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**A STUDY OF LONG-LIVED ASSET IMPAIRMENT UNDER U.S. GAAP AND IFRS
WITHIN THE U.S. INSTITUTIONAL ENVIRONMENT**

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A STUDY OF LONG-LIVED ASSET IMPAIRMENT UNDER U.S. GAAP AND IFRS WITHIN THE U.S. INSTITUTIONAL ENVIRONMENT

This paper explores whether differences in accounting standards influence reporting behavior within the U.S. institutional environment where both IFRS and U.S. GAAP are used for reporting purposes. We focus on the accounting for impairment of long-lived assets, an area where significant differences exist between U.S. GAAP and IFRS. We identify all U.S.-listed firms who have recognized long-lived asset impairment losses during the 2004 to 2012 period. From these firms, we identify firms following IFRS, then develop a matched sample of U.S. GAAP firms, using a propensity score matching procedure. We examine the relation between impairment loss and unexpectedly high or low earnings in the year of impairment using a two-stage Heckman regression model, controlling for industry, country, year of write-down, and firm-level economic factors. We find that the association between impairment losses and unexpectedly high and low earnings is significantly greater for U.S. GAAP firms as compared to IFRS reporting firms, implying differences in accounting standards influence firm financial reporting. Our findings are robust to alternative measures of country level institutional factors and macro-economic variables, as well as inclusion of asset impairment reversals.

Keywords: Long-lived asset write-downs, asset impairments, IFRS, U.S. GAAP.

I. INTRODUCTION

In recent years the U.S. Securities and Exchange Commission (SEC) has taken steps towards accepting International Financial Reporting Standards (IFRS). In 2007, the SEC eliminated the requirement for foreign private issuers using IFRS as issued by the International Accounting Standards Board (IASB) to reconcile IFRS financial statements to U.S. GAAP. Thus, U.S. investors and financial statement users need to interpret both IFRS and U.S. GAAP financial statements. Further, in 2010 the SEC expressed support for the continuing convergence of U.S. GAAP and IFRS (SEC Release No. 33-9109). While U.S. GAAP and IFRS accounting models are similar in many respects, significant differences remain (SEC Staff Paper - Final Report, 2012). The effect of these differences on reporting behavior within the U.S. institutional environment is unclear.

Prior cross-national research provides evidence that a weak reporting environment has a stronger influence on firm reporting behavior than do exogenously determined high quality accounting standards (Ball, Robin and Wu 2003; Burgstahler, Hail and Leuz 2006; Daske, Hail, Leuz and Verdi 2008). Within the U.S., pre-2007 research provides evidence that a strong reporting environment may not constrain earnings management behavior of firms from weak home country reporting regimes (Lang, Raedy and Wilson 2006). While prior research offers insight on the relation between reported earnings and the institutional environment, it does not address the effect of differences between high quality accounting standards within a strong reporting environment. Given that foreign private issuers may now report in accordance with IFRS within the U.S., it is important to understand the effect of specific differences between U.S. GAAP and IFRS standards on reporting behavior.

One area of continuing difference is the accounting for impairment of long-lived assets (SEC Staff Paper - Final Report, 2012). This paper examines whether the differences in accounting standards on impairment of long-lived assets, other than goodwill, under U.S. GAAP (ASC 360-10-35) and under IFRS (IAS 36), influence firms' reporting behavior in the U.S. Understanding the effect of the differences in these accounting standards, if any, provides insight to standard-setters and regulators, as well as to financial statement users seeking to understand the influence of accounting standards and the implications of asset write-downs on a firm's reported earnings.

While both U.S. GAAP and IFRS require assumptions and estimates that provide firms' flexibility in determining the amount and timing of the write-down, two significant differences exist between the asset impairment standards that could influence firms' reporting behavior.¹ The first is the U.S. GAAP recoverability test and the second is the reversal of impairment losses allowed under IFRS but prohibited under U.S. GAAP. Research of long-lived asset impairments, other than goodwill, in the 1990's in the U.S. observed indications of firms recording asset write-downs in periods of unexpectedly low earnings suggesting "big bath" reporting behavior (Riedl 2004). Research has also observed income smoothing and "big bath" reporting behavior in non-U.S. listed firms reporting under IAS 36 in specific country settings (Siggelkow and Zülch 2013; Duh, Lee and Lin 2009).

While research suggests that reporting incentives within specific institutional environments are more important to accounting quality than accounting standards (Ball et. al, 2003; Burgstahler et. al, 2006), little research examines the behavior of firms using IAS 36 in the U.S. institutional setting. No study compares the reporting of firms under ASC 360-10-35 and IAS 36 within one country's institutional setting.

¹ We discuss other less fundamental differences between the standards such as, impairment indicators and the specifics of the calculation of the amount of the impairment loss, in the Background and Prior Research section.

To examine the reporting behavior of firms following the two asset impairment standards, we identify all U.S. listed firms found in *Compustat North America* that recognized long-lived asset impairment losses, other than goodwill, during the 2004 to 2012 period. From these firms we develop a matched sample, using propensity scores based on firm specific characteristics and year of write-down, of U.S. GAAP firms and IFRS firms. We compare these firms' long-lived asset impairment losses, earnings, and other firm characteristics using univariate comparisons. In addition, we use multivariate regression analyses to examine the relation between impairment loss and unexpectedly high or low earnings in the year of impairment. To mitigate potential selection bias, we use the Heckman two-stage specification for our IFRS model. Since the asset impairment amount is related to a decline in recoverability of a firm's assets, we also control for economic factors i.e., industry return on assets, firm level sales and operating cash flows.

Our multivariate analysis finds a significant negative relation between unexpectedly low earnings (prior to write-downs) and write-downs for U.S. GAAP firms during the 2004 through 2012 period, suggesting "big bath" reporting behavior. We also find a significant positive relation between unexpectedly high earnings (prior to write-downs) and write-downs for U.S. GAAP firms, suggesting income-smoothing behavior. A comparison of U.S. GAAP reporting firms and U.S. listed IFRS firms reveals that U.S. GAAP firms have a significantly higher association between write-downs and both unexpectedly low earnings (prior to write-downs) and unexpectedly high earnings (prior to write-downs) as compared to IFRS firms. We include alternative measures for country level institutional factors for the foreign private issuers in our sample with no substantive difference in our findings. Our findings remain robust when we limit our sample to a comparison of foreign private issuers using U.S. GAAP reporting standards to foreign private issuers using IFRS.

The strong U.S. regulatory and legal environment incentivizes appropriate application of accounting standards. Therefore, one interpretation of our findings is that the application of ASC 360-10-35 results in the unintentional appearance of earnings management. An alternative explanation is that the two-step test required for determining an impairment loss under U.S. GAAP allows more discretion in determining the timing of impairment losses. This discretion, coupled with the inability to reverse impairment losses, provide U.S. GAAP firms both opportunity and incentive to time reporting of impairment losses in periods when there is a need to report higher or lower earnings.

We find that long-lived asset write-down reporting behavior differs between firms applying U.S. GAAP, ASC 360-10-35, and firms applying IFRS, IAS 36. This finding contributes to our understanding of the effect of differences in the reporting of U.S. listed firms under IFRS and U.S. GAAP standards. This evidence implies that accounting standards influence firm reporting behavior within the U.S. institutional setting. Our findings highlight differences financial statement users may encounter in comparing U.S. GAAP and IFRS earnings for U.S. listed firms with seemingly similar economic conditions and transactions. Further, our evidence implies that differences in accounting standards are reflected in reporting behavior within strong reporting environments, contributing to the debate on the desirability of global accounting standards.

Our findings also contribute to the asset impairment literature by extending the findings of Riedl (2004) on firm behavior under U.S. GAAP and extending the IFRS asset impairment research to the U.S. setting. These findings should be of interest to accounting standard-setters and regulators as they evaluate the impact of the standards and work to improve them.

The remainder of the paper proceeds in the following order. Section II provides background and prior research. Section III describes the institutional setting and presents hypotheses. Section

IV describes the sample and presents the method for our analysis. Section V presents results and additional tests. We present our conclusions in Section VI.

II. BACKGROUND AND PRIOR RESEARCH

Overview of U.S. GAAP and IFRS Asset Impairment Standards

Within the U.S., there are separate standards and criteria for accounting for impairment of long-lived tangible assets (ASC 360-10-35) and indefinite-lived intangible assets, including goodwill (ASC 350). Distinct differences between the nature and accounting for indefinite-lived intangible assets and long-lived tangible assets influence the timing of impairment loss recognition (Banker, Basu and Byzalov 2014; Ramanna and Watts 2012; Li, Shroff, Venkataraman, and Zhang 2011; Hayn and Hughes 2006).² In this study, we examine whether there is a difference in the association between current period income and impairment losses between U.S. GAAP and IFRS. Given our focus on differences in specific standards and the effect on net income we limit our examination to impairments of long-lived tangible assets (ASC 360-10-35).

The intent of both ASC 360-10-35 and IAS 36 is to provide a method for recognizing losses when the recoverable amount of a long-lived asset is less than its financial statement carrying amount. The standards are similar in that they require management to use subjective estimates, projections, and assumptions to assess the recoverability of an asset's carrying amount. Both standards require identification of the level at which assets will be tested for impairment, individually or as an asset group, determination of when to test for impairment, and the recoverable amount, as well as the measurement and recognition of the impairment loss. Regardless of these similarities, differences exist within the specific guidance provided by each standard. For example,

² For example, Banker et al. (2014) provide evidence that short-term economic signals, such as sales change and operating cash flow change, have a greater impact on long-lived tangible assets than on indefinite-lived intangible assets.

IFRS considers changes in market interest rates as an indicator of impairment whereas U.S. GAAP does not. Further, when determining the asset's recoverable amount IFRS provides more specificity on the identification of discounted cash flows. There are also differences in the sequence of testing for impairment of asset groups that have associated goodwill. Beyond these guidance differences there are two fundamental differences between the standards that are recognized as potentially more significant (SEC 2011): the recoverability test used to identify impairment and the reversal of impairment losses.

U.S. GAAP requires a two-step test for determining an impairment loss. First, the recoverability test is used to identify a recognizable impairment. This test compares the carrying amount of a long-lived asset to its undiscounted sum of future cash flows (ASC 360-10-35-17). According to the FASB, undiscounted cash flows are used for "practical reasons" (SFAS 144 ¶B15). However, the amount of the impairment loss is not the difference between the carrying value of the asset and the undiscounted future cash flows. This test is used only to determine if a recognizable impairment exists. If the asset does not pass the recoverability test, the second step requires measurement of the impairment loss, determined as the difference between the carrying amount and fair value of the asset. Fair value is based on quoted market prices, if available. Otherwise, a discounted cash flow approach is used.

The recoverability test is required in ASC 360-10-35 but disallowed in IFRS. IAS 36 uses a one-step approach to determine an impairment loss. Under this standard when there is an indication of impairment the amount of the write-down is calculated as the excess of the asset's carrying amount over its recoverable amount. Recoverable amount is defined as the higher of an asset's fair value less costs to sell and its value in use. Discounted future cash flows are used to determine an asset's value in use. An impairment loss is recognized to the extent that the recoverable amount of

an asset is less than its carrying amount. When measuring an asset's recoverable amount, the International Accounting Standards Committee (IASC, the predecessor of the IASB), specifically rejected the proposal that recoverable amount be based on undiscounted cash flows. The IASC stated that the objective of the standard is to reflect an investment decision and that "all rational economic transactions take account of the time value of money" (IAS 36 ¶ BCZ13 (a)). The use of undiscounted cash flows in the U.S. GAAP recoverability test provides a higher threshold for recognizing an impairment loss. As such, it may result in later recognition of losses under U.S. GAAP than under IFRS (PWC 2013). This difference implies that assets with similar economics may be recognized differently under U.S. GAAP and IFRS.

The second fundamental difference is the ability of a firm to reverse previously recognized impairment losses allowed by IAS 36 but not under U.S. GAAP. Following IAS 36, at the end of each reporting period companies must assess whether a previously recognized impairment loss no longer exists or has decreased. If the company determines that an asset's recoverable amount has improved, they may reverse the impairment loss. However, IAS 36 specifies that "an impairment loss recognized in prior periods for an asset other than goodwill shall be reversed if, and only if, there has been a change in the estimates used to determine the asset's recoverable amount since the last impairment loss was recognized" (IAS 36 ¶114). Assuming these requirements are met, the reversal is immediately recognized as a gain on the income statement in order to offset the loss originally recorded for the impairment. Although a company may reverse the impairment loss, it cannot write the asset above its original value under the traditional historical cost model.³ U.S. GAAP does not allow the restoration of previously recognized impairment losses. Therefore,

³ Under IAS 16, a company may select to use either the cost model or the revaluation model as their accounting policy for a class of property, plant and equipment. The requirements, for reversal of impairment losses under the revaluation model, are presented in IAS 36.

although assets are subjected to a less strenuous recoverability test under U.S. GAAP, the write-down or impairment loss is permanent and cannot be reversed, even if the fair value of the asset returns to or exceeds its original value.

The fundamental differences between the U.S. GAAP and IFRS asset impairment standards potentially influence write-down behavior. In experimental studies, Seybert (2010) finds that the possibility of an asset impairment influences managerial behavior and Trottier (2013) finds that when managers know that an appropriate asset impairment loss can be reversed when economic conditions justify it, they are significantly more likely to record the impairment.

Prior Research

Prior to 1995 there was no explicit U.S. guidance on accounting for long-term asset impairment. Firms applied the general guidance in Statement of Financial Accounting Standard (SFAS) No. 5 *Accounting for contingencies*. However concerns over diversity of practice in the timing and measurement of impairment losses led the FASB to issue SFAS 121 *Accounting for the impairment of long-lived assets and for long-lived assets to be disposed of* which provides specific guidance and is the basis for the general provisions found in ASC 360-10-35.⁴ SFAS 121 was effective for fiscal years beginning after December 15, 1995. Alciatore et al. (1998 and 2000) provide a comprehensive review of the literature examining the effect of write-downs in the pre-SFAS 121 period. Given that the change in U.S. GAAP accounting standards may have affected the magnitude, timing, and managerial incentives related to write-down amounts, we focus on research examining the behavior of firms after the effective date of SFAS 121.

Riedl (2004) compared the association of long-lived asset write-offs with economic factors and firm behavior before and after SFAS 121. Prior to SFAS 121 two types of earnings

⁴ SFAS 121 was superseded in 2001 by SFAS 144 to address the accounting for a business segment that is identified as a discontinued operation.

management behavior were observed with asset write-downs, income smoothing and “big bath” behavior (Zucca and Campbell 1992). In the context of asset write-downs, income smoothing describes a firm that in its desire to maintain smooth earnings growth records write-downs in periods of unusually high earnings. Alternatively, “big bath” behavior describes a firm that records asset write-downs in a period when it already has lower than expected earnings providing the opportunity for better future earnings. Writing down an asset ensures that depreciation expense will be lower and therefore net income higher in future periods.

Riedl’s (2004) results reveal that write-downs under SFAS 121 have a lower association with economic factors and a higher association with “big bath” reporting behavior than pre-SFAS 121 write-downs. Further, Riedl finds that this “big bath” behavior “more likely reflects opportunistic reporting than managers providing information about their firms’ performance” (p. 849). This is the opposite effect that the standard is meant to have, yet is a consistent finding across industry, macro, and firm-specific variables.

Since Riedl’s (2004) study, there has been a significant increase in the amount of negative special item reporting in the U.S. (Johnson, Lopez, and Sanchez 2011; Fairfield, Kitching, and Tang 2009). Johnson et al. (2011) find that restructuring charges and long-lived asset write-offs are of significant importance to the negative special item category, finding that 39 percent of firms reporting a negative special item from 2001 to 2009 reported one or both of these types of charges. This increase in write-offs combined with the increased use of IFRS for reporting in the U.S. provides a unique opportunity to explore the effect on reporting behavior of differences between IFRS and U.S. GAAP within a strong institutional environment.

From an international perspective, studies examining the effect of IAS 36 observe the behavior of firms from specific institutional settings (Siggelkow and Zülch 2013; Duh et al. 2009; Dai, Deng,

and Mao 2007; Loh and Tan 2002). While the results of these studies may not be generalizable to a U.S. setting, we can draw insight from their findings. Dai et. al (2007) examine the behavior of Chinese listed firms after the adoption of the *China Accounting System for Business Enterprises* which aligned Chinese long-lived asset impairment accounting standards with IFRS. They find evidence of “big bath” reporting behavior, concluding that the revised Chinese accounting system provides “more opportunities of manipulating earnings” (p. 363). Loh and Tan (2002) examine long-lived asset write-down behavior in Singaporean firms that follow accounting standards aligned with IFRS. Their analyses of firm-specific and macroeconomic factors finds that profitability is related to long-lived asset write-downs suggesting earnings management motives.

Similarly, Siggelkow and Zülch (2013) examining write-off decisions of German-listed companies that report under IFRS, provide evidence indicating income smoothing behavior but not “big-bath” reporting behavior. Siggelkow and Zülch believe these findings may be a result of the German institutional environment which stresses prudence, creditor protection and minimization of tax payments.

As previously discussed, IFRS permits reversal of an impairment loss when information indicates that the impairment loss has decreased or no longer exists. Trottier (2013) examines the effect of allowing impairment loss reversals when the asset value recovers, as permitted by IAS 36, on Canadian managers’ decisions to recognize impairment losses. In the experiment, managers were asked to assess the likelihood of recording an indicated, material impairment loss. Her results suggest that the ability to reverse an impairment loss significantly increases the probability that managers will record such a loss.

Duh et al. (2009) examine whether Taiwanese listed firms that follow the equivalent of IAS 36 reverse asset write-downs to manage earnings. Using a sample of firms that reversed

impairment losses, they find that companies use periods of strong financial results to create reserves that can be used to bolster earnings in periods with weak financial results. They also find that this income smoothing behavior is more prevalent for firms with higher debt ratios, suggesting that these firms are managing earnings to avoid violating debt covenants.

Similar to the concept of asset write-down reversals, but using a different set of criteria, IFRS also allows the upward revaluation of property, plant and equipment to its fair value under the revaluation model (IAS 16). The revaluation model is not allowed under U.S. GAAP. The limited research examining IFRS asset revaluations provide evidence that the motives and effects for revaluations are a function of the institutional setting, consistent with evidence provided in cross-national asset impairment studies (Barley, Fried, Haddad and Livnat 2007; Missonier-Piera 2007). For example, Gordon and Hsu (2014) provide evidence that while asset write-offs under IFRS are more predictive of future cash flows than those under U.S. GAAP, there are differences in IFRS reporting behavior between firms from strong legal enforcement as compared to low legal enforcement institutional environments.

Overall, prior research examining reporting under IAS 36 and ASC 360-10-35 provides evidence that firms are able to manipulate earnings through asset impairments within specific country settings. Cross-national research also implies that differences in institutional factors influence that behavior. However, whether there are differences in the behavior of firms reporting under the U.S. GAAP and IFRS asset impairment standards within the U.S. institutional setting has not been examined.

III. INSTITUTIONAL SETTING AND HYPOTHESES

Institutional Setting

Cross-national research has found that the institutional setting influences firms' reporting incentives (Leuz et al. 2003; Daske et al. 2008; Jeanjean and Stolowy 2008; Houque, van Zijl, Dunstan and Karim 2012). This evidence appears consistent with the differential findings on reporting behavior under IAS 36. Gordon and Hsu (2014) provide evidence suggesting that the informativeness of asset write-downs depends on the institutional setting and Siggelkow and Zülch's (2013) evidence of income smoothing reporting behavior is consistent with Germany's institutional setting.

The U.S. institutional environment is based on a common law legal system with a large equity market, strong investor protection rights, and a strong legal enforcement system (LaPorta et al. 1997 and 1998; Leuz et al. 2003). Burgstahler et al. (2006) find that strong legal systems and capital market forces are associated with higher earnings quality suggesting that "the first order effect of capital markets is to increase earnings informativeness" (p. 1013). Further, Ball et al. (2003) in an analysis of East Asian countries provide evidence that the market and political forces forming a country's institutional setting have a greater impact on financial reporting quality than do high quality accounting standards.

However, Lang et al. (2006) provide evidence suggesting that the strong U.S. regulatory environment does not override the effect of the home country reporting regime. Examining reconciled earnings for U.S. listed foreign firms for 1991 – 2002; they find that non-U.S. firms exhibit more earnings management than U.S. firms. While they did not specifically consider the effect of IFRS reporting, their results held even for foreign firms that reported using U.S. GAAP in their home country. Within the U.S. market there is evidence implying that the institutional setting influences financial reporting. Kim, Li and Li (2012) find that U.S. listed firms reporting in accordance with IFRS without reconciliation to U.S. GAAP have not experienced negative

capital market consequences. Taken together this evidence leaves open the question of whether differences between U.S. GAAP and IFRS influence reporting behavior within the U.S. setting.

We consider this question and add to this research by examining the asset impairment reporting behavior of U.S. listed firms using accounting standards with recognized differences, IAS 36 and ASC 360-10-35. Prior to U.S. acceptance of IFRS for foreign private issuers, reconciliations were required between U.S. GAAP and IFRS (20-F reconciliations). Research examining these reconciliations provide evidence of significant differences between reported net income under the two sets of standards during the 2004-2006 period, with long-lived asset impairments being the second most common reconciliation category (Henry, Lin and Yang 2009). Examining a specific difference in accounting standards within the same institutional setting adds to the discussion over the influence of accounting standards and institutional environment on financial reporting.

Hypotheses

We are interested in whether the U.S. GAAP and IFRS long-lived asset impairment standards result in different firm reporting behavior in the U.S. setting. The U.S. is recognized as one of the most shareholder-focused countries in the world with strong investor rights and legal enforcement (Stout, 2012; LaPorta, et al., 1998). Therefore, this setting allows us to examine whether differences in accounting standards influence reporting behavior within a strong institutional environment. Ball et al. (2003) report evidence that the institutional setting has a stronger influence on reporting behavior than high quality accounting standards, exogenously determined, within weak investor protection environments. Leuz et al. (2003) find that investor protection is a more influential determinant of earnings management behavior than accounting rules that are endogenously determined. The U.S. setting is unique in that it provides a strong investor protection

environment in which to examine differences between high quality accounting standards, one developed within that environment (U.S. GAAP) and the other exogenously determined (IFRS). The strong institutional environment provides a high level of assurance on appropriate application of the standards.

As described previously, both standards seek to ensure that assets are not reported in financial statements at more than their recoverable amount. However, there are two fundamental differences between the asset impairment standards: the recoverability test required under U.S. GAAP but not allowed under IFRS, and the reversal of impairment losses allowed under IFRS but prohibited under U.S. GAAP. These differences in the standards may result in different reporting behavior by U.S. listed firms. However, if the U.S. institutional environment has a stronger influence on firm reporting behavior than accounting standards, then we would expect to see similar reporting behavior between firms following U.S. GAAP and IFRS. To investigate this expectation we examine the asset impairments of U.S. listed firms and test the following hypotheses.

H1: There is no difference in the relation between long-lived asset impairment write-downs and unexpectedly *low* earnings for U.S. GAAP reporting firms and U.S. listed IFRS reporting firms.

H2: There is no difference in the relation between long-lived asset impairment write-downs and unexpectedly *high* earnings for U.S. GAAP reporting firms and U.S. listed IFRS reporting firms.

If we find no difference in reporting behavior, it indicates that the U.S. institutional environment is influencing reporting behavior or that regardless of the differences in the standards, the reporting under the IFRS and U.S. GAAP standards is substantially equal. If however, we find a difference in reporting behavior, *ceteris paribus*, it indicates that, within a strong institutional environment, differences in accounting standards are influencing reporting behavior.

IV. SAMPLE SELECTION AND METHOD

Sample Selection

To develop the sample for our study, we identify all public companies within *Compustat North America* recording a write-down from 2004 to 2012.⁵ We select only firms listed in the U.S. and subject to U.S. financial reporting requirements. Prior to 2007, foreign private issuers listed in the U.S. that reported in accordance with IFRS were required to provide reconciliations between IFRS and U.S. GAAP in Form 20-F filings. Since 2007, foreign private issuers listed on U.S. stock exchanges are no longer required to prepare reconciliations to U.S. GAAP if their financial statements are prepared in accordance with IFRS as issued by the IASB.⁶ Thus IFRS financial statements are available within the U.S. market providing a favorable setting for examining the impact of differences in exogenously and endogenously determined reporting standards.⁷ We exclude from the sample companies not indicating the accounting standard used and those missing other data needed for our models. We include IFRS asset write-down firms reported as having standards that are compliant with IFRS as required by the SEC.⁸ This produces 7,478 potential firm-year observations, of which 578 are IFRS and 6,900 are U.S. GAAP firm-year observations.

⁵ We use the *Compustat* item “WDP” which includes 1) Impairment of assets other than goodwill, and 2) Write-down/write-off of assets other than goodwill, which excludes impairment of goodwill and impairment of unamortized intangibles. Therefore, it is possible the asset impairments include other amortizable intangible assets. However, while this is a limitation of our study its effect is mitigated since the size of intangible assets (*with either a definite or indefinite life*) other than goodwill (ITANO) is \$248 (\$0.56) million in mean (median) during our sample period while total fixed assets is \$1,241 (\$24.0) million.

⁶ The SEC acceptance of financial statements prepared in accordance with IFRS as issued by the IASB was effective for fiscal years ending after November 15, 2007.

⁷ A natural setting for the testing of our hypotheses would be to compare the U.S. GAAP write-down amount with the IFRS write-down amount for the same U.S. listed IFRS reporting firms in the pre-2007 period where U.S. GAAP reconciliations were required. However, when we reviewed the 20-F reconciliations for a sample of 33 of the 75 firm-year write-downs in our pre-2007 sample period, we found that 20-F reconciliations either were not available (10 observations) or specific item reconciliation amounts for write-downs were not provided (22 observations). Due to the lack of data we are unable to directly compare the write-down amount under U.S. GAAP and IFRS for the same firm.

⁸ IFRS data is presented at pre-reconciliation amounts in the *Compustat North American* database for fiscal years ending prior to the SEC’s elimination of the 20-F reconciliation requirement. To confirm this claim, we took a sample of 33 IFRS firms and compared their specific *Compustat* data with IFRS data from the firms’ Form 20-F filings. Without exception, all *Compustat* data matched IFRS information.

For our setting, we believe there could be two primary sources of potential selection bias. First, a foreign incorporated firm's decision to be cross-listed in the U.S. stock exchanges is not a random decision. Second, a foreign firm cross-listed in U.S. stock exchanges also has to select an accounting standard: U.S. GAAP or IFRS. This decision may not be random, either. Successfully controlling for these potential selection biases is critical to draw any meaningful inferences from our results.⁹

To address the first selection bias, related to a foreign firm's decision to be cross-listed in the U.S. stock market, we adopt the two-stage approach suggested by Heckman (1979). In the first stage, we model a firm's decision to be cross-listed, and compute the Inverse Mill's Ratio, which is added as a control variable to the model to correct the selection bias in the second stage. To address the second selection bias, related to a foreign firm's decision to select between U.S. GAAP versus IFRS, we compare IFRS asset write-down firm-years to their matched U.S. GAAP asset write-down firm-years, generated by a propensity matching process (see Tucker 2010). Our sample of foreign private issuers that report in accordance with IFRS in the U.S. is similar to those matched U.S. firms that use U.S. GAAP in size (market capitalization), profitability (ROA), and growth potential (book-to-market ratio). The propensity matching procedure first estimates a probability (or propensity score) that a firm will select IFRS with a given set of firm characteristics (size, ROA, and book-to-market ratio). Then we identify a firm-year observation with the closest probability within the U.S. GAAP asset write-down firm-years to identify a matched firm-year observation.

⁹ Ideally, we would like to compare U.S. firms that use U.S. GAAP to U.S. firms that use IFRS in the U.S. market. This method will allow us to test the impact of accounting standards after controlling for the regulatory environment and firms' country of incorporation. There is very few cases, however, that U.S. incorporated firms that use IFRS in the U.S. market during our sample period. As an alternative, our current research design compares the U.S. firms that use GAAP and the non-U.S. firms that use IFRS in the same stock market. However, we acknowledge the limitation of this matched sample approach because the U.S. firms and the non-U.S. firms are fundamentally different. Consequently, even our matched sample approach and the Heckman's two-stage approach can not completely rule out the possibility that our results are driven by the fundamental difference between the U.S. vs. non-U.S. firms in the U.S. stock markets.

Our matching procedure controls for certain factors affecting management incentives to manipulate earnings i.e., profitability and growth potential (Burgstahler and Dichev 1997; Barton and Waymire, 2004; Graham et al. 2005; Badertscher, 2011). Other factors, identified in prior research, may influence management incentives, such as CEO tenure and type of CEO compensation contract (Matsunaga and Park 2001). However, this information is not publically available for our sample firms.

Our matching procedure includes industry and year of write-down in addition to the propensity score in order to mitigate the impact of within industry and between year macro-economic changes that may influence managerial incentives related to write-downs.¹⁰ Since we match our U.S. GAAP and IFRS sample firm-years based on year of write-down and industry, we expect that any exogenous shock, such as the financial crisis that occurred during our sample period, affects both U.S. GAAP and IFRS reporting firms equally with respect to reporting behavior.

The matching process eliminated 11 IFRS firm-year observations because we were unable to appropriately match them with U.S. GAAP firm-year observations. Our final matched sample consists of 567 IFRS and 567 U.S. GAAP firm-year observations. Table 1 contains a summary of the sample selection process.¹¹

[Insert Table 1]

¹⁰ Results from excluding the year of write-down from the sample matching process confirms our main results that is, significant differences between U.S. GAAP and IFRS for the *BATHINCENT* ($\chi^2=2.11$, $p=.07$) and *SMOOTHINCENT* ($\chi^2=2.31$, $p=.06$) variables.

¹¹ Out of our sample of 567 IFRS firm-years, only 6 of the firm-years are voluntary adopters. This is consistent with our sample composition where we have 5 firm-year observations in 2004, prior to the 2005 mandatory adoption of IFRS in the European Union. Exclusion of voluntary adopters from our sample did not change the results substantively.

Table 2 summarizes the demographics of the U.S. listed IFRS sample. Panel A of Table 2 reveals that Canada is the most represented country with 189 firm-year observations, over 33 percent of all IFRS firm-year observations in the sample. The United Kingdom is the next most represented country with 74 firm-year observations, over 13 percent of all IFRS firm-year observations in the sample. Panel B of Table 2 reveals that the year 2012 has more observations in our IFRS sample than any other year; this is primarily a result of Canada requiring the use of IFRS for listed firms beginning in 2011. Panel C reveals that the IFRS companies found in the *Compustat North America* dataset represent diverse industries according to the Global Industry Classification Standard (GICS). The most frequent industry among the IFRS firm-year observations according to GICS is Materials, making up over 21 percent of the sample.

[Insert Table 2]

Method

We examine the validity of our sample matching process using univariate statistics to compare the firm specific characteristics of the IFRS sample and the matched U.S. GAAP sample. We then analyze the relation between write-downs and unexpectedly low and unexpectedly high earnings for IFRS and U.S. GAAP firm-years separately using the following two-stage Heckman regression model (Lennox, Francis, and Wang, 2012), adapted from Riedl (2004) and Francis et al. (1996).¹²

$$WDP_AT_{it} = \alpha + \beta_1 BATHINCENT_{it} + \beta_2 SMOOTHINCENT_{it} + \beta_3 \Delta INDROA_{it} + \beta_4 \Delta SALES_{it} + \beta_5 \Delta OCF_{it} + \beta_6 \log MARKETCAP_{it} + \beta_6 MILLS_{it} + \varepsilon_{it} \quad (1)$$

where:

$$WDP_AT_{it} = \text{Firm } i\text{'s pre-tax asset write-off (reflected as a positive amount) for period } t, \text{ divided by total assets at the end of } t-1;$$

¹² Unlike Riedl (2004) and Francis et al. (1996) who use a Tobit regression model we use an OLS regression model since we do not include non-write-down firms in our sample. However, the use of Tobit regressions did not change our results. Further, we do not include a variable for change in earnings in our models because in our sample change in earnings is highly correlated (over 69%) with both of our variables of interest, $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$, as such inclusion in the models results in high variance inflation factors indicating severe multicollinearity producing unstable models.

- $BATHINCENT_{it}$ = Firm i 's proxy for "earnings big bath" incentive, equal to the change in firm i 's pre-write-off earnings from $t-1$ to t , divided by total assets at the end of $t-1$, when this change is below the median of non-zero negative values of this variable, and 0 otherwise;
- $SMOOTHINCENT_{it}$ = Firm i 's proxy for "earnings smoothing" incentive equal to the change in firm i 's pre-write-off earnings from $t-1$ to t , divided by total assets at the end of $t-1$, when this change is above the median of non-zero negative values of this variable, and 0 otherwise;
- $\Delta INDROA_{it}$ = The median change in firm i 's (2-digit SIC) industry ROA from period $t-1$ to t ;
- $\Delta SALES_{it}$ = Firm i 's percent change in sales from period $t-1$ to t ;
- ΔOCF_{it} = Firm i 's change in operating cash flows from period $t-1$ to t , divided by total assets at the end of $t-1$;
- $\log MARKETCAP_{it}$ = Firm i 's proxy for size, equal to natural logarithm of market capitalization, calculated as fiscal-year closing stock price multiplied by number of outstanding common shares for period t ;
- $MILLS_{it}$ = Firm i 's inverse Mills ratio estimated from the Heckman's selection model

The dependent variable of the Heckman second-stage OLS model (1) is WDP_AT , which is the pre-tax asset write-down (reflected as a positive amount) for period t , divided by total assets at the end of $t-1$. In our model we include the variables, $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$, to capture reporting incentives that may exist when earnings are unexpectedly low, "big bath" incentives, and unexpectedly high, income smoothing incentives. $BATHINCENT_{it}$ is measured as the change in pre-write-off earnings from the previous year, divided by total assets of the previous year, when this change is below the median of non-zero negative values, and 0 otherwise. This variable has a predicted negative sign. $SMOOTHINCENT_{it}$ is measured as the change in pre-write-off earnings from the prior year, divided by prior year total assets, when this change is above the median of nonzero positive values, and 0 otherwise. The predicted sign of the $SMOOTHINCENT_{it}$ variable is positive. These variables are consistent with Riedl (2004) and Francis et al. (1996). We estimate two separate regression models: one for the U.S. GAAP sample and another for the IFRS

sample, and test whether the coefficients for $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$ are statistically different using the Wald test (Judge et al. 1985).¹³

We include in our regression model $\Delta INDROA_{it}$ capturing the effects of industry-specific changes on asset write-downs since economic conditions in less robust industries may require more asset write-downs than from firms in healthier industries. We measure this variable as the change from prior year in median return on assets (ROA) in industry as grouped by two-digit SIC code. We predict a negative association between write-downs (recorded as a positive amount) and $\Delta INDROA_{it}$. Next, we include two variables, $\Delta SALES_{it}$ and ΔOCF_{it} , to capture the effects of firm-specific performance changes on asset write-downs. $\Delta SALES_{it}$ is measured as the percentage change in sales of a firm from the prior year. ΔOCF_{it} is measured as the change in operating cash flows of a firm from the prior year, divided by the previous year total assets. We predict that both variables will have negative signs. We also include $\log MARKETCAP_{it}$, *Year Dummy*, *Country Dummy*, and *Industry Dummy* in the model to control for the effect of firm size, year, industry, and country, respectively. $\log MARKETCAP_{it}$ equals the log of the firm's market value, calculated as fiscal-year closing stock price, multiplied by the number of outstanding common shares for the year.¹⁴

To control for selection bias regarding IFRS firm's decision to be cross-listed in the U.S. we conduct the Heckman two-stage procedure (Heckman 1979; Lennox et al. 2012). We run our first

¹³ Conducting one regression with an indicator variable for IFRS and U.S. GAAP firms and a fully interacted model produces identical results.

¹⁴ The quality of the auditor may also influence reporting behavior. Therefore, we conducted a regression model including an indicator variable based on size of the audit firm as a proxy for auditor quality, coded 1 for use of a Big 4 auditor and 0 otherwise. We found no significance for the audit quality variable and found very little impact on the coefficient estimates for our other variables; the coefficients on $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$ were $-.097$ ($t = 2.31, p < .05$) and $.183$ ($t = 2.64, p < .05$) for the U.S. GAAP firms, respectively, and $-.003$ ($t = -.06, p > .1$) and $-.003$ ($t = -.08, p > .1$) for the IFRS firms, respectively. We do not include the audit quality variable in the main regression model because we do not have auditor data available for all firms resulting in a small reduction in our sample size ($n = 563$ and $n = 565$, for IFRS and U.S. GAAP, respectively).

stage model with IFRS firms' decision to be cross-listed as the dependent variable with a set of independent variables, identified by prior studies (Lang, et al. 2003). As well as controlling for company size (*logASSETS*), leverage (*LEVERAGE*), and profitability (*ROA*), we include the firm's industry median Tobin's q (*TOBINQ*) and the country's Gross Domestic Product (GDP). We also include industry and year indicator variables to control for the cross-sectional difference (e.g. the product market difference) and the fixed year effect. In addition, we include an indicator variable for the country legal system (English, French, German, Scandinavian, and others). From this first-stage model, we calculate the inverse Mill's ratio, which is added to the second-stage model (1) above.

V. RESULTS

Descriptive Statistics

Descriptive statistics on firm specific characteristics and model variables are provided in Table 3. The univariate comparison results presented in Table 3 support the validity of our sample matching selection process. The matched U.S. GAAP sample is similar to the IFRS sample in size (market capitalization), profitability (ROA), and growth potential (book-to-market ratio). Two-tailed t-tests of mean difference reveal that for the measurements of earnings management, neither the indicator of "big bath" reporting behavior (*BATHINCENT_{it}*) nor income smoothing behavior (*SMOOTHINCENT_{it}*) is significantly ($p < .10$) different for U.S. GAAP firms as compared to IFRS firms. We also find that size, return on equity, and return on assets are not significantly different between IFRS and U.S. GAAP firm-years.

[Insert Table 3]

Panels A and B of Table 4 present Pearson and Spearman correlation coefficients among the model variables for U.S. and IFRS firm-year observations, respectively. Examining the Pearson

correlation coefficients, we find that the write-down amount (WDP_AT) for U.S. GAAP firms is highly correlated with both $BATHINCENT_{it}$ (-.209, $p < .001$) and $SMOOTHINCENT_{it}$ (.295, $p < .001$). For IFRS reporting firms there is a much lower correlation between WDP_AT_{it} and the earnings management indicator variables, $BATHINCENT_{it}$ (-.130, $p < .01$) and $SMOOTHINCENT_{it}$ (.116, $p < .01$). Based on this univariate analysis, these correlations imply a stronger relation between asset impairment write-downs and earnings management in U.S. GAAP firms than in IFRS firms. As expected the firm financial performance variables, $\Delta SALES_{it}$ and ΔOCF_{it} , are significantly correlated across the IFRS and U.S. GAAP samples. These findings are consistent across both the Pearson and Spearman correlation analyses.

[Insert Table 4]

Empirical Findings

Table 5 presents the multivariate regression analysis and compares coefficients to test for differences in the asset write-down behavior of U.S. GAAP and IFRS firms. For IFRS firms, we report results from the two-stage Heckman model as well as the OLS model, following Lennox, Francis, and Wang (2012). The amount of variation explained by the models as indicated by the adjusted R^2 is 24% for the U.S. GAAP model and 22% for the IFRS Heckman model.

For U.S. GAAP firms, reported in column (1), the coefficient on $BATHINCENT_{it}$ (t-statistic = -4.68, $p < .01$) is significant and negative. This result suggests that U.S. GAAP firms may recognize asset write-downs in periods of unexpectedly low earnings implying “big bath” behavior. In addition, the coefficient on $SMOOTHINCENT_{it}$ is positive and significant (t-statistic = 2.78, $p < .01$) suggesting that U.S. GAAP firms may recognize write-downs in periods of unexpectedly high earnings implying income smoothing behavior. The size variable, $\log MARKETCAP_{it}$, is negative and significant (t=-6.00, $p < .01$) indicating an association between the firm size and the write-down. Of the two control variables structured to capture the effects of firm-specific

performance on asset write-downs, the coefficient on $\Delta SALES_{it}$ is significantly negative ($t = -2.24$, $p < .05$), while ΔOCF_{it} reports only a marginally significant coefficient ($t = -1.88$, $p < .10$). These relations are consistent with the notion that poor financial performance is associated with asset write-downs. Overall, the U.S. GAAP findings suggest that the asset impairment standard in U.S. GAAP, ASC 360-10-35, may provide managers discretion to opportunistically report impairment losses.

[Insert Table 5]

Our findings differ from those of Riedl (2004) on the behavior of U.S. firms in the post-SFAS 121 period. Riedl (2004) finds evidence of “big bath” reporting behavior but not of income smoothing behavior based on his sample of 265 firm-year write-down observations from the post SFAS 121, 1995 – 1998 period. Our full U.S. GAAP sample contains 5,425 firm-year write-down observations from the 2004 - 2012 period. As discussed in the Additional tests section below, when we conduct the regression model for the full U.S. GAAP sample we find consistent results with our matched sample. Both $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$ are significantly associated with asset write-downs. The difference with Riedl’s (2004) findings may be due to differences in the model specifications,¹⁵ time period examined or sample size. That is, given the size of our sample there are more opportunities to observe both “big bath” and income smoothing behavior.

Column (4) in Table 5 reports the second stage Heckman model results for IFRS firms. Neither the coefficient on $BATHINCENT_{it}$ ($t = 0.41$), nor the coefficient on $SMOOTHINCENT_{it}$ ($t = 0.44$) is significant. This finding suggests that the IFRS firms in our sample are not using asset

¹⁵ Our model specification is different from that of Riedl (2004) in that unlike Riedl’s model we do not include a variable capturing the change in firm pre-write-off earnings (ΔE) due to high correlations (over 69% in the U.S. GAAP sample) between ΔE and $BATHINCENT$ and $SMOOTHINCENT$. In addition Riedl includes both write-down and non-write-down firms in his regression model.

impairment write-downs to manage earnings. The size variable, $\log\text{MARKETCAP}_{it}$, is negative and significant ($t = -6.00, p < .01$), consistent the U.S. sample. None of the other control variables are statistically significant. Column (2) reports the results from the OLS model for IFRS firms. The main results are consistent with those from the Heckman two-stage model, in that neither BATHINCENT_{it} , nor SMOOTHINCENT_{it} are significant.

We hypothesize that there is no difference in the association of long-lived asset impairment write-downs and unexpectedly low or unexpectedly high earnings for U.S. GAAP firms as compared to IFRS firms in the U.S institutional setting. To test these hypotheses we compare the regression coefficients between U.S. GAAP and IFRS firms, using the Wald test. The results, presented in Column (5) in Table 5, reveal that the association between BATHINCENT_{it} and write-offs for U.S. GAAP firms is significantly higher than for IFRS firms ($\chi^2 = 3.68, p < .05$). In addition, the association between SMOOTHINCENT_{it} and write-offs for U.S. GAAP firms is significantly higher than for IFRS firms ($\chi^2 = 5.55, p < .01$). These findings are not consistent with the hypotheses of no differences in H1 and H2.

Overall, our findings provide evidence that there is a difference in write-off behavior for U.S. listed firms following U.S. GAAP as compared to firms following IFRS within the U.S. institutional environment. The association between asset impairment write-offs and “big bath” and income smoothing reporting behavior in U.S. GAAP firms is significantly higher than observed in U.S. listed IFRS firms. U.S. GAAP firms appear to opportunistically time the write-down of asset impairments consistent with earnings management behavior whereas we find no significant relation between write-downs in the period of unusually low or high earnings for IFRS firms. Contrary to our hypotheses, our evidence implies that differences in asset impairment standards are influencing firm reporting behavior within the U.S. It may be that U.S. GAAP and/or IFRS

reporting firms would react differently in other institutional environments. However, that question is beyond the scope of this study.

Additional Tests

Foreign Private Issuers Sample

To determine if unmeasured differences between U.S. domestic firms and foreign firms are influencing our results, we compare the asset impairment reporting behavior of foreign firms that use U.S. GAAP reporting in the U.S. (1,475 firm-year observations) to foreign firms that use IFRS for U.S. reporting purposes.¹⁶ The results, not tabulated, are consistent with our sample of U.S. domestic firms. That is, the association between both $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$ and write-downs is significantly higher for foreign firms reporting in accordance with U.S. GAAP than for foreign firms reporting in accordance with IFRS. This result confirms our main finding that the association between asset write-downs and unexpectedly high and low earnings is stronger for firms that use U.S. GAAP as compared to those that use IFRS within the U.S. institutional setting regardless of whether those firms are incorporated within the U.S. or in a foreign country.¹⁷

Alternative Measures of Country Level Institutional Factors

It is also possible that while we controlled for country of origin within the regression analysis there are similarities among countries in institutional factors that are influencing our results. To determine if the country of origin of the foreign private issuers in our sample influences reporting behavior, we categorize countries based on whether they are an outsider or insider economy. We use this categorization since Leuz et al. (2003) observed significant cross-national differences in

¹⁶ We did not form a matched sample from foreign firms that use the U.S. GAAP reporting for the corresponding IFRS firms because there are too few firm-year observations in each industry sector within the same year for the U.S. GAAP reporting foreign firms' sample, making it difficult to match a comparable U.S. GAAP firm for each IFRS firm.

¹⁷ We note that foreign private issuers that choose to use U.S. GAAP for reporting purposes within the U.S. have self-selected to use U.S. GAAP. We have not controlled for self-selection bias in our model due to the small number of foreign firms that use IFRS, as discussed earlier. Therefore, while these results provide interesting information they should be interpreted with this limitation in mind.

earnings management behavior across these groups. Leuz et al. (2003) grouped countries into three clusters based on similarities in their institutional characteristics identifying outsider economies and two levels of insider economies. The countries in our sample fall into two categories. We categorize Canada, Australia, the U.K., and the U.S. as outsider economies with large stock markets, strong legal enforcement and outsider rights. The remaining countries in our sample are classified as insider economies with smaller stock markets, weaker investor protections and somewhat weaker legal enforcement environments as compared to the outsider economies.

We conduct the regression analysis separately for the IFRS firms from outsider and insider economies. We find results (not tabulated) consistent with our full IFRS sample findings. The $BATHINCENT_{it}$ and $SMOOTHINCENT_{it}$ variables are not significant for either country grouping.

Asset Impairment Reversals

Since asset impairment reversals are a distinguishing feature of IAS 36 that may influence reporting behavior, we investigate whether the reversal of impairment losses, allowed under IFRS but not under U.S. GAAP affects our main results presented in Table 5. To identify reversals of long-lived asset impairments we examined the 10-K and 20-F filings for the 567 IFRS firms included in our sample.¹⁸ Through this process we obtained 63 observations of reversals.

We modify our main regression model (1) by adding a reversal variable, $REVERSAL_{it}$, and two interaction variables, $REVERSAL_{it} \times BATHINCENT_{it}$ and $REVERSAL_{it} \times SMOOTHINCENT_{it}$. The $REVERSAL_{it}$ variable is coded 1 if a firm has a reversal of a long-lived impairment loss during our sample period and zero, otherwise. We present the results of this regression model in Table 6. We find that the addition of these variables does not alter our main findings in Table 5. The

¹⁸ While companies typically disclose their reversal information in the *PP&E* footnote or in a separate section under *Impairment* we searched the entire 10-K and 20-F filings of each firm for reversal data.

REVERSAL_{it} variable and the two interaction variables are not significantly associated with firms' write-off amounts for our sample IFRS firms. Further, consistent with our main findings, the coefficients on *BATHINCENT_{it}* and *SMOOTHINCENT_{it}* are also not significant.

[Insert Table 6]

IFRS Sample Composition

It is also possible that IFRS firms from Canada are influencing our results since they comprise 33.3% of our IFRS sample. To examine this possibility, we partition our IFRS sample into Canadian and non-Canadian firms. We conduct regression analyses, not tabulated, separately for the Canadian and non-Canadian IFRS firms. In each sample group, the findings are consistent with the full matched IFRS sample. That is, the *BATHINCENT_{it}* and *SMOOTHINCENT_{it}* variables are not statistically significant for either Canadian or non-Canadian IFRS firms.¹⁹ Moreover, the coefficients for *BATHINCENT_{it}* and *SMOOTHINCENT_{it}* between those two subsamples (i.e. Canadian and non-Canadian IFRS firms) are not statistically different from each other indicating that our results are not driven by the Canadian firms in our sample.

U.S. GAAP Firms

Another possible explanation for our results is that our matching process identified U.S. GAAP firms with specific characteristics that are not generalizable to the U.S. GAAP population. However, when we conduct the regression model for the full U.S. GAAP sample (5,425 U.S. GAAP firm-year observations) we find consistent results, not tabulated, with our matched sample. Both *BATHINCENT_{it}* and *SMOOTHINCENT_{it}* are significantly associated with asset write-offs.

Macro-Economic Influence

¹⁹ *BATHINCENT_{it}* and *SMOOTHINCENT_{it}* are $t = .81$ ($p > .1$) and $t = -.27$ ($p > .1$) for the Canadian firms, respectively; and $t = -1.36$ ($p > .1$) and $t = .91$ ($p > .1$) for the non-Canadian firms, respectively.

The proxies used to capture macro-economic effects may also be influencing our results. In our model, we include dummy variables for each of our sample years (*Year Dummy*), to control for macro-economic annual differences, while Riedl (2004) includes the percentage change in Gross Domestic Product (GDP) in his model. To determine if our results are affected by GDP we include both variables, the change in GDP and the year dummy variables, and repeat our analysis. We find that the change in GDP is not statistically significantly associated with firms' write-off amounts and no other inferences from our model change.²⁰

Other Issues

We also incorporate capital expenditures and restructuring charges in our models as additional control variables (results not reported) since these items may influence write-down behavior. The inclusion of these two additional variables does not change our main results qualitatively. In addition, as a robustness test, we use fixed assets instead of total assets in the matching process. Analyses using this new matched control sample produce consistent results with our main findings.

VI. CONCLUSION

Prior research suggests that reporting incentives within specific institutional environments are more important to accounting quality than accounting standards (Ball et al. 2003; Burgstahler et al. 2006). However, prior studies have not examined the effect of differences between U.S. GAAP and IFRS within a strong institutional environment. This study examines whether differences in impairment of long-lived asset accounting standards under U.S. GAAP (ASC 360-10-35) and under IFRS (IAS 36) influence firms' reporting behavior in the U.S. We identify U.S. GAAP and

²⁰ Results from including the change in GDP in the regression models and conducting the comparison of the regression coefficients between the U.S. GAAP and IFRS firms confirm our main results of significant differences on the *BATHINCENT_{it}* ($\chi^2 = 2.57$, $p < .05$) and *SMOOTHINCENT_{it}* ($\chi^2 = 6.15$, $p < .01$) variables.

IFRS firms listed in the U.S. that have asset impairment write-downs during the 2004 – 2012 period. We develop a matched sample of IFRS and U.S. GAAP firms based on firm specific characteristics using propensity matching scores and industry and year of write-down. We conduct univariate and multivariate analyses to examine the relation between asset write-downs and unexpectedly low and unexpectedly high earnings (prior to write-downs) for our IFRS and U.S. GAAP firm-year observations while controlling for firm and industry-level economic variables, as well as year of write-down and country. Additionally we employ the Heckman two-stage model for our IFRS sample to mitigate potential selection bias.

Overall, our evidence indicates that the association between “big bath” and income smoothing behavior and asset write-downs is significantly higher for U.S. GAAP firms than for IFRS firms. Since we limit our sample to firms listed in the U.S., control for firm specific economic factors, and match our IFRS and U.S. GAAP firm-year observations, our evidence implies that the difference in reporting behavior is associated with the difference in the asset impairment standards. Given that prior research finds that the institutional setting influences reporting behavior, our findings should be interpreted specific to the U.S. environment. These findings should interest financial statement users as they consider the impact of asset write-downs on U.S. GAAP reported income, as well as the effect on comparisons between U.S. GAAP and IFRS reported incomes that include asset write-downs.

Our findings suggest the possibility that IFRS motivates management to reflect the underlying firm economics by requiring impairment write-downs based on discounted cash flows and reversal of those write-downs when the asset’s economics change. Whereas the U.S. GAAP recoverability test based on undiscounted cash flows, coupled with the prohibition on reversing impairment losses provides both managerial discretion and incentives that allow for earnings management

behavior. This possibility is consistent with Riedl's (2004) suggestion that "the issuance of a 'brighter line' standard, combined with (possibly increased) capital market pressures for achieving earnings targets during the latter part of the 1990's (e.g., Dechow and Skinner 2000), may have enabled/driven managers to adopt more discretionary reporting choices under SFAS 121 relative to before the standard" (p. 850).

Our results are specific to IFRS firms listed in the U.S. and are not generalizable to IFRS firms listed outside of the U.S. where different institutional features may influence reporting behavior. While this is a limitation of our study, it is also a strength in that we are able to compare the behavior of firms following two different standards within the same institutional setting. Our study is also limited to publically available information. As discussed in the paper there are differences, in addition to the recoverability test and the provision for impairment reversal, that exist between IFRS and U.S. GAAP. However, access to the data required to quantify the effect of these differences is not publically available.

Our study is subject to limitations. First, U.S. listed firms and foreign private issuers may be fundamentally different, and this difference may drive our results. Our robustness test addresses this issue by comparing the asset impairment reporting behavior of foreign private issuers using U.S. GAAP to foreign private issuers using IFRS for U.S. reporting purposes. However, we acknowledge that this test does not eliminate the concern. Second, our research design focuses on a firm's incentives to manipulate earnings and ignores the cost of earnings management since the ex-ante cost of earnings management is unobservable.²¹ Finally, even though we try to hold managers' incentive constant across U.S. GAAP and IFRS firms, we cannot completely rule out the possibility that manager's incentives from reporting higher or lower earnings may be different

²¹ We thank the anonymous reviewer for bringing these points to our attention.

for U.S. GAAP and IFRS firms, which can drive different reporting behaviors as documented in this study.

Regardless of these limitations, we provide evidence that differences in accounting standards result in differences in firms' reporting behavior within strong institutional environments. These findings should be of interest to accounting standard-setters as they consider the effectiveness of specific reporting standards.

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APPENDIX: Variable Definitions

WDP_AT_{it}	=	Firm i 's pre-tax asset write-down (reflected as a positive amount) for period t , divided by total assets at the end of $t-1$;
$BATHINCENT_{it}$	=	Firm i 's proxy for "earnings big bath" incentive, equal to the change in firm i 's pre-write-down earnings from $t-1$ to t , divided by total assets at the end of $t-1$, when this change is below the median of non-zero negative values of this variable, and 0 otherwise;
$SMOOTHINCENT_{it}$	=	Firm i 's proxy for "earnings smoothing" incentive equal to the change in firm i 's pre-write-down earnings from $t-1$ to t , divided by total assets at the end of $t-1$, when this change is above the median of non-zero negative values of this variable, and 0 otherwise;
$\Delta INDROA_{it}$	=	The median change in firm i 's (2-digit SIC) industry ROA from period $t-1$ to t ;
$\Delta SALES_{it}$	=	Firm i 's percent change in sales from period $t-1$ to t ;
ΔOCF_{it}	=	Firm i 's change in operating cash flows from period $t-1$ to t , divided by total assets at the end of $t-1$;
$\log MARKETCAP_{it}$	=	Firm i 's proxy for size, equal to natural logarithm of market capitalization, calculated as fiscal-year closing stock price multiplied by number of outstanding common shares for period t ;
$MILLS_{it}$	=	Firm i 's inverse Mills ratio estimated from the Heckman's selection model;
$TOBINQ_{it}$	=	Firm i 's industry median Tobin's q ;
$\log ASSETS_{it}$	=	Natural log of firm i 's total assets;
$LEVERAGE_{it}$	=	Firm i 's leverage ratio, measured as total liabilities divided by total assets;
ROA_{it}	=	Firm i 's return on assets, measured as income before extraordinary items, divided by total assets;
$\log GDP_{it}$	=	Natural log of firm i 's country Gross Domestic Product;
$LAWENGLISH_{it}$	=	An indicator variable which takes value of 1 if firm i 's country has English legal systems, 0 otherwise;
$LAWFRENCH_{it}$	=	An indicator variable which takes value of 1 if firm i 's country has French legal systems, 0 otherwise;
$LAWGERMAN_{it}$	=	An indicator variable which takes value of 1 if firm i 's country has German legal systems, 0 otherwise;
$LAWSCANDIN_{it}$	=	An indicator variable which takes value of 1 if firm i 's country has Scandinavian legal systems, 0 otherwise;
$LAWOTHER_{it}$	=	An indicator variable which takes value of 1 if firm i 's country has other legal systems, 0 otherwise.

TABLE 1
Sample Selection

	IFRS	US GAAP	Number of Firm-Year
Companies with total assets greater than zero (<i>Compustat North America</i> , 2004-2012)			82,596
<i>Eliminate companies that:</i>			
have no write-down data			(71,926)
have non-negative pretax write-down			(266)
have no recorded accounting standard			(17)
have missing regression variables			(2,697)
are listed on Canadian stock exchanges			(212)
IFRS and US GAAP companies with negative asset write-downs	578	6,900	7,478
Foreign incorporated firms who use US GAAP		(1,475)	(1,475)
Final IFRS and US GAAP firms	578	5,425	6,003
<i>Propensity score matching procedure:</i>			
IFRS and US GAAP firms with no matching counterpart	(11)	(4,858)	(4,869)
Final sample used in the study (firm-year)	567	567	1,134

To develop our sample, we first identify all public companies within *Compustat North America* reporting a write-down (*Compustat* data item “WDP”) from 2004 to 2012. This produces 7,478 potential firm-year observations, of which 578 are IFRS and 6,900 are U.S. GAAP firm-year observations. Then we identify a matched U.S. sample firm-year for each IFRS firm-year, using a propensity matching process. Our final matched sample consists of 567 IFRS and 567 U.S. GAAP firm-year observations.

TABLE 2
IFRS Sample Distribution

Panel A: Final IFRS Sample—By Country

<u>Country</u>	<u>No. of Firm-Years</u>	<u>Percent of Total Observations</u>
Canada	189	33.3%
United Kingdom	74	13.1%
Australia	32	5.6%
France	31	5.5%
Germany	29	5.1%
Netherlands	21	3.7%
Switzerland	19	3.4%
South Africa	18	3.2%
Finland	14	2.5%
Sweden	9	1.6%
Other	131	23.1%
Total	567	100.0%

Panel B: Final IFRS Sample—By Year

<u>Year</u>	<u>No. of Firm-Years</u>	<u>Percent of Total Observations</u>
2004	5	0.9%
2005	39	6.9%
2006	31	5.5%
2007	34	6.0%
2008	53	9.4%
2009	46	8.1%
2010	56	9.9%
2011	133	23.5%
2012	170	30.0%
Total	567	100.0%

Panel C: Final IFRS Sample—By Industry

<u>GICS Code</u>	<u>Industries</u>	<u>No. of Firm-Years</u>	<u>Percent of Total Observations</u>
10	Energy	61	10.8%
15	Materials	119	21.0%
20	Industrials	47	8.3%
25	Consumer Discretionary	69	12.2%
30	Consumer Staples	50	8.8%
35	Health Care	66	11.6%
40	Financials	35	6.2%
45	Information Technology	41	7.2%
50	Telecommunication Services	52	9.2%
55	Utilities	27	4.8%
Total		567	100%

TABLE 3
Descriptive Statistics

Variable	U.S. Matched Companies (N=567)			IFRS Matched Companies (N=567)			Mean Difference
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	
<i>WDP_AT</i>	0.020	0.004	0.054	0.023	0.004	0.058	-0.003
<i>BATHINCENT</i>	-0.031	0.000	0.082	-0.026	0.000	0.065	-0.005
<i>SMOOTHINCENT</i>	0.032	0.000	0.094	0.033	0.000	0.088	-0.001
<i>ΔINDROA</i>	-0.003	-0.001	0.012	-0.002	0.000	0.014	-0.005
<i>ΔSALES</i>	0.084	0.045	0.378	0.126	0.043	0.476	-0.042
<i>ΔOCF_{it}</i>	0.008	0.005	0.087	0.011	0.005	0.085	-0.003
<i>logMARKETCAP</i>	7.080	7.524	2.625	7.315	7.739	2.831	-0.235
<i>Book-to-Market</i>	0.922	0.575	1.247	0.907	0.618	1.027	0.015
<i>ROA</i>	-0.015	0.025	0.172	-0.022	0.019	0.175	0.006

This table reports the summary statistics for the variables in our sample. The sample consists of 567 IFRS and 567 U.S. GAAP firm-year observations over the period 2004–2012. Variables are defined in the Appendix.

*, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent, respectively using two-sided t-test for mean difference. None of the differences is statistically significant at the 10 percent level.

TABLE 4
Pearson and Spearman Correlation Coefficients

Panel A: Pearson and Spearman Correlations for Matched U.S. GAAP Sample (n = 567)

Variable	WDP_AT	BATH INCENT	SMOOTH INCENT	ΔINDROA	ΔSALES	ΔOCF	logMARKET CAP
<i>WDP_AT</i>		-0.209***	0.295***	0.000	-0.079*	-0.095**	-0.314***
<i>BATHINCENT</i>	-0.274***		0.128***	0.168***	0.087**	0.353***	0.293***
<i>SMOOTHINCENT</i>	0.151***	0.260***		0.024	0.212***	0.343***	-0.209***
<i>ΔINDROA</i>	-0.089**	0.196***	0.083**		0.113***	0.068	0.081*
<i>ΔSALES</i>	-0.051	0.234***	0.194***	0.160***		0.292***	0.046
<i>ΔOCF</i>	-0.080*	0.334***	0.323***	0.071*	0.294***		0.087**
<i>logMARKETCAP</i>	-0.440***	0.345***	-0.139***	0.137***	0.157***	0.125***	

Panel B: Pearson and Spearman Correlations for Matched IFRS Sample (n = 567)

Variable	WDP_AT	BATH INCENT	SMOOTH INCENT	ΔINDROA	ΔSALES	ΔOCF	logMARKET CAP
<i>WDP_AT</i>		-0.130***	0.116***	-0.053	0.009	0.032	-0.380***
<i>BATHINCENT</i>	-0.214***		0.150***	0.042	0.050	0.128***	0.289***
<i>SMOOTHINCENT</i>	0.100**	0.294***		0.035	0.165***	0.271***	-0.306***
<i>ΔINDROA</i>	-0.112***	0.061	0.073*		0.077*	0.065	0.091**
<i>ΔSALES</i>	-0.030	0.150***	0.177***	0.091**		0.141***	-0.100**
<i>ΔOCF</i>	-0.004	0.192***	0.178***	0.100**	0.232***		-0.112***
<i>logMARKETCAP</i>	-0.446***	0.248***	-0.203***	0.110***	0.023	-0.039	

This table reports correlation coefficients between the variables in our sample. Pearson correlation coefficients are presented at the top-right half of the table; Spearman correlations are presented at the bottom-left half of the table. Variables are defined in the Appendix.

*, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent, respectively using two-sided t-statistics.

TABLE 5
Asset Write-Downs and Unexpectedly High or Low Earnings: U.S. GAAP versus IFRS

Variables	Pred. Sign	U.S. GAAP OLS (t-stat) (1)	IFRS OLS (t-stat) (2)	IFRS Heckman 1st Stage (z-stat) (3)	2nd Stage (t-stat) (4)	Difference (χ^2 -stat) (5) = (1) -(4)
<i>BATHINCENT</i>	-	-0.100*** (-4.68)	-0.005 (-0.11)		0.017 (0.41)	-0.117** (3.68)
<i>SMOOTHINCENT</i>	+	0.185*** (2.78)	0.002 (0.06)		0.010 (0.44)	0.175*** (5.55)
Δ INDROA	-	0.367*** (3.99)	-0.049 (-0.36)		-0.041 (-0.31)	0.408** (3.25)
Δ SALES	-	-0.016** (-2.24)	-0.002 (-0.27)		-0.001 (-0.21)	-0.015 (1.31)
Δ OCF	-	-0.066* (-1.88)	-0.012 (-1.45)		-0.008 (-1.05)	-0.058 (1.81)
<i>log</i> MARKETCAP	-	-0.004*** (-6.21)	-0.010*** (-4.00)		-0.014*** (-6.00)	0.010*** (9.95)
<i>MILLS</i>					0.216*** (3.25)	
<i>TOBINQ</i>				0.750*** (9.76)		
<i>log</i> ASSETS				0.245*** (31.46)		
<i>LEVERAGE</i>				-0.551*** (-8.46)		
<i>ROA</i>				-0.918*** (-15.58)		
<i>log</i> GDP				0.003 (0.17)		
<i>LAWENGLISH</i>				0.948*** (8.70)		
<i>LAWFRENCH</i>				0.527*** (4.68)		
<i>LAWGERMAN</i>				0.066 (0.57)		
<i>LAWSCANDIN</i>				0.698*** (5.43)		
<i>LAWOTHER</i>				1.364*** (7.28)		
<i>Intercept</i>		0.057*** (8.57)	0.065*** (2.72)	-5.681*** (-12.88)	0.025 (1.15)	
<i>Year Dummy</i>		Yes	Yes		Yes	
<i>Industry Dummy</i>		Yes	Yes		Yes	
<i>Country Dummy</i>		Yes	Yes		Yes	
<i>Observations</i>		567	567	245,596	567	
<i>Adjusted R²</i>		0.24	0.20		0.22	

This table presents the multivariate regression analysis and comparison of coefficients conducted to test whether there are differences in the asset write-down behavior of U.S. GAAP and IFRS firms. We estimate the regression models using the pooled data over the period of 2004–2012. The dependent variable is *WDP_AT* which is pre-tax asset write-down (reflected as a positive amount) for the year, divided by total assets for the prior year. All other variables are defined in the Appendix. For IFRS firms, we report results from the two-stage Heckman model (shown in columns 3 and 4) as well as from the OLS model (shown in column 2). *, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent, respectively, based on two-sided t-test.

TABLE 6
The Reversals of Asset Write-Downs for IFRS Firms

Variables	Pred. Sign	IFRS	IFRS Heckman	
		OLS (t-stat)	1st Stage (z-stat)	2nd Stage (t-stat)
<i>BATHINCENT_{it}</i>	-	0.004 (0.08)		0.026 (0.50)
<i>SMOOTHINCENT_{it}</i>	+	0.002 (0.06)		0.010 (0.47)
Δ <i>INDROA_{it}</i>	-	-0.031 (-0.21)		-0.022 (-0.16)
Δ <i>SALES_{it}</i>	-	-0.003 (-0.33)		-0.002 (-0.34)
Δ <i>OCF_{it}</i>	-	-0.010 (-0.37)		-0.005 (-1.24)
<i>logMARKETCAP_{it}</i>	-	-0.010*** (-3.94)		-0.014*** (-5.91)
<i>REVERSAL_{it}</i>		-0.001 (-0.06)		-0.001 (-0.20)
<i>REVERSAL_{it}</i> × <i>BATHINCENT_{it}</i>		-0.067 (-0.74)		-0.073 (-0.55)
<i>REVERSAL_{it}</i> × <i>SMOOTHINCENT_{it}</i>		-0.070 (-0.75)		-0.096 (-1.17)
<i>MILLS_{it}</i>				0.216*** (3.25)
<i>TOBINQ</i>			0.750*** (9.76)	
<i>logASSETS_{it}</i>			0.245*** (31.46)	
<i>LEVERAGE_{it}</i>			-0.551*** (-8.46)	
<i>ROA_{it}</i>			-0.918*** (-15.58)	
<i>logGDP_{it}</i>			0.003 (0.17)	
<i>LAWENGLISH_{it}</i>			0.948*** (8.70)	
<i>LAWFRENCH_{it}</i>			0.527*** (4.68)	
<i>LAWGERMAN_{it}</i>			0.066 (0.57)	
<i>LAWSCANDIN_{it}</i>			0.698*** (5.43)	
<i>LAWOTHER_{it}</i>			1.364*** (7.28)	
<i>Intercept</i>		0.067*** (2.72)	-5.681*** (-12.88)	0.025 (1.15)
<i>Year Dummy</i>		Yes		Yes
<i>Industry Dummy</i>		Yes		Yes
<i>Country Dummy</i>		Yes		Yes
<i>Observations</i>		567	245,596	567
Adjusted R ²		0.20		0.22

This table presents the multivariate regression analysis to test whether asset impairment reversals may influence the asset write-down behavior of foreign firms that use IFRS for U.S. reporting purposes. We estimate the regression models using the pooled data over the period of 2004–2012. The dependent variable is *WDP_AT*. The variable, *REVERSAL*, is coded 1 if a firm has a reversal of a long-lived impairment loss during our sample period and zero, otherwise. All other variables are defined in Appendix. *, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent, respectively, based on two-sided t-test.