oil and Gas Extraction	13	87	3.16	561	3.28
Electric, Gas & Sanitary	49	80	2.91	522	3.05
Others	-	1,328	48.26	8,229	48.05
Total		2,752	100	17,126	100

Table 21.
Descriptive Statistics

	Pool			US GAAP			IFRS		
Variable	N	Mean	SD	N	Mean	SD	N	Mean	SD
Panel A: Variables for Equity Price Models									
P_{it}	28,270	23.40	167.20	11,309	25.90	80.27	16,949	21.80	205.70
BV_{it}	28,451	14.80	118.90	11,330	15.70	66.45	17,121	14.20	143.40
E_{it}	28,447	0.61	19.40	11,326	0.01	22.12	17,121	1.00	17.35
Ea_{it}	28,447	1.02	18.49	11,326	0.63	18.65	17,121	1.27	18.38
$IMPSA_{it}$	28,451	0.41	5.38	11,330	0.62	6.10	17,121	0.27	4.84
$IMPST_{it}$	28,451	0.14	3.30	11,330	0.17	2.07	17,121	0.12	3.90
$IMPSI_{it}$	28,451	0.05	1.15	11,330	0.06	0.65	17,121	0.05	1.38
$IMPSG_{it}$	28,451	0.22	3.86	11,330	0.40	5.52	17,121	0.09	2.13
Panel B: Variables for Stock Return Models									
$IMPA_{it}$	28,240	0.01	0.03	11,314	0.01	0.03	16,926	0.01	0.03
$IMPT_{it}$	28,240	0.00	0.01	11,314	0.00	0.01	16,926	0.00	0.01
$IMPI_{it}$	28,240	0.00	0.00	11,314	0.00	0.00	16,926	0.00	0.00
$IMPG_{it}$	28,240	0.00	0.01	11,314	0.00	0.01	16,926	0.00	0.00
$FRET_{it}$	27,533	0.14	0.57	11,249	0.10	0.53	16,284	0.17	0.59
RET_{it}	27,818	0.19	0.59	11,289	0.14	0.54	16,529	0.23	0.62
$BRET_{it}$	22,958	0.20	0.62	9,457	0.13	0.55	13,501	0.24	0.66
MTB_{it}	27,792	2.40	2.03	11,285	2.52	2.04	16,507	2.32	2.01
ROA_{it}	28,236	5.47	132.40	11,310	9.02	118.50	16,926	3.10	141.00
$SIZE_{it}$	27,818	5.65	2.16	11,289	6.21	1.94	16,529	5.27	2.21
$IROA_{it}$	28,266	0.02	0.06	11,318	0.02	0.03	16,948	0.01	0.07
$IRET_{it}$	27,818	0.10	0.33	11,289	0.04	0.29	16,529	0.13	0.35

See APPENDIX A for variable definitions.

6.5 Empirical Results

Table 22, Panel A presents the regression results of model (3.1) based on book value of equity and earnings before extraordinary items in different groups, including firms under US GAAP, IFRS with high enforcement, and IFRS with low enforcement. All variables excluding indicators are constructed on a per share basis. In each group the coefficients of BV_{it} and E_{it} are positively associated with equity price, supporting Ohlson's (1995) accounting-based valuation model. IFRS with low enforcement reports the highest explanatory power for stock price (0.870) whereas the R^2 value of such association is lower under US GAAP (0.709) and IFRS with high enforcement (0.490).

Panel B of Table 22 shows the regression results for model (3.2) with disaggregated reporting of long-lived asset impairments. Comparing with model (3.1), the explanatory power of model (3.2) in each group improves consistently from 2.7% (IFRS with low enforcement) to 14.3% (IFRS with high enforcement). The book value of equity (BV_{it}) and earnings excluding long-lived asset write-offs (Ea_{it}) are positively associated with stock prices, but the effects of asset impairments are inconsistent across standards regimes and institutions. The write-offs under IFRS with high enforcement are negatively associated with stock price, implying impairment losses are a signal of downside adjustment of expected future performance that are incorporated in market valuation. However, under IFRS with low enforcement, although the coefficient sign is negative as expected, the relation between asset write-offs and stock price is not significant, indicating the lack of value relevance of such information. This finding suggests the effects of enforcement on the investors' valuation process of incorporating accounting amounts. Under US GAAP, the association between $IMPSA_{it}$ and the stock price is

opposite to my prediction. Given the market is efficient in understanding the event of the loss in economic value of an asset, such results may imply that asset impairments are not reported in a timely manner under US GAAP.

Panel C of Table 22 reports the results of comparing the explanatory power between model (3.1) and (3.2) in respective groups, including the difference in R^2 and *z-statistic* values based on Vuong's (1989) tests. The comparisons indicate that the R^2 values between model (3.1) and (3.2) are significantly different under IFRS with high enforcement (-1.92), and low enforcement (-2.46). Under US GAAP the disaggregated reporting of long-lived asset impairments does not improve the explanatory power of accounting information for equity price and H3.1(a) is rejected. Conversely, under IFRS the significant difference and higher explanatory power in model (3.2) than model (3.1) both in high and low enforcement suggest the value relevance of reported asset write-offs under IFRS and therefore H3.1(b) and (c) are not rejected.

Table 22.
Cross-Sectional Regressions of Equity Prices on Earnings, Book Value of Equity, and Long-Lived Asset Impairments[63]

Panel A: Model (3.1): $P^*_{it} = \alpha_0 + \alpha_1 BV_{it} + \alpha_2 E_{it} + YR_t + \varepsilon_{it}$

	α_1	α_2	N	F-value	Adj. R^2
US	1.001***	2.741***	11,309	1,374.6	0.709
	(163.16)	(32.41)		(0.00)	
IFRS_H	0.563***	0.856***	10,663	512.7	0.490
	(93.07)	(19.21)		(0.00)	
IFRS_L	1.061***	2.741***	6,286	2,095.2	0.870
	(104.32)	(32.41)		(0.00)	

Panel B: Model (3.2): $P^*_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 Ea_{it} + \beta_3 IMPSA_{it} + YR_t + u_{it}$

	β_1	β_2	β_3	N	F-value	Adj. R^2
US	0.976***	0.697***	0.644***	11,309	940.8	0.714
	(154.80)	(28.00)	(8.37)		(0.00)	
IFRS_H	0.706***	1.334***	-0.396***	10,663	614.1	0.633
	(118.16)	(28.66)	(-3.94)		(0.00)	
IFRS_L	1.006***	3.227***	-0.093	6,286	1,828.5	0.897
	(89.23)	(38.61)	(-0.45)		(0.00)	

Panel C: Comparisons of Model (3.1) and (3.2):	*US*	*IFRS_H*	*IFRS_L*
R^2 difference	-0.005	-0.143*	-0.027**
[z-statistics]	[-0.75]	[-1.92]	[-2.46]

Panel D: Difference	*US vs. IFRS_H*	*IFRS_H vs. IFRS_L*
$IMPSA_{it}$	1.040*	-0.303
	[1.96]	[-0.03]

***, **, and * denote the significance at <.01, <.05, and <.10 levels for two-tailed tests.
† denotes the significance at <.10 level for one-tailed tests.
t-statistics are showed in parentheses. chi-squared values included in brackets.
See APPENDIX A for variable definitions.

Panel A of Table 23 presents the analyses of the regressions based on model (3.2) and disaggregating total impairments to components based on different types of long-lived assets (on per share basis). The explanatory power of model (3.3) is slightly higher than that of model (3.2) in each group. However the results of Vuong's (1989) tests show that such increase is not significant in any settings and lead to the conclusion that the

[63] *IFRS_H* and *IFRS_L* represent samples under IFRS with high enforcement and low enforcement respectively

write-offs of long-lived asset components do not provide incremental information to the market compared to aggregate impairment amounts.

The write-offs from long-lived tangible assets are negatively associated with unexplained equity price, P^*_{it}, under IFRS with both high and low enforcement and support H3.2(b) and (c). The coefficient magnitude under IFRS with high enforcement is higher than that under low enforcement, implying more information and value relevance incorporated in such account in high enforcement group. However under US GAAP the impairments from tangible long-lived assets are positively related to equity prices and H3.1(a) is rejected. The results reflect the effects of two-step impairment testing under US GAAP, criticized for not reporting asset write-offs in time. Based on the strong-form market efficiency hypothesis claiming stock price can reflect all information, including hidden or insider information via different sources, the downward adjustments of stock prices for the loss of economic value in firm assets have been done before the report of impairment loss. When the 'delayed impairment reporting' is actually released the 'worst period' has passed. The equity prices have incorporated new (better) information by the time the impairment is reported and the positive associations are observed.

The relations between the impairments of intangibles with definite life and equity prices are inconsistent with the expectations and are positive across all standards and institutions to reject H3.2(a), (b), and (c). One of the possible explanations is that the difficulties in determining the value (and following write-offs) of intangibles lead managers not to report related impairment losses in time no matter which impairment accounting methods are applied. Another explanation is market investors explain such impairments as a cleaning of existing bad news in firm operations.

Goodwill impairments are negatively associated with equity prices under IFRS, but only the relations under IFRS with high enforcement are significant, indicating investors put more weight on goodwill impairment for valuation in this group. Under US GAAP the relations between the write-offs from goodwill and equity prices are positive, suggesting the delayed reporting of these accounts or the different explanations from investors' perspectives. The results are consistent with my findings on the informativeness of goodwill impairment in this dissertation. In chapter 4 I find the associations between goodwill impairment and firm future performance are mixed under both US GAAP and IFRS. Under US GAAP goodwill impairment is negatively associated with one-year ahead earnings but positively related to future cash flows in most models. Under IFRS the goodwill impairment is indicative of future earnings but not future cash flows. When the impairment accounting approaches are different under US GAAP and IFRS, investors would adjust the weights or effects of goodwill impairment items on their valuation process accordingly. In summary, for goodwill impairment the empirical results only support H3.2(b) and H3.2(a) and (c) are rejected.

Table 23, Panel B shows the comparison results of coefficients in write-off components across standards and institutions. The differences are significant between US GAAP and IFRS with high enforcement for impairments from long-lived tangible assets and goodwill so therefore lead to reject H3.3 (a). Comparing IFRS adopters with different levels of enforcement, the results are insignificant across all types of asset write-offs and H3.3(b) cannot be rejected. Taken together, accounting standards in place take more important roles than institutions in determining the value relevance of impairment components. Under IFRS with high enforcement, investors react more negatively to the

write-offs of tangible long-lived assets than those from goodwill. Although goodwill is the difference between the acquired price and the fair value of the net assets of a firm and implies a firm's excess profitability, its intangibility leads investors to put less weight on its impairment when determining the value of a firm.

Table 23.
Cross-Sectional Regressions of Equity Prices on Earnings, Book Value of Equity, and Components of Long-Lived Asset Impairments

Panel A: Regression Analyses of Model (3.3):
$P^*_{it} = \beta_0 + \beta_1 BV_{it} + \beta_2 Ea_{it} + \beta_3 IMPST_{it} + \beta_4 IMPSI_{it} + \beta_5 IMPSG_{it} + YR_t + u_{it}$

	US	*IFRS_H*	*IFRS_L*
BV_{it}	0.975***	0.702***	0.990***
	(154.62)	(116.35)	(93.93)
Ea_{it}	0.680***	1.529***	2.465***
	(26.97)	(31.84)	(30.01)
$IMPST_{it}$	0.537***	-2.595***	-1.505***
	(2.74)	(-7.40)	(-7.16)
$IMPSI_{it}$	4.381***	6.781***	20.799***
	(6.99)	(12.79)	(28.97)
$IMPSG_{it}$	0.571***	-0.514***	-0.724
	(6.68)	(-4.86)	(-1.21)
Observations	11,309	10,663	6,286
Adj. R^2	0.715	0.641	0.910
F test	566.9	380.4	1,277.4
Prob >F	0.00	0.00	0.00

Comparisons between Model (3.2) & (3.3):

	US	*IFRS_H*	*IFRS_L*
R^2 difference	-0.001	-0.010	-0.013
[z-statistics]	[-0.36]	[-0.98]	[-0.49]

Panel B : Difference	*US* vs. *IFRS_H*	*IFRS_H* vs. *IFRS_L*
$IMPST_{it}$	3.132***	-2.405
	[7.36]	[-0.54]
$IMPSI_{it}$	-2.400	-14.018
	[-0.07]	[-1.15]
$IMPSG_{it}$	1.315*	0.210
	[2.57]	[0.00]

IFRS_H and *IFRS_L* represent samples under IFRS with high and low enforcement respectively.
***, **, and * denote the significance at <.01, <.05, and <.10 levels for two-tailed tests.
† denotes the significance at <.10 level for one-tailed tests.
t-statistics are showed in parentheses. z-statistics are included in brackets.
See APPENDIX A for variable definitions.

The results of the associations between market returns and asset write-offs are presented in Table 24. $BRET_{it}$, RET_{it}, and $FRET_{it}$ are variables for past, current, and future stock returns. Under US GAAP the associations between asset write-offs and

current stock returns is statistically negative, consistent with my prediction if impairment losses are reported in a timely manner. If the impairment information is delayed and the negative associations still holds, a possible explanation is that the information about the loss of an asset value is not available until the release of financial report. In this case, even if the reported loss is transitory and not relevant to a firm's current performance, the concurrent stock price will still decrease accordingly. My findings in chapter 4 regarding the lower informativeness and predictive ability of asset write-offs under US GAAP are consistent with the second explanation.

Asset impairments are negatively associated with the future stock returns ($FRET_{it}$). The two-step impairment testing under ASC 350/360 tends to postpone the timing of impairing asset values. The reporting of impairment losses, if any, may not fully reflect the variation of a firm's underlying economics. Therefore, the stock returns may not be adjusted accordingly until future periods.

The associations between asset write-offs and past stock returns ($BRET_{it}$) are negative, indicating investors may incorporate the event with respect to the loss of an asset's economic value even if the related accounting information is not reported.

Under IFRS with high enforcement asset write-offs are negatively associated with past ($BRET_{it}$) and current (RET_{it}) stock returns, but not future returns ($FRET_{it}$). This suggest investors may predict asset impairments event before the release of related reporting based on other factors, such as the variation of macroeconomics, or other information sources. The asset write-offs in this setting are relatively timely and reflected on current stock returns. Under IFRS with low enforcement, reported asset write-offs are negatively associated with stock returns from past, current and future period, suggesting

the effects of institutions. The lack of enforcement under IFRS may lead to the delayed reporting of asset write-offs and establish the negative relations between $FRET_{it}$ and reported amounts. Another explanation is that when enforcement is lower, investors do not rely on accounting information to reflect stock price immediately until next period.

The comparisons of model coefficients across accounting standards and institutions show significant difference in current and future stock returns between US GAAP and IFRS with high enforcement to reject H3.4(a), suggesting the different value relevance of reported asset impairment between the two settings. However, under IFRS the significant difference between high and low enforcement only exist in future stock returns to reject null hypothesis H3.4(b). Taken together, accounting standards in place take more important roles in the valuation of asset impairments than institutional characters.

Most signs of coefficients on control variables are consistent with my expectations and prior literature under both accounting standards. Asset write-offs are positively associated with firm size ($SIZE_{it}$). The results are consistent with the findings in Francis et al. (1996) under US GAAP. Large firms have higher complexity and a broader business scope. Both cases provide more opportunities for firms to face recession in specific industries and impair their long-lived assets. On the other hand, asset impairments are negatively associated with most variables for firm and industry performance, including market-to-book ratio (MTB_{it}), return on assets (ROA_{it}), industry return on assets ($IROA_{it}$), and industry returns ($IRET_{it}$) under respective accounting standards. The results imply that firms having potential for growth, with better performance, and belonging to burgeoning industries will face lower probability of reporting asset impairments. The only variable inconsistent with my prediction is $IRET_{it}$

under IFRS with low enforcement. It suggest that reported asset write-offs under this setting do not reflect the recession in the industry.

Table 24.
Regression Analyses of Long-Lived Asset Impairments on Stock Returns

Variables	Exp. Sign	US	*IFRS_H*	*IFRS_L*	*Difference*	
					US vs IFRS_H	*IFRS_H vs IFRS_L*
$FRET_{it}$	?	-0.067***	0.008	-0.020*	-0.075***	0.028*
		(-6.72)	(0.81)	(-1.91)	[-24.37]	[3.08]
RET_{it}	-	-0.122***	-0.064***	-0.050***	-0.058***	-0.014
		(-9.62)	(-5.67)	(-3.43)	[-9.27]	[-0.43]
$BRET_{it}$	?	-0.050***	-0.043***	-0.034***	-0.007	-0.009
		(-4.91)	(-4.78)	(-3.66)	[-0.23]	[-0.37]
MTB_{it}	-	-20.343***	-0.536	-16.272***		
		(-7.06)	(-0.17)	(-5.33)		
ROA_{it}	-	-0.002***	-0.001***	-0.001***		
		(-40.5)	(-32.50)	(-20.02)		
$SIZE_{it}$	+	0.056***	0.044***	0.036***		
		(16.81)	(12.359)	(12.03)		
$IROA_{it}$	-	0.333	-0.727***	-0.873***		
		(1.372)	(-7.93)	(-6.63)		
$IRET_{it}$	-	-0.132***	0.015	0.041*		
		(-5.55)	(0.74)	(1.86)		
Obs		9,457	8,342	5,159		
Pseudo R-sq		0.043	0.123	0.101		
LR Chi-sq		233.2	152.4	71.6		
Prob > Chi		0.00	0.00	0.00		

IFRS_H and *IFRS_L* represent samples under IFRS with high and low enforcement respectively.
***, **, and * denote the significance at <.01, <.05, and <.10 levels for two-tailed tests.
† denotes the significance at <.10 level for one-tailed tests.
t-statistics are showed in parentheses. z-statistics are included in brackets.
See APPENDIX A for variable definitions.

6.6 Additional Analyses

Table 25 provides year-by-year comparisons of explanatory power between model (3.1) and (3.2). Under US GAAP although the R^2 values of model (3.2) are higher than those of model (3.1), such differences are not significant across all sample years. Under IFRS with high enforcement, the disaggregated reporting of asset impairment provides most improvement in explanatory power of model across all settings. The improvements are from 8.3% to 23.8% and significant consistently after 2008. Under IFRS with low enforcement disaggregating report of asset impairments significantly increase the R^2 of the models addressing the relations between accounting information and equity price except the year of financial crisis (2008). The results imply that in the year with dramatic fluctuation in macroeconomics investors may rely more on other resource than accounting information to determine stock prices.

Table 26 presents the associations between the components of asset impairments and stock returns. Under US GAAP the current and past stock returns are consistently and negatively associated with write-off components. The future stock returns are only negatively associated with impairments from intangibles with indefinite life. This result is inconsistent with Sloan and Li (2009) showing the lag deteriorating stock returns in the following two years. Under IFRS with high enforcement, the negative relations between impairment loss and current and past stock returns hold across different types of assets. Future returns are only negatively associated with impairments from intangible with indefinite life, suggesting the lag effects of such accounts. Under IFRS with low enforcement, current and past stock returns are negatively associated with write-off components.

Table 25.
Regression Analyses of Equity Prices on Long-Lived Asset Impairments by Year

US					
Year	Model 3.1	Model 3.2	Difference	z-statistics	N
2005	0.685	0.686	-0.001	[-0.08]	1,785
2006	0.793	0.806	-0.013	[-0.74]	1,771
2007	0.854	0.858	-0.004	[-0.50]	1,730
2008	0.832	0.866	-0.034	[-1.35]	1,645
2009	0.538	0.539	-0.001	[-0.450]	1,552
2010	0.251	0.288	-0.037	[-0.769]	1,455
2011	0.553	0.553	-0.000	[-0.00]	1,371

IFRS_H					
Year	Model 3.1	Model 3.2	Difference	z-statistics	N
2005	0.544	0.645	-0.101	[-0.15]	1,696
2006	0.536	0.655	-0.119	[-0.18]	1,680
2007	0.519	0.602	-0.083	[-0.63]	1,610
2008	0.525	0.689	-0.164	[-1.45]	1,532
2009	0.458	0.690	-0.232**	[-2.30]	1,441
2010	0.467	0.705	-0.238***	[-3.05]	1,382
2011	0.524	0.705	-0.181**	[-2.51]	1,322

IFRS_L					
Year	*Model 3.1*	*Model 3.2*	*Difference*	*z-statistics*	*N*
2005	0.866	0.890	-0.024***	[-4.23]	981
2006	0.874	0.879	-0.005***	[-3.94]	964
2007	0.861	0.888	-0.027***	[-3.28]	939
2008	0.924	0.879	0.045***	[-2.70]	907
2009	0.925	0.968	-0.043***	[-2.98]	872
2010	0.929	0.965	-0.036**	[-2.41]	831
2011	0.907	0.945	-0.038**	[-2.36]	792

IFRS_H and *IFRS_L* represent samples under IFRS with high and low enforcement respectively.
***, **, and * denote the significance at <.01, <.05, and <.10 levels for two-tailed tests.
† denotes the significance at <.10 level for one-tailed tests.
t-statistics are showed in parentheses. z-statistics are included in brackets.
See APPENDIX A for variable definitions.

Table 26.
Regression Analyses of the Components of
Long-Lived Asset Impairments on Stock Returns

	Variables	*US*	*IFRS_H*	*IFRS_L*	Difference *US* vs *IFRS_H*	*Difference* *IFRS_H* vs *IFRS_L*
	$FRET_{it}$	0.003	0.013	-0.007	-0.010	0.020
		(0.78)	(1.29)	(-1.14)	[-1.99]	[1.15]
IMPT	RET_{it}	-0.017***	-0.029***	-0.044***	0.012	0.015
		(-3.63)	(-4.35)	(-5.17)	[1.73]	[1.61]
	$BRET_{it}$	-0.011***	-0.017***	-0.029***	0.006	0.012
		(-2.86)	(-3.17)	(-5.31)	[0.74]	[2.05]
	$FRET_{it}$	-0.006***	-0.005*	0.003†	-0.001	-0.008**
		(-2.59)	(-1.87)	(1.32)	[-0.22]	[-5.00]
IMPI	RET_{it}	-0.009***	-0.012***	-0.008**	0.003	-0.004
		(-3.04)	(-3.89)	(-2.56)	[0.22]	[-0.51]
	$BRET_{it}$	-0.010***	-0.010***	-0.009***	-0.000	-0.001
		(-3.72)	(-4.23)	(-4.47)	[-0.00]	[-0.02]
	$FRET_{it}$	0.003†	-0.003	-0.004	0.006	0.001
		(1.32)	(-0.74)	(-0.79)	[1.47]	[0.01]
IMPG	RET_{it}	-0.008**	-0.031***	-0.019**	0.023***	-0.012
		(-2.56)	(-5.37)	(-2.54)	[10.26]	[-1.39]
	$BRET_{it}$	-0.009***	-0.015***	-0.004	0.006	-0.011*
		(-4.47)	(-3.44)	(-0.86)	[1.24]	[-2.70]

IFRS_H and *IFRS_L* represent samples under IFRS with high and low enforcement respectively.
***, **, and * denote the significance at <.01, <.05, and <.10 levels for two-tailed tests.
† denotes the significance at <.10 level for one-tailed tests.
t-statistics are showed in parentheses. z-statistics are included in brackets.
See APPENDIX A for variable definitions.

6.7 Conclusions

The objective of this study is to investigate the market valuation of long-lived asset impairments under US GAAP and IFRS. In chapter 4 of this dissertation I compare the ability of asset impairments to predict future performance under the two standards. I document that the impairment losses under IFRS with high enforcement are in general more informative about firms' future performance than those under US GAAP, especially in the impairments from long-lived tangible assets and goodwill. The results suggest that impairment accounting under US GAAP and IFRS is not totally comparable in terms of informativeness. In this chapter I address this comparability issue from investors' perspectives and examine how the asset impairments under the two standards are incorporated into investors' valuation process.

Value relevance comparability defines accounting amounts as being comparable if they explain the same variation in economic outcomes (Barth et al. 2012). By employing equity price as the metric of economic outcome in the capital market, I address the respective usefulness of long-lived asset impairments under US GAAP and IFRS in explaining firm values and document the highest improvement (14.3 percent) in explanatory power of asset write-offs in IFRS adopters with high enforcement whereas the slight but insignificant increase (0.5 percent) under US GAAP, suggesting greater value relevance of asset impairments under IFRS. I further disaggregate impairment losses to components based on respective long-lived asset types. Although such disaggregation does not explain equity prices better, the effects of impairment loss on equity price vary with the types of long-lived assets. Under IFRS, the impairments of tangible assets are negatively related with equity price, suggesting investors incorporate

this information as negative signal into their valuation models. However, the impairments of intangibles under IFRS and most asset write-offs under US GAAP are positively associated with equity price, suggesting asset write-offs are not reported in a timely manner or investors have different understanding of these components.

The coefficient comparisons exhibit significant difference in most asset write-off components between US GAAP and IFRS with high enforcement but not between high and low enforcement under IFRS, implying that accounting standards in place take more important roles than institutions in determining the effects of impairment information on equity prices.

I also use different periods of stock returns as alternative metrics of economic outcome and examine their associations with asset impairments. Asset impairments are consistently and negatively associated with concurrent stock returns under US GAAP and IFRS, confirming their negative effects on the market. The significantly negative association between asset write-offs and future earnings provides evidence of delayed reporting of asset write-offs under US GAAP whereas this association is not significant under IFRS with high enforcement. The relations between asset impairments and future returns are also negatively significant under IFRS with low enforcement. One possibility is that as a result of low enforcement, the reporting of asset write-offs is not fully reported as that under IFRS with high enforcement. Another possibility is that although the asset is impaired fully and timely, investors do not rely on impairment reporting to make enough downward adjustment for firm value due to the low enforcement. Both cases will lead stock returns decrease further in the future. The associations between past stock returns and asset write-offs are consistently negative across all settings and suggest

that investors may sense the deterioration of underlying economics from sources other than financial reporting, such as the change in macroeconomics or the trend in industry growth no matter what accounting standards are adopted. Considering the effects of asset impairments on stock returns in different time periods, the associations differ more between US GAAP and IFRS with high enforcement than those within IFRS regimes between high and low enforcement.

Consistent with the conclusions in chapter 4 that asset impairments in general provide more relevant information under IFRS than US GAAP, I find that impairments are also reflected in equity prices and stock returns in a more timely manner under IFRS. In summary, the comparability of value relevance in long-lived asset impairments is determined more by the design of accounting approaches than institutional characteristics.

CHAPTER 7

CONCLUSIONS

In this dissertation, I compare impairment accounting of long-lived operating assets under US GAAP and IFRS along different dimensions, including informativeness about future performance, determinants of write-offs, and market valuation. Under US GAAP, after the release of SFAS No. 168 the accounting standards codification (ASC) superseded previous documents to form the single authoritative accounting principles. Impairment accounting is included in Topic 350 *Intangibles- Goodwill and Other* and Topic 360 *Property, Plant, and Equipment* for respective assets. Both topics employ the two-step impairment testing model. Under IFRS, this issue is covered in IAS 36 *Impairment of Assets*, which is applicable to all types of long-lived assets and the one-step impairment model is utilized.

Although impairment accounting under US GAAP and IFRS both are designed to reflect the underlying economics and the decline of assets' economic value, the inconsistency between the two standards such as impairment testing model, thresholds to trigger impairment reporting, and the criteria to identify asset groups lead to the question whether the reported asset write-offs under US GAAP and IFRS comparable and motivate this dissertation.

In the first paper (chapter 4) I address the informativeness of reported asset write-offs and examine the predictive ability of such amounts for firm future performance. I document that impairments are indicative of the lower of firm future performance, but such predictive ability also depends on the types of assets impaired, accounting standards

applied, and institutional characteristics. Total impairments, in general, are consistently related to firm future performance under IFRS but not US GAAP. Under IFRS the impairments from tangible long-lived assets is more informative than those from other types of assets, but such predictive ability also vary with institutions. In IFRS countries when enforcement is high the impairment losses are more associated with firm future performance. However, legal origin does not significantly affect this association.

In my second paper (chapter 5) I investigate the determinants of long-lived asset impairments under US GAAP and IFRS, including macroeconomic factors, firm performance and characters, reporting incentives and executive incentives. I find that while US GAAP and IFRS apply different models for asset impairment, both of them reflect certain underlying economics and reporting incentives. Under US GAAP the reported asset write-offs strongly reflect macroeconomic factors and are associated with proxies for earnings management, including taking a big bath and income smoothing. Under IFRS asset impairments reflect most economic factors and less reporting incentives and are different from those under US GAAP in unemployment rates, industry performance, the change of cash flows and past earnings. In addition, the institutions play important roles in this setting. With high enforcement, impairment losses are more related to indicators of firm characters while such amounts reflect more macro economic factors in countries with low enforcement. In addition, reporters in low enforcement countries tend to take a big bath and smooth income through asset impairments.

In the third paper (paper 6) I compare the value relevance of reported asset write-offs under US GAAP and IFRS with different levels of enforcement. I examine whether the disaggregated reporting of long-lived asset impairments increases the explanatory

power of accounting information for equity price and find significant improvement under IFRS with high enforcement but not under US GAAP or IFRS with low enforcement. Combined with the findings in chapter 4 of the higher informativeness of long-lived asset impairments under IFRS, I document impairment information is reflected in equity prices and stock returns in a more timely manner under IFRS. The delayed reporting of asset write-offs under US GAAP has lagged effects on future stock returns. On the other hand, stock returns partially reflect the event of asset impairments before the release of financial reporting in all standards and institutions settings, implying investors may sense a downward turn in underlying economics and firm values from other sources, such as the change in macroeconomics or the trend in industry growth.

In summary, the findings suggest long-lived asset impairments are more informative about firms' future, reflect less reporting incentives, and are valued more by investors under IFRS than under US GAAP. Enforcement also takes an important role and strengthens these associations except for market valuation. This work addresses the comparability of a specific issue under US GAAP and IFRS and is relevant to SEC's concern about the convergence of the two standards. Reporting of asset impairments and related comparisons in this dissertation may be limited by exogenous factors, such as the difference in market efficiency or the effects of economic trends (e.g., financial crisis) over the world. In addition, I only focus on long-lived operating assets. The impairments of assets in other types (e.g., current assets or financial assets) or purposes (e.g., held for sale) are excluded.

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APPENDIX A.
SUMMARY OF VARIABLE DEFINITIONS

Chapter 4 Model (1.1) to (1.3)

IMP	=	reported long-lived asset impairments (shows as a positive amount); including *IMP_TOL*, *IMP_TAN*, *IMP_INT*, and *IMP_GW* which represent respective impairments in total, tangible assets, intangible assets other than goodwill, and goodwill.
IBB	=	income before extraordinary items and discontinued operations (*EARN*) minus long-lived asset write-offs (*IMP_TOL*);
OCF	=	net cash flow from operation excluding accruals from extraordinary items and discontinued operations;
ACC	=	accrual components excluding long-lived asset impairments= *EARN-OCF+IMP*;
ΔAR	=	change in accounts receivable per the statement of cash flows;
ΔAP	=	change in accounts payable per the statement of cash flows;
ΔINV	=	change in inventory;
DEP	=	depreciation and amortization expense;
OTHER	=	net of all other accruals, calculated as *EARN*-(*OCF+ΔAR-ΔAP+ΔINV-DEP-IMP*);
IROA	=	median in firm *i*'s country-industry return on assets. Industry classification is based on two-digit SIC code
AT	=	total assets at the beginning of the year;

All above variables except *IROA* and *AT* are deflated by beginning total assets.

Chapter 4 Model (1.4) to (1.6)

IMP	=	reported long-lived asset impairments (shows as a positive amount), including *IMPA*, *IMPT*, *IMPI*, and *IMPG* which represent respective impairments in total, tangible assets, intangible assets other than goodwill, and goodwill;
ROE	=	net income adjusted by long-lived asset impairments;
ROEBSI	=	income before special items, extraordinary items and discontinued operations adjusted by long-lived asset impairments;
OPINC	=	operating income after depreciation adjusted by long-lived asset impairments;
GM	=	gross margin;
SGA	=	selling, general and administrative expenses;
DA	=	depreciation and amortization;
MIN	=	minority interest;
NOPIN	=	non-operating income;
ICTX	=	income tax;
SPEC	=	special item;
NREC	=	non-recurring items;
IROA	=	median in firm *i*'s country-industry return on assets. Industry classification is based on two-digit SIC code
SEQ	=	total shareholders' equity at the beginning of the ye;

All above variables except *IROA* and *SEQ* are deflated by beginning shareholders' equity.

Chapter 5 Model (2.0) to (2.3)

Dependent Variables:

$Pr(IMP_{it})$ = the dummy variable for IMP_{it}, equal to 1 to indicate the occurrence of respective asset write-offs in year t for firm i, and 0 otherwise.

IMP_{it} = aggregate long-lived asset impairments deflated by total assets at the beginning of period for firm i in year t reported as positive numbers.

Explanatory Variables and Controls:

ΔGDP_{it} = the percent growth of gross domestic product in respective countries of firm i from year t-1 to t.

UER_{it} = the unemployment rate based on the total labor force in respective countries where firm i is incorporated in year t.

$\Delta IROA_{it}$ = the median change in firm i's country-industry return on assets from t-1 to t. Industry classification is based on 2-digit SIC code.

ΔOCF_{it} = the change of operating cash flows from t-1 to t deflated by total assets at the beginning of year t.

E_{it-1} = earnings adjusted form long-lived asset write-offs in t-1 deflated by total assets at the beginning of t.

BH_{it} = the measure of "taking a big bath", equal to the change in firm i's pre write-off earnings from t-1 to t deflated by total assets at the beginning of t if below the median of nonzero negative values of this variable, and 0 otherwise.

SM_{it} = the measure of "earnings smoothing", equal to the change in firm i's pre- write-off earnings from t-1 to t deflated by total assets at the beginning of t if above the median of non-zero positive values of such value, and 0 otherwise.

FA_{it} = the proportion of foreign assets to total assets for firm i in year t.

VOL_{it} = volatility of firm value measured as firm i's average annual price movement from mean to high and low price in year t.

ΔCEO_{it} = an indicator equal to 1 if firm experiences a change in chief executive officer (CEO) from year t-1 to t, and 0 otherwise.

$SIZE_{it-1}$ = the natural log of total assets of firm i at the beginning of year t.

LEV_{it-1} = total debt-to-asset ratio of firm i at the beginning of year t.

$LOSS_{it-1}$ = an indicator to identify firms having net loss in year t-1.

$Mills_{it}$ = the *inverse Mill's ratio* developed from model (2.2).

Chapter 6 Model (3.0) to (3.3)

Dependent Variables:

P	=	stock price six months after the fiscal year-end;
P^*	=	residuals from regressing stock price (P) on country and industry fixed effects;
IMP	=	reported write-offs from total long-lived assets (*IMPA*), tangible assets (*IMPT*), identifiable intangibles (*IMPI*), and goodwill (*IMPG*). All aforementioned variables are deflated by total assets at the beginning of period;

Explanatory Variables and Controls:

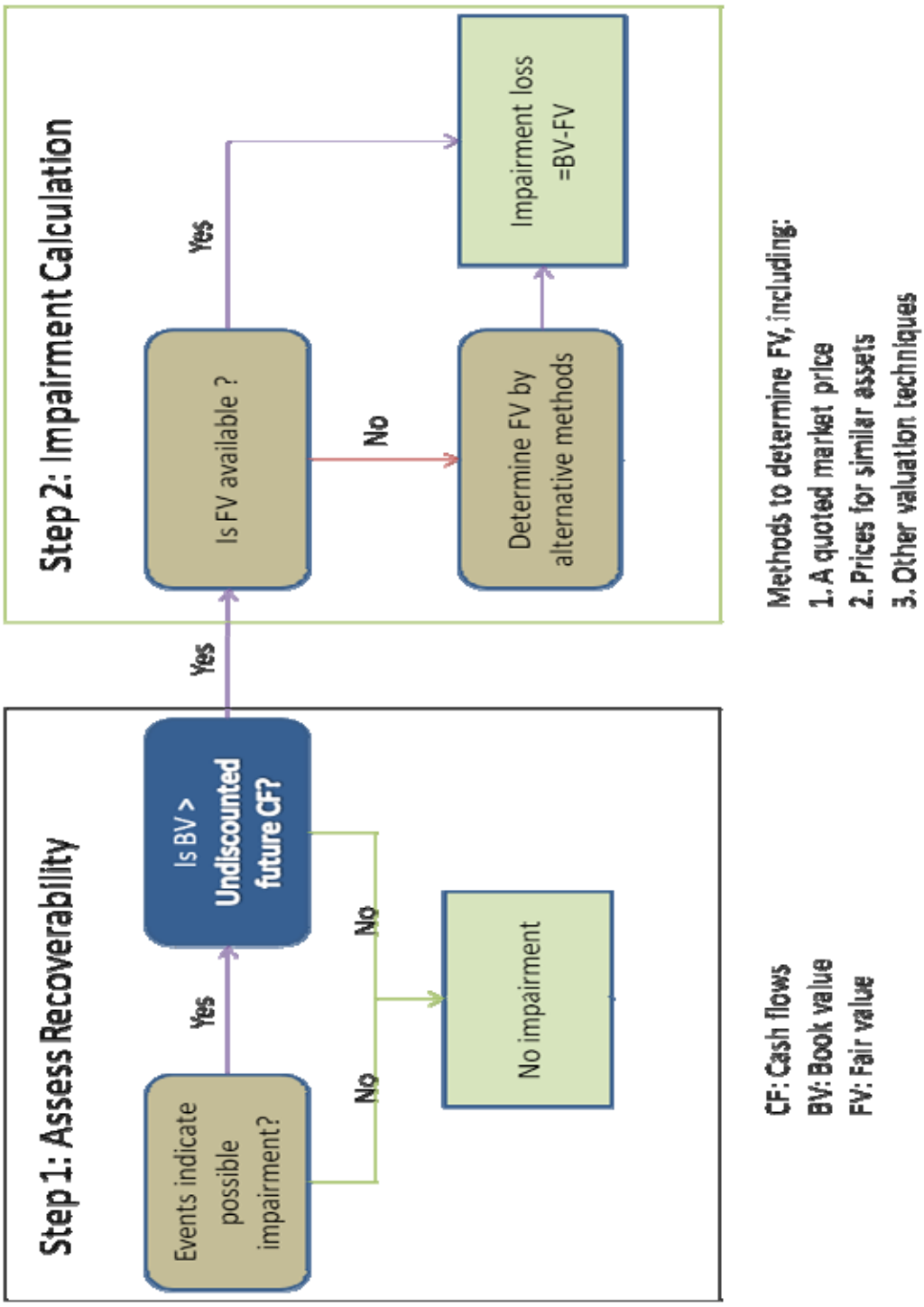
IMPPS	=	items for long-lived asset impairment per share, including aggregate impairments (*IMPSA*), reported write-offs from tangible assets (*IMPST*), intangibles (*IMPSI*), and goodwill (*IMPSG*).
C	=	indicators of firm countries;
I	=	indicators of firm industries; Industry is classified based on 2-digit SIC code;
BV	=	book value of equity per share.
E	=	income before extraordinary items per share;
Ea	=	earnings before extraordinary items adjusted by long-lived asset impairments per share.
FRET	=	future return, constructed as the market-adjusted annual return starting from six months after fiscal year end. The raw return is adjusted by the value-weighted average annual market return in respective sample country;
RET	=	contemporaneous return, constructed as the market-adjusted annual return starting from six months before fiscal year end. The raw return is adjusted by the value-weighted average annual market return in respective sample country;
BRET	=	past return, constructed as the market-adjusted annual return ending at six months after the beginning of the fiscal year. The raw return is adjusted by the value-weighted average annual market return in respective sample country;
MTB	=	market-to-book ratio;
ROA	=	return on assets;
SIZE	=	logarithm of market value;
IROA	=	mean of industry return on assets under respective accounting standards. Industry is classified based on 2-digit SIC code;
IRET	=	industry stock return under respective accounting standards. Industry is classified based on 2-digit SIC code;

APPENDIX B.
SUMMARY OF IMPAIRMENT TESTING FOR LONG-LIVED OPERATING ASSETS BY STANDARDS AND TYPES

US GAAP			
Steps	***Tangible & Intangible Assets with a Definite-life***	***Intangible Assets with an Indefinite Life***	***Goodwill***
Frequency	When indicators are present	At least annually	When indicator are present[64]
Step 1: Assess Recoverability	Determine whether the asset's carrying amount is higher than the sum of the future undiscounted cash flows. If yes, then move to the impairment test. **If no, then stop.**		Determine whether the reporting unit's (RU) carrying amount is higher than its fair value. If yes, then move to the impairment test. **If no, then stop.**
Step 2: Impairment Loss Calculation	Carrying amount less fair value	Determine the fair value. Impairment loss is the carrying amount less fair value	Carrying amount less implied value of goodwill. Implied value is the difference between the fair value of the RU and the fair value of the RU's individual net assets *excluding* goodwill. Impairment amount is limited to the carrying value of goodwill.
IFRS			
Steps	***Tangible & Intangible Assets with a Definite-life***	***Intangible Assets with an Indefinite Life***	***Goodwill***
Frequency	Annually - assess existence of impairment indicators	At least annually	At least annually
Step 1: Impairment Loss Calculation	Determine the recoverable amount, which is the higher of fair value less costs to sell and its value in use. Then, move to the impairment test. Impairment loss is the carrying amount less recoverable amount	Determine the recoverable amount, which is the higher of fair value less costs to sell and its value in use. Then, move to the impairment test. Impairment loss is the carrying amount less recoverable amount	Determine the CGU's recoverable amount, which is the higher of its fair value less costs to sell and its value in use. Then, move to the impairment test. Impairment loss is the carrying amount of the CGU less recoverable amount of the CGU. Goodwill is first reduced and then the remaining loss is prorated to the unit's other net assets.

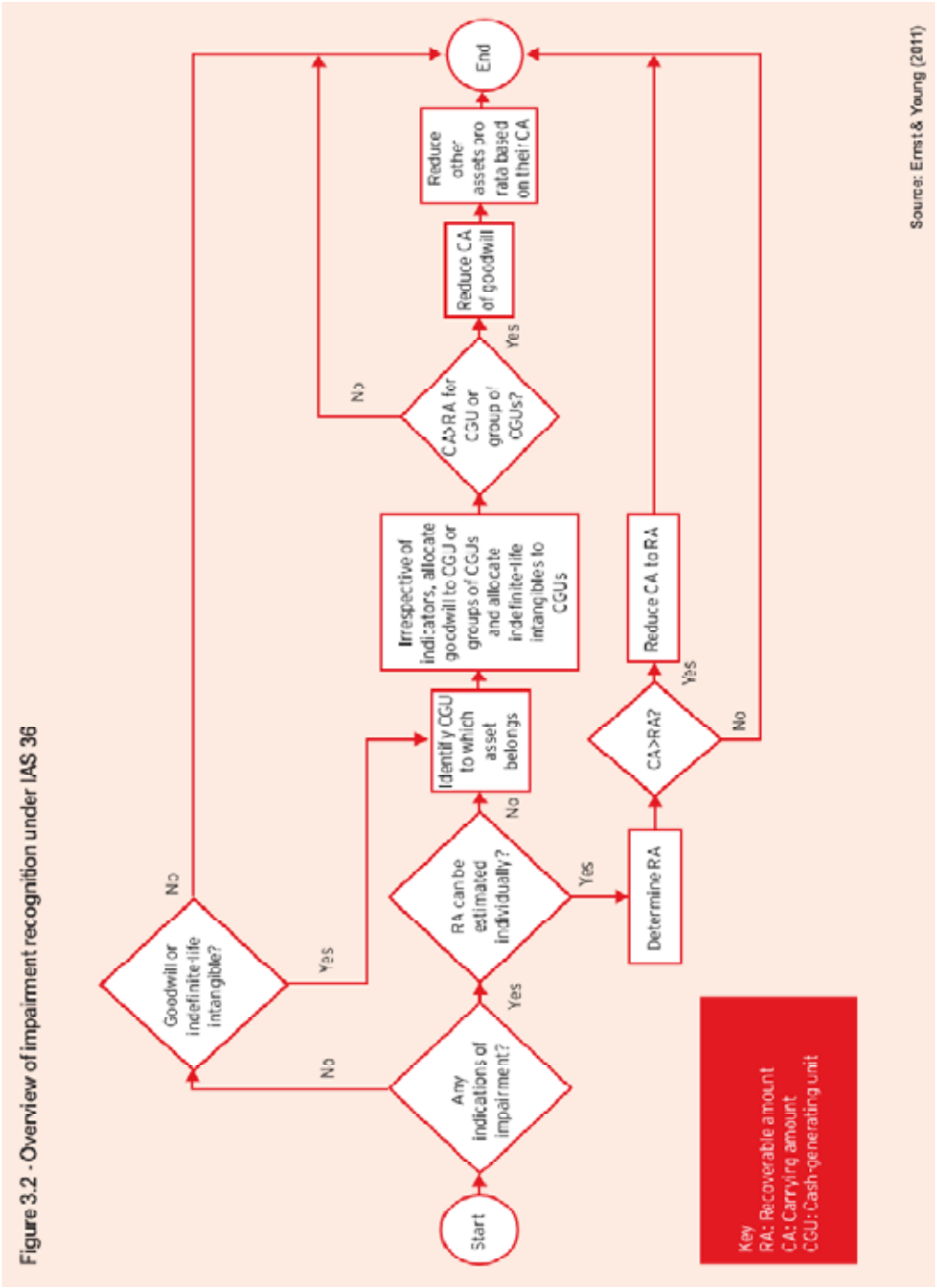
[64] At least annually before September 2011 (ASU 2011-08).

Two-step Model of Impairment Testing under US GAAP (ASC 350/360)[65]



[65] Fair value used in impairment testing here is determined by the guidance of ASC 820-10-30-2 (Ernst and Young 2011), which defines fair value as the price that would be received to sell the asset or paid to transfer the liability (an exit price). ASC 360-10-50-2 requires the disclosure of the bases or methods for

One-step Model of Impairment Testing under IFRS (IAS 36)



determining fair value in the notes to financial statements, such as a quoted market price, prices for similar assets, or another valuation technique.