U.S. GAAP vs. IFRS: A Comparative Study Regarding How Differences in Accounting Standards Can Affect Understanding of Company Financial Performance

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Abstract: *Internationally, the two main regulatory bodies, which affect company financial reporting, are the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB). The standards they have created, U.S. GAAP and IFRS/IAS, although very similar have key differences which can affect comparability of company financial performance, when analyzing entities following different standards. This paper attempts to address two of these differences, Research and Development Expenditures and Inventory treatment, and their impacts on financial performance. Metrics used to measure this include common financial ratios such as Profit Margin, EBITDA Margin, Return on Assets, and Asset Turnover. Standard and Poor's North America and International Compustat Database was used for analysis, and to look at specific effects on companies, each chapter, both R&D and Inventory, includes a specific comparison of two comparable companies, one following U.S. GAAP and the other adhering to IFRS. This question proves important for financial experts, company managers, individual investors, or any person attempting to compare companies under different accounting standards.*

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Introduction

All public companies and many private companies uniformly organize and present their financial information so that investors, employees, managers, owners, and governments can easily look at the information and understand the company's financial position. In order to achieve this and provide maximum comparability, people and governments developed accounting standards which outline rules and guidelines for companies. Although these standards exist and greatly enhance comparability, the world lacks a single set of accounting standards utilized by all countries. Because of this, company owners, investors, analysts, bankers, and anyone interested in comparing firm financial performance across the globe face significant challenges. This paper attempts to identify and evaluate key differences between standards and their effects on financial statements, so that evaluators can better understand and compare companies across international borders. Such understanding will allow evaluators to draw inferences from differences in companies and their financial performance, and make sure that it is differences in performance, rather than a company's accounting choice, influencing the results or understanding of companies.

While there are many individual country standards, U.S. GAAP (Generally Accepted Accounting Principles) under the Financial Accounting Standards Board (FASB) and the semi-global standard called IFRS, created by the International Accounting Standards Board (IASB), emerge as the two most prominent accounting standards. Many countries that do not follow either standard, bases their rules off of components of these standards. The countries using IFRS include but are not limited to, Austria, Australia, Botswana, the Czech Republic, Denmark, Estonia, France, Ghana, Guatemala, South Korea, the Netherlands, Peru, Poland, Russia, South Africa, Spain, Sweden, and the United Kingdom. Some country specific standards prove very to IFRS. For example, Chinese standards, although not completely compliant, are substantially the same as IFRS with slight variation, and Japanese companies

are permitted to use IFRS if they desire. IFRS standards permeate worldwide, and individuals more familiar with either standard may have difficulty understanding or analyzing the key differences in standards and how those differences can affect companies.

Because of these different standards, rules and regulations vary slightly, which may sometimes result in varying analyses and affect accurate assessment of companies' financials. The use of and compliance with diverse accounting rules affects the comparability of financial statements, causing evaluators to look at and analyze companies differently. The accounting and finance community must perform significant research to understand the differences that result. Many accounting firms advise companies, investors, and individuals on the disparities between these standards and the implications on company analysis.

The consideration of accounting differences is particularly important in cross-boarder acquisition analysis. PricewaterhouseCoopers LLP (PwC) (2014) discusses this subject in the article "Mergers and Acquisitions – a snapshot: Change the way you think about tomorrow's deals," arguing that companies interested in acquiring an entity headquartered in a country using different accounting standards should pay close attention to the discrepancies in standards. The article discusses the differences between U.S. GAAP and IFRS. According to PwC, buyers might over- or under-value the target or misinterpret the efficiency and general operations of the business if unacquainted with the effects of accounting standards on company valuation. The authors argue that the key accounting standard issues to consider are revenue and expense recognition. PwC also discusses risk and tax considerations as important in the acquisition process (PwC, 2014).

Revenue recognition variation, however, is moving towards convergence for U.S. GAAP and IFRS. In May of 2014, the FASB and IASB issued their converged standard for revenue recognition, effective for calendar year-end companies in 2017. This new convergence was issued under ASU 606 and IFRS 15, *Revenue from Contracts with*

Customers. Many of the current differences have been eliminated with this new standard. In the new model, companies must apply a five-step process for revenue recognition. Although the potential still exists for slight variations in the revenue recognition standards, the general convergence makes it a much smaller concern than expense recognition for the cross boarder acquisitions that PWC describes.

If convergence has begun to happen, in areas such as revenue recognition, then the question arises, is there a need for understanding the differences between standards? Currently, the only path towards convergence is through collaborations between FASB and IASB, such as the aforementioned revenue recognition standards update. James Schnurr, Chief Accountant to the SEC (2015), in his speech at the Baruch College Financial Reporting Conference, stated that collaborations were currently the only way for convergence, but there would not likely be complete convergence or adoption of a single standard in the near future. As a result, the standard differences are still very important. The paper published by the SEC (2012), titled "Work Plan for the Consideration of Incorporating International Financial Reporting Standards into the Financial Reporting System for U.S. Issuers," outlines some of the potential issues. It refrains from making a recommendation but outlines numerous barriers to implementation other than just changes in standards, such as changes in work force, increased funding in the U.S., and new education and training (SEC, 2012). Since complete convergence seems unlikely in the near future, understanding the current differences remains important, and one key divergence is expense recognition.

According to PwC (2014), the important expense recognition variations include development costs, employee benefits expense, contingencies, leases, and impairment (for both inventory and assets). Figure 1 outlines the specific differences between the standards for all of these. For development costs, U.S. GAAP prohibits capitalization, while IFRS allows it. Capitalization of development costs in the technology and software industry is one

of only a few exceptions to this rule, in which U.S. GAAP and IFRS standards align. Employee benefits expense presents several discrepancies. One such is actuarial gains and losses. Companies under IFRS permanently recognize actuarial gains and losses in other comprehensive income. Conversely, U.S. GAAP presents two options for actuarial gains and losses. They are either expensed immediately as net periodic pension costs or recognized in other comprehensive income, like IFRS companies. Depending on the choice by the U.S. GAAP company, this causes earnings volatility. Similarly, the financing component of net periodic pension costs may be included as interest expense under IFRS, but under U.S. GAAP, all costs must be included together and cannot be separated. Contingency differences develop as another important variation between the standards. Under IFRS, companies record contingent liabilities when it is "more likely than not" that the liability has been incurred (PwC, 2014, p. 3), while under U.S. GAAP, firms record the loss when probable. Nevertheless, as this is a relatively minor difference, focusing on other expensing differences proves more beneficial for understanding the effects of accounting standard variation on financial statements.

For leases and inventories, the difference lies in the classification and treatment of the two accounts. U.S. GAAP, permits both operating and capital leases, while IFRS only allows for capital leases; U.S. GAAP includes the two lease types on different sections of the financial statements (although this category converges also). Operating leases are included on the income statement, but not the balance sheet for U.S. GAAP companies. This allows them to classify these leases as expenses rather than debts, which can cause their operations to look significantly different than IFRS companies that refrain from using different classifications. There is, however, convergence on this issue; FASB and IASB recently updated the standards to include operating leases on the balance sheet for U.S. GAAP companies, increasing the comparability of financial statements with IFRS. Because of the convergence

in leases, other areas where merging is not foreseeable in the near future may provide better long-term insight into the challenges of evaluating companies under different standards. Inventory also proves different under U.S. GAAP and IFRS. The two standards allow for diverging costing methods. U.S. GAAP companies can use Last-in, First-Out inventory costing methods, while IFRS companies cannot. In conjunction, inventory and assets have varied impairment standards and subsequent treatment of these assets after impairment. Generally, IFRS companies recognize impairments earlier than their U.S. GAAP counterparts. After impairment, the rules also vary: IFRS allows for the impaired assets to be written back up if the reason for impairment no long exists; U.S. GAAP prohibits writing up of these assets. The combined effect of these differences may have a significant impact on the understanding of these companies' operations and financial valuation (PwC, 2014).

Whether differences in accounting standards affect evaluators understanding of companies proves an interesting topic to consider, and as a result, academics have studied this question in various ways. Experts debate whether which standard, U.S. GAAP or IFRS proves the better accounting standard. The current literature shows both positive and negative reviews for both standards. In their article "Comparing the Value Relevance of Earnings and Book Value in IFRS and GAAP Standards," Escaffre and Sefsaf (2011) study which accounting standard and what financial market has the greatest correlation between accounting numbers presented on financial statements and the market price of the company. They perform this analysis across more than 1,000 companies in five financial markets: the Benelux countries, France, Spain, Great Britain, and the United States. The two variables used to analyze accounting and financial numbers are earnings per share (EPS), found on the income statement, and book value per share (BVS), found using balance sheet numbers. Their findings reveal that within the European markets (IFRS companies), book value per share has a higher level of explanatory value for market price than earnings per share.

Conversely, in the U.S., EPS has a higher relevance and more explanatory power than BVS when analyzing market price. Differences in the rules and standards of U.S. GAAP and IFRS affect these companies and how the market values them. These differences end up altering the balance sheet, income statement, cash flow statement and more. Which intern causes the balance sheet accounts to more accurately indicate actual value for IFRS companies, while pure earnings provides a more accurate indicator of value for U.S. GAAP companies (Escaffre and Sefsaf, 2011).

Hope (2003) uses a different approach to analyze the two accounting standards and their effect on financial statements, company valuation, and operations in the paper, "Disclosure Practices, Enforcement of Accounting Standards, and Analysts' Forecast Accuracy: An International Study." By using a sample of 22 countries, Hope investigates whether the degree of enforcement of accounting standards impacts analysts' forecast accuracy. The sample includes countries that use IFRS, U.S. GAAP, and other standards. The authors demonstrate that forecasting and valuation accuracy is not solely based on differences between standards; it also results from differences in standard enforcement. For example, if regulators make sure that companies consistently provide accurate information, a practice that results in little information asymmetry, analysts will likely increase their prediction and valuation accuracy for future company earnings potential. Controlling for firm- and country-level factors, Hope (2003) finds that the "firm-level annual report disclosure level is positively associated with forecast accuracy, which suggests that firm-level disclosures provide useful information for analysts" (p. 264). Hope also finds that enforcement is significantly related to forecast accuracy; greater enforcement by regulators results in higher analyst accuracy. This presents another method in which differences in accounting standards and enforcement affect understanding of companies around the world.

In another article, Liu, Yip Yuen, Yao, and Chan (2013) write about how different accounting standards play a role in earnings management. Their article titled, "Differences in Earnings Management between Firms using U.S. GAAP and IAS/IFRS," argues that the more principles-based IFRS standards allow for companies to manage their earnings more than the very rules based U.S. GAAP standards. U.S. GAAP standards are thousands of pages long with many detailed instructions, and attempt to address every contingency, thus proving very prescriptive. IFRS standards prove more overarching; there are still many standards but with a smaller attempt to account for every possible situation or detail. As a result, the authors find that firms using IAS/IFRS manage earnings through various means, such as research and development expenditure classification and discretionary accruals; U.S. GAAP companies, conversely do not participate as actively in this earnings management. These discretionary activities result in income smoothing and increased differences in companies' financial statements. Earnings management is not confined to IFRS companies. Numerous studies also show income management occurs in U.S. companies. This paper demonstrates that discrepancies in companies' financial statements develop from more than just differences in specific standards or rules. Even the manner in which the standards are written and the intentions of the documents have an impact on analysts' interpretations of companies and financial statements (Liu, et al., 2013).

There are significant questions about differences between accounting standards, particularly the two most prominent ones, IFRS and U.S. GAAP, and how the variation affects analysis and understanding of companies. There are, however, so many differences between the standards that one paper could not address all of them. Therefore, this paper addresses two issues, both of which are significant and can have large effects on financial statements. These two differences are treatment of research and development (R&D) expenditures and treatment of inventory. There are several inventory differences, which

cannot all be addressed; therefore, the specific issue discussed in detail is inventory costing methods, specifically the differences that result after the election of the LIFO or FIFO inventory costing method.

Each chapter, both the R&D chapter and the inventory chapter, begins by discussing the differences between the two standards, then includes a literature review of the current research surrounding the accounting differences, a simple example of a fictitious company that shows the potential differences and helps to create a theory about the effect on financial statement ratios follows, and the chapter finally ends with analysis of real companies (following U.S. GAAP and IFRS) using financial statements and Compustat data to see if the theorized differences actually translate onto financial statements. In the real company analysis, an assessment of two specific comparable businesses shows potential the changes that arise. The effect of conversion of one company from its original standard, either U.S. GAAP or IFRS, into the other standard also provides a point of comparison.

Solely studying the differences in the financial statements, however, does not provide a strong basis for comparison, analyzing ratios over time provides a better assessment. They succinctly identify variations with financial performance that result because of accounting standard choice. The ratios used are profit margin, EBITDA (Earnings Before Interest Tax Depreciation or Amortization) margin, return on assets (ROA), and asset turnover. The research and development chapter also includes R&D margin, while the inventory chapter includes gross profit margin and inventory turnover. Profit margin is calculated as $\frac{net\ income}{total\ revenue}$ (Table 2). This ratio proves a good indicator of the company's general financial health. EBITDA margin is calculated as $\frac{EBITDA}{total\ revenue}$. Most financial analysts look at the company's EBITDA in some way when studying entities. They use it to compare profitability between companies, and because it eliminates depreciation, amortization, and interest

expense from the calculation, people consider it to eliminate the effects of financing and accounting decisions on profitability. Eliminating depreciation and amortization makes it a quick approximation for cash flows. Because so many financial analysts use this number, determining the effect of different accounting standards on it proves important. Changes in EBITDA could have a large impact on analysts and investors understanding of the company.

The next two ratios are return on assets (ROA) and asset turnover. ROA is calculated as $\frac{net\ income}{average\ total\ assets}$, and it provides a good indication of how efficiently the company management uses its assets to generate earnings. As the differences in both accounting standards for R&D expenditures and inventory costing methods involve changes in total assets, comparison of this ratio also proves interesting. Asset turnover is similar to ROA and is calculated as $\frac{total\ revenue}{average\ total\ assets}$. This assesses how efficiently management converts its assets into revenues. Comparison of this ratio is useful for many of the same reasons that ROA proves useful.

The other three ratios, specific to individual chapters, provide insight into that particular accounting standard difference. R&D margin is $\frac{R\&D\ expense}{total\ revenue}$. If a company does not have significant amounts of R&D in relation to sales, it will have a low R&D margin. If a company has low R&D margins, then the differences in the two standards with regard to R&D expenditures will likely have little effect on the companies' financial statements. Gross profit margin is calculated as $\frac{Sales\ revenue - Cost\ of\ Goods\ Sold\ (COGS)}{Sales\ revenue}$ or $\frac{Gross\ Profit}{Sales\ Revenue}$. It represents the total sales revenue that the company has after incurring the costs associated with producing the goods and services. If there are changes in inventory as a result of varied inventory costing methods, they will be reflected in COGS and thus gross profit margin. As a result, this ratio provides a more detailed look at how financials might change under varied

inventory costing methods than just profit or just EBITDA margin. Finally, inventory turnover is also a more detailed and specific ratio, which gets closer to the differences in inventory costing methods than just asset turnover. Evaluators calculate it as $\frac{COGS}{Average\ Inventory}$, and it shows how many times a company's sells or replaces its inventory over a period. Generally speaking, a higher inventory turnover is good; it implies strong sales and little excess inventory. All of these ratios prove beneficial for financial analysts and provide insights into the financial performance and operations of businesses. This paper delves into potential differences in the standards, specifically treatment of R&D expenditures and inventory, and how they might affect understanding and analysis of companies operating all around the world.

Appendix

Table 1: U.S. GAAP vs. IFRS accounting standard differences

		U.S. GAAP	IFRS
Business Combinations: ASC 805, *Business Combinations* and IFRS 3(R) *Business Combinations*	Noncontrolling interest is measured at fair value, including goodwill	Noncontrolling interest is measured at fair value, including goodwill	(1) Fair value, including goodwill (2) The noncontrolling interest's proportionate share of the fair value of the acquiree's identifiable net assets, exclusive of goodwill
	Acquiree's Operating Leases	If the acquiree operating lease is favorable or unfavorable relative to market terms, the acquirer recognizes an intangible asset or liability, regardless of whether the acquiree is the lessor or lessee	Separate recognition of an intangible asset or liability is required only if the acquiree is a lessee. If the acquiree is the lessor, the terms of the lease are taken into account in estimating the fair value of the asset subject to the lease
	Combination of entities under common control	The receiving entity records the net assets at their carrying amounts in the accounts of the transferor (historical cost)	This is outside the scope of IFRS 3(R), *Business Combinations* . In practice, either follow an approach similar to US GAAP (historical cost) or apply the acquisition method (fair value) if there is substance to the transaction (policy election)
Inventory: ASC 330, *Inventory* , and IAS 2, *Inventories*	Costing Methods	LIFO is an acceptable method and a consistent cost formula for all inventories similar in nature is not explicitly required	LIFO is prohibited. The same cost formula must be applied to all inventories similar in nature or use to the entity
	Measurement	Inventory is carried at lower of cost or market, where market is defined as current replacement cost, but not greater than net realizable value (estimated selling price less reasonable costs of completion and sale) and not less than net realizable value reduced by a normal sales margin	Inventory is carried at the lower of cost or net realizable value. Net realizable value is defined as the estimated selling price less the estimated costs of completion and the estimated costs necessary to make the sale
	Reversal of inventory write-downs	Any write-down of inventory to the lower of cost or market creates a new cost basis that subsequently cannot be reversed	Previously recognized-impairment losses are reversed up to the amount of the original impairment loss when the reasons for the impairment no longer exist
	Permanent inventory markdowns under the retail inventory method (RIM)	Permanent markdowns do not affect the gross margins used in applying the RIM. Rather, such markdowns reduce the carrying cost of inventory to net realizable value, less an allowance for an approximately normal profit margin, which make be less than both original cost and net realizable value	Permanent markdowns affect the average gross margin used in applying the RIM. Reduction of the carrying cost of inventory to below the lower of cost or net realizable value is not allowed
Long - Lived Assets: ASC lacks a comprehensive standard but IAS 16, *Property, Plant and Equipment*	Revaluation of write downs of assets	Revaluation not permitted	Revaluation is a permitted accounting policy election for an entire class of assets, requiring revaluation to fair value on a regular basis
	Depreciation of asset components	Component depreciation permitted but not common	Component depreciation required if components of an asset have differing patterns of benefit
	Measurement	Carried at depreciated cost	Carried at fair market value
	Investment property	Investment property is not separately defined and, therefore, is accounted for as held for use or held for sale	Investment property is separately defined in IAS 40, *Investment Property* , as property held to earn rent or for capital appreciation (or both) and may include property held by lessees under a finance or operating lease. Investment property may be accounted for on a historical cost basis or on a fair value basis as an accounting policy election. Capitalized operating leases classified as investment property must be accounted for using the fair value model

Sources: "IFRS compared to US GAAP: An Overview," *KPMG's Global IFRS Institute,* (2014)
"US GAAP vs IFRS: The Basics," *Ernst & Young,* (2008)

		U.S. GAAP	IFRS
Leases: ASC 840, *Leases,* and IAS 17, *Leases*	Lease of Real Estate	A lease of land and buildings that transfers ownership to the lessee or contains a bargain purchase option would be classified as a capital lease by the lessee, regardless of the relative value of the land If the fair value of the land at inception represents less than 25% of the total fair value of the lease, the lessee accounts for the land and building components as a single unit for purposes of evaluation the 75% and 90% tests. Otherwise, the lessee must consider the land and building components separately for purposes of evaluating other lease classification criteria	The land and building elements of the lease are considered separately when evaluating all indicators unless the amount that would initially be recognized for the land element is immaterial, in which case they would be treated as a single unit for purposes of lease classification There is no 25% test to determine whether to consider the land and building separately when evaluation certain indicators
	Recognition of a gain or loss on a sale and leaseback when the leaseback is an operating leaseback	If the seller does not relinquish more than a minor part of the use of the asset, gain or loss is generally deferred and amortized over the lease term. If the seller relinquishes more than a minor part of the use of the asset, the part or all of a gain may be recognized depending on the amount relinquished	Gain or loss is recognized immediately, subject to adjustment if the sales price differs from fair value
	Recognition of gain or loss on a sale-leaseback when the leaseback is a capital leaseback	Generally, same as above for operating leaseback in which the seller does not relinquish more than a minor part of the use of the asset	Gain or loss deferred and amortized over the lease term
Employee benefits other than Share-Based Payments: ASC 715, *Compensation - Retirement Benefits,* and ASC 712, *Compensation - Nonretirement Post-Employment Benefits,* and IAS 19, *Employee Benefits*	Actuarial method used for defined benefit plans	Different methods are required depending on the characteristics of the plan's benefit formula	Projected unit credit method is required in all cases
	Calculation of the expected return on plan assets	Based on either the fair value of plan assets or a "calculated value" that smooths the effect of short-term market fluctuations over five years	Limited to the "net interest" on the net defined benefit liability (asset) calculated using the benefit obligation's discount rate
	Treatment of actuarial gains and losses in net income	May be recognized in net income as they occur as periodic pension cost if applied consistently or deferred through a corridor approach and included in comprehensive income and later included in net income as periodic pension costs	Recognized immediately in other comprehensive income. Gains and losses are not subsequently recognized in net income. Only a portion of gain or loss can be reported in profit or loss using the corridor method
	Recognition of prior service costs from plan amendments	Initially deferred in other comprehensive income and subsequently recognized in net income over the average remaining service period of active employees or, when all or almost all participants are inactive, over the average remaining life expectancy of those participants	Immediate recognition in net income
	Settlement and curtailments	Settlement gain or loss is recognized when the obligation is settled. Curtailment losses are recognized when the curtailment is probable of occurring, while curtailment gains are recognized when the curtailment occurs	Gain or loss from settlement is recognized when it occurs. Change in the defined benefit obligation from a curtailment is recognized at the earlier of when it occurs or when related restructuring costs or termination benefits are recognized
Research and Development Costs: ASC 730, *Research and Development,* and IAS 38, *Intangible Assets*	Development Costs	Expensed as incurred unless addressed by another ASC Topic. Development costs related to computer software developed for external use are capitalized once technological feasibility is established in accordance with specific criteria (ASC 985-20). In the case of software developed for internal use, only those costs incurred during the application development stage may be capitalized	Capitalized when technical and economic feasibility of a project can be demonstrated in accordance with specific criteria, including: demonstrating technical feasibility, intent to complete the asset and ability to sell the asset in the future (i.e. research costs are expensed and development costs are capitalized).There is no separate guidance addressing computer software development costs
Contingencies : ASC 450, *Contingencies,* and IAS 37, *Provisions, Contingent Liabilities and Contingent Assets*	Recognition threshold	A loss must be "probable" to be recognized. Probable is usually denoted as 70% or more, in other words it must be likely	A loss must also be "probable," but it is interpreted as "more likely than not." The probability must only be greater than 50%
	Measurement of contingency provisions	The most likely outcome within the range should be accrued. When no outcome is more likely than the others, the minimum amount in the range should be accrued	The best estimate should be accrued, which is typically the expected value. This means it may be the most likely outcome or it may not

Table 2: Ratio Formulas

Ratio	Equation
Return on Assets (ROA)	Net Income/ ((Beginning Total Assets + Ending Total Assets)/2)
Asset Turnover	Total Revenue/ ((Beginning Total Assets + Ending Total Assets)/2)
Inventory Turnover	Cost of Good Sold/ ((Beginning Inventory + Ending Inventory)/2)
Gross Profit Margin	Gross Profit/ Sales Revenue
EBITDA Margin	EBITDA/ Total Revenue
R&D Margin	R&D/ Total Revenue
Profit Margin	Net Income/ Total Revenue

Chapter 1: Research and Development

Introduction

Research and development (R&D) costs are a key area in which International Standards and U.S. GAAP differ. U.S. GAAP prevents capitalization of these costs in all areas except software development; companies only have the option to expense. However, IFRS allows companies to capitalize if the research and development expenditures meet certain criteria.

The Accounting Standards Codification provides guidance about R&D expenditures for United States companies. ASC 730-10-25-1 states research and development costs must be "charged to expense" as incurred. ASC requires this because, with R&D expenditures, the "future benefits are at best uncertain. In other words, there is no indication that an economic resource has been created" (ASC 730-10-05-2). This inhibits the costs from satisfying the measurability test required to recognize them as an asset. As a result, companies immediately expense all of these costs on the income statement, which prevents them from impacting the balance sheet.

Conversely, IFRS allows for capitalization, but not immediately. IAS 58-54 states, "no intangible asset arising from research shall be recognized;" instead, it must be recognized as an expense when incurred. However, IAS 38-57 states that an "intangible asset arising from research and development" can be recognized if all of the following are met:

a) the technical feasibility of completing the intangible asset so that it will be available for use or sale
b) its intention to complete the intangible asset and use or sell it
c) its ability to use or sell the intangible asset
d) how the intangible asset will generate probable future economic benefits. Among other things, the entity can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself, or if it is to be used internally, the usefulness of the intangible asset
e) the availability of adequate technical, financial, and other resources to complete the development and to use or sell the intangible asset

f) its ability to measure reliably the expenditure attributable to the intangible asset during its development

At this point, the Company considers the R&D as more development than research. Although difficult to achieve, once the IFRS company reaches these standards outlined in IAS 38-57, it capitalizes and amortizes the R&D expenditures on the balance sheet, diverging from U.S. GAAP, which solely expenses.

Literature Review

Many papers discuss the differences between U.S. GAAP and IFRS; however, the differences in accounting for research and development are relatively unexplored. Most academics study two key areas with regards to R&D expenditures: which are the use of R&D for earnings management and the treatment of R&D as capital or operating expenses. One key author, Damodaran (1999), theorizes about the possible effects of capitalizing or expensing R&D on financial statements and valuation, discussing potential policy implications associated with this choice. In the paper "Research and Development Expenses: Implications for Profitability Measurement and Valuation," Damodaran discusses the effect of capitalization on operating income, net income, profitability measures, and cash flows. Damodaran argues that classification of R&D expenses as capital expenditures, rather then operating expenses, paints a more accurate picture of the company's operations and financial position. These R&D expenses create assets for firms if successfully completed. According to Damodaran reclassification affects value. He further argues that treating internal R&D expenses as operating is inconsistent with patents acquired from other companies, which are essentially acquired R&D projects. Patents acquired from third parties are treated as assets; however, internal development is not treated as nor creates assets according to FASB. As a result, companies treat similar assets completely differently on financial statements depending on how acquired. Treating R&D as capital expenditures is consistent with how IFRS companies would classify R&D if the

company believed it feasible for an intangible asset to arise from the R&D expenditures. Treating R&D as operating expenditures follows U.S. GAAP's standards (Damodaran, 1999).

Through analysis of expensing and capitalization, Damodaran demonstrates that both operating income and net income increase as a result of R&D expenditure capitalization. Profitability measures, such as ROE (return on equity), also increase. This causes no effect on free cash flows, but separating R&D expenses from other operating expenses provides a "cleaner picture of what a firm is actually earning on its assets in place, and how much it is investing for future growth" (Damodaran, 1999, p. 17). Finally, Damodaran argues that reclassifying R&D expenses as capital expenditures significantly affects valuation because of three main reasons: first, expected growth rates can be tied to a firm's investments in R&D; second, reclassifying R&D expenditures will affect operating margins; and third, computing terminal value requires making assumptions about growth and reinvestment rates which would change if reclassified as capital expenditures. In an example, calculating The Boeing Company's (Boeing) value, and treating R&D, first as operating expenditures and second, as capital expenditures, results in significant valuation differences. The overall value of Boeing increases by about $6 billion as a result of treating R&D as capital expenditures rather than just expenses. Damodaran thus concludes that reclassifying R&D can have significant impacts on company valuation. Understanding this variation will improve analysts' accuracy in company valuation and understanding of financial performance.

According to some analysis, companies also use R&D expenditures for earnings management. In the paper "Differences in earnings management between US GAAP and IAS/IFRS," Liu, Yuen, Yao, and Chan (2014) discuss companies' decisions to use discretionary R&D investment and deferred income tax to smooth or maintain earnings. The authors hypothesize that firms using the more "principles-based IAS/IFRS use real EM (earnings management) via discretionary R&D more than firms reporting with rules-based US GAAP" (Lui, et al., 2014, p. 141). Through studying 905 firms, the authors conclude that those using IAS/IFRS are more likely to manage earnings with real

EM through R&D than rules-based U.S. GAAP firms. This means that IFRS companies are more likely to change the timing or magnitude of their R&D decisions to smooth earnings, although this does not mean U.S. GAAP companies are innocent with regard to attempting to smooth earnings. This could affect later capitalization under IFRS. An IFRS company might postpone or lower its R&D for a year, which results in later capitalization. Conversely, an IFRS company might increase its R&D expense for a year, capitalizing a smaller amount, to keep earnings in line with previous years. This could lead to capitalization earlier or later for the Company after it determines the economic feasibility of the product associated with the R&D.

Other academics have studied managerial discretion when choosing whether to capitalize or expense and have found similar results to Lui, Yuen, Yao, and Chan. Markarian, Pozza, and Prencipe (2007), in their paper, "Capitalization of R&D Costs and Earnings Management: Evidence from Italian Listed Companies," found that Italian firms with lower return on assets, when compared to the average are more likely to capitalize R&D expenditures to smooth earnings (2007, p. 24). Similarly, in their paper, "Managerial Discretion and Accounting for Research and Development Costs" Chambers, Jennings, and Thompson II (2001) investigate the extent to which a less conservative accounting method affects financial reporting, asking if company management uses the increased discretion to increase or decrease reporting accuracy. They find that managers use discretion positively when choosing whether to capitalize or expense R&D, and as a result, capitalizing and amortizing R&D costs can produce "economically significant financial reporting benefits," contradicting Lui, Yuen, Yao, and Chan's (2014) findings (Chambers, et al., 2001, p. 29-30).

Oswald and Zarowin (2007) measure R&D capitalization and its effect on stock prices in their paper, "Capitalization of R&D and the Informativeness of Stock Prices." They hypothesize that capitalization provides more relevant information in comparison to expensing R&D when predicting future stock prices and valuations. The two study U.K. firms, because at that time, U.K. GAAP, like IFRS, allowed companies to choose whether to capitalize or expense, creating an interesting

dichotomy in which some companies capitalized and some expensed in the same country. The authors conclude that, all else equal, firms' capitalization of R&D expenditures is associated with greater stock price informativeness and provides more complete information about future earnings to the market (Oswald and Zarowin, 2007). This concept is key for analysts studying stock prices and valuations. The choice to capitalize or expense impacts stock price variability.

Overall, determining whether IFRS or U.S. GAAP provides more value with regard to R&D can prove difficult, there are academics on both sides of the argument. Yusuf Mohammed Nulla (2013), begins to analyze this question in his paper, "IFRS adoption in Research and Development Companies." He studies research and development companies that followed Canadian GAAP (which was very similar to U.S. GAAP) and their recent conversion to IFRS to try to determine if one provided better accounting quality. His measures of accounting quality include reported earnings, accruals, persistency, value relevance, income smoothing, timeliness of loss recognition, and reporting aggressiveness. Mohamed finds that IFRS adoption in Canada resulted in "lower persistency and predictability in earnings; decrease in earnings influence to shareholder value; weak volatility in market price; better predictability of cash flows and financial forecasts; increase in accruals and timeliness of loss recognition; and decrease in research and development expenditures" (Nulla, 2013, p. 40-45). He argues that the decrease in research and development expenditures is likely due to capitalization of some R&D. Overall, accounting quality is affected both positively and negatively by the move to IFRS. Nulla further notes that, specifically, research and development companies are affected both positively and negatively, IFRS and U.S. GAAP provide value in two different but useful ways (Nulla, 2013). Although the verdict is still out as to whether capitalization or expensing proves the better accounting choice, analysts must be conscious of the difference and potential effect on companies when comparing firms.

Theory

A simple example of the fictitious Company ABC can demonstrate the effect of capitalization under IFRS compared to U.S. GAAP. This company is shown using either U.S. GAAP or IFRS over a seven-year period, altering only the treatment of research and development. Holding Company ABC's R&D constant at 60 every year from the start until the end of the seven-year timeframe and using an amortization period for its definite life intangibles of three years, can show the differences between U.S. GAAP and IFRS. For simplicity, this company holds very few assets and no liabilities, only equity. Cost of Goods Sold (COGS) for this company is 80% of sales; Sales, General and Administrative expenses are 10% of sales; and the tax rate is assumed to be 30% of pre-tax income. Current tax rules remain in effect, thus creating a book-tax difference and a deferred tax liability under capitalization. If there is the assumption of no book-tax difference, this affects cash flows, which could affect valuation. Assuming that Company ABC considers the R&D project to be immediately economically feasible, it capitalizes in year one. Holding all else constant, Tables 1A and 1B demonstrate the differences in the financial statements of the company if it chooses to use U.S. GAAP and expense or IFRS and capitalize.

The four key ratios to analyze within the context of R&D expense vs. capitalization are ROA, asset turnover, profit margin, and EBITDA margin. Figure 1A demonstrates that capitalization initially results in a larger ROA, because there are lower expenses on the income statement, causing a higher net income and increasing return on assets. However, as soon as the three-year amortization period concludes, and the amount amortized equals the R&D expense, then U.S. GAAP and IFRS standards begin to align. Capitalization still occurs, but amortization of this capitalized R&D equals the R&D expense for the company that only expenses. At this point, and moving forward, expensing results in a higher ROA, but the two ROA's are very similar, changing at a comparable rate.

Figure 1B demonstrates the asset turnover variation between the different standards. The company that expenses R&D has a consistently higher asset turnover. The company that expenses

(the U.S. GAAP company) has a higher asset turnover, because it holds fewer assets on its balance sheet; the balance sheet includes the capitalized R&D under IFRS, increasing total assets and thus decreasing asset turnover.

Figures 1C and 1D show EBITDA and profit margin variability resulting from accounting standard rules. Capitalizing consistently results in a higher EBITDA for the IFRS company. Because EBITDA excludes amortization expense, the company that capitalizes and amortizes has a consistently higher EBITDA than the U.S. GAAP firm that solely expenses. With profit margin, Figure 1C, the story proves slightly different. Initially, the company that capitalizes has a higher profit margin, but after it amortizes for three years, amortization expense equals the research and development expense of the U.S. GAAP firm that solely expenses. Although the two income statements show different types of expenses, the sum of the expenses remains equal. At this point, the profit margins for the two companies remain equal as long as their R&D expenditures and sales numbers remain constant.

If R&D grows rather than remaining constant, it tells a similar story. Tables 2A and 2B demonstrate how this affects the balance sheet and income statement. Figure 2A shows ROA variation as R&D expenses and sales both grow at 20% each year. Initially, when net income is significantly lower, the IFRS company has a higher ROA because of larger expenses under U.S. GAAP. Although the IFRS company has higher assets as a result of capitalization, the difference in net income outweighs the difference in total assets, causing a higher ROA. However, over time, the company that expenses has its net income grow at a faster rate in relation to its total assets than the company that capitalizes. Towards the end of the seven-year period, the U.S. GAAP company that expenses has a slightly higher ROA than the IFRS company that capitalizes.

Figure 2B shows the asset turnover variation, and like the constant R&D expenditure example, asset turnover begins slightly higher for the U.S. GAAP company that expenses because its total assets are lower than the IFRS company that capitalizes. In other the words, the company that

capitalizes has higher total asset balances. As the IFRS firm increases its assets, the difference between asset turnover grows, and expensing results in an increasingly higher asset turnover through year seven.

EBITDA margin and profit margin ratios again prove similar to the example with no R&D growth. EBITDA margin remains significantly higher over the entire period under capitalization because EBITDA margin excludes amortization expense. Again, profit margin starts high for the company that capitalizes, but after the amortization period completes, the two margins begin to converge. When R&D and sales consistently grow however, the two profit margins do not converge; instead, the capitalization profit margin remains slightly higher. This develops because net income remains greater under capitalization than expensing throughout the time period, even though the two have identical sales figures.

One key consideration includes how R&D expensing vs. capitalization affects these ratios at various points throughout the firm's life cycle. For example, do these ratios converge as the company amortizes all R&D previously capitalized? If the company halts its R&D expenditures for longer than the amortization period necessary to capitalize, then the ratios will begin to converge, if not completely converge. ROA and asset turnover almost merge, but as a result of small variations remaining in total assets and cash balances, they remain slightly different. However, the income statement ratios do converge; the two margins become equal at the completion of amortization. Analysts must be cognizant of each company and its current point in the overall life cycle, because this impacts the ratios and their comparability. The stage within the firm's life cycle has the potential to change the effect of varying treatment of R&D under U.S. GAAP or IFRS on the company and analysis of it.

The analysis of this fictitious company provides insights onto the potential real effects on firms using U.S. GAAP and IFRS accounting standards. Considering the four key ratios (ROA, asset turnover, EBITDA margin, and profit margin), they will likely follow the simple example with slight

variation. First, ROA will be greater under IFRS as long as the company continues to capitalize a portion of its growing R&D expenditures. (If the amount of capitalization flattens out or decreases, the amortization period will either cause the IFRS ROA to converge with U.S. GAAP, or cause the U.S. GAAP company to have a higher ROA). Second, asset turnover will be larger, although not significantly so, when solely expensing under U.S. GAAP. Over time, however, there may be increased divergence between the two ratios. Third, EBITDA margin should remain larger under IFRS, and the size of the amortization in relation to operating income affects the size of the difference in EBITDA margin. Lastly, profit margin will remain larger under IFRS, although not significantly larger than under U.S. GAAP.

Company Analysis

Although it is unlikely that R&D expense will be the only factor that differs between U.S. GAAP and IFRS companies, it is clear that there can be a significant impact on ratios if companies in a particular industry have large levels of R&D and that R&D has the potential of being capitalized under IFRS standards. Tables 4A and 4B show the top 10 industries both globally and in North America with regards to R&D margins. The results show that industrial and manufacturing companies, technology and software development, and chemical or pharmaceutical development emerge as top industries. Both tables show some outliers in each group, such as Service, NEC (only globally) and Agricultural Production-Crops both in North America and internationally.

Ignoring the outliers, one of the top industries will be best to study in depth; however, a single industry must be chosen. The pharmaceutical and industries which perform significant amounts of software development both present problems, which makes the manufacturing/ industrial industry promising for exploring the effect of R&D expenditures on financial statements. For example, many pharmaceutical companies complying with IFRS do not capitalize any of their research and development. This results in few significant variations between IFRS and U.S. GAAP

concerning R&D and these ratios. A possible explanation for this lack of capitalization is the fact that many of the drugs researched never make it out of testing because of general uncertainty and regulation concerns. Some companies estimate on their annual filings that as few as 1 in 30 pharmaceutical drugs that enter phase one trials complete testing and are marketed to the general public. Few drugs in initial testing end up creating profit for the pharmaceutical companies, which prevents them from capitalization. For example, the Swiss pharmaceutical company Novartis International AG, in the footnotes of its 2014 Annual Report, states:

> Internal Research & Development costs are fully charged to Research & Development in the consolidated income statement in the period in which they are incurred. The Group considers that regulatory and other uncertainties inherent in the development of new products preclude the capitalization of internal development expense as an intangible asset until marketing approval from a regulatory authority is obtained in a major market.

Other IFRS-following pharmaceutical companies, that have similar footnotes in their annual reports, include AstraZeneca plc, Bayer AG, Novo Nordisk, Teva Pharmaceutical Industries, and Astellas Pharma Inc. This confirms that companies believe economic feasibility less likely, which prohibits pharmaceutical companies adhering to IFRS standards from capitalizing R&D expenditures. Thus, differences in R&D accounting should not create issues when comparing U.S. GAAP to IFRS for these companies.

Industries, which perform significant software development and data processing R&D, also present a problem for researching the effect of expensing or capitalizing, because U.S. GAAP and IFRS have relatively similar standards for R&D. As mentioned previously, IFRS allows that goods be capitalized after technological feasibility occurs for the research and development, or the company knows that the R&D will result in profits. U.S. GAAP and IFRS are in agreement, but only for software development. ASC 985-20-25-1 states, “All costs incurred to establish the technological feasibility of a computer software product to be sold, leased, or otherwise marketed are research and development costs. Those costs shall be charged to expense when incurred.” However, once

companies establish technological feasibility, subsequent production costs must be capitalized according to ASC 985-20-25-3. U.S. GAAP treats software development costs almost identically to IFRS's overall R&D treatment; therefore, comparing firms in industries with large software development likely results in few differences under U.S. GAAP and IFRS.

Although pharmaceutical companies and companies which perform significant software development present problems for analyzing R&D, the industrial/manufacturing industry proves promising. Under IFRS, many of these companies capitalize a portion of their R&D expenditures. Also, these companies are generally easy to understand, with simple financial statements. General manufacturing, however, proves too large of an industry to study, because finding an obvious peer group, within this large industry, may prove difficult. Therefore further narrowing is necessary. Car manufacturing develops as a great smaller industry because it expends a great deal on R&D and contains an easily identifiable peer group. Figures 6 A and B demonstrate that both the United States and international car manufacturing companies have a healthy portion of their sales allocated to research and development. The sample size ranges from 11-15 companies in the United States over the years from 2009 - 2014 and includes General Motors, Chrysler, and Tesla among others. The sample size also includes international companies, which report using U.S. GAAP on their 20-F financial statements, such as Honda and Toyota. These companies report using U.S. GAAP to be included on U.S. stock exchanges.

Table 5 lists the U.S. GAAP and IFRS companies used to determine average and median R&D margins. The sample size for the IFRS companies is 17 and includes companies such as Volvo, Audi, Volkswagen, and Peugeot. Over the period, the average international R&D margins ranges from 2.5% to 5.8%. The international median varies from 2.6% to 4.5%. The U.S. GAAP margins are also high. The companies' average ranges from 3.9% to 11.9%, and the median ranges from 2.7% to 3.8%. For both the IFRS and U.S. GAAP companies, research and development is a relatively large portion of sales. Overall, the U.S. GAAP average numbers seem higher than the IFRS numbers,

which on the surface complies with the idea that some of IFRS companies' R&D are capitalized and thus not included in R&D expense, making the overall R&D expense lower than that of the U.S. GAAP competitors.

An analysis of one car manufacturer complying with U.S. GAAP, Ford Motor Company (Ford), and one car manufacturer complying with IFRS, The Volvo Group (Volvo), helps demonstrate the potential differences developing between companies as a result of capitalizing or expensing R&D. A key item to note is that the two companies are different and operate under different business plans. Although both car manufacturers, they have developed diverse business strategies in order to make cars and appeal to customers. Similarly, other variation between U.S. GAAP and IFRS accounting standards might affect the ratios. Regardless, Volvo capitalizes a significant portion of its intangible assets, making it a sound comparison to Ford in demonstrating the differences between U.S. GAAP and IFRS. From 2010 – 2014, Volvo's capitalized development ranged from 28% - 38% of total intangible assets. It regarded many of its research and development ventures as feasible and likely to create later value for the Company.

The remainder of this chapter analyzes the differences between the ratios that develop between the two companies and then discusses possible reasons for why these ratios align with or deviate from expectations, concerning differences between U.S. GAAP and IFRS. ROA will be greater for IFRS as long as the company continues to capitalize a portion of its growing R&D expenditures. If the amount of capitalization continues to grow, over the length of the amortization period, the IFRS ROA will begin to converge with U.S. GAAP, which expenses ROA. If the total amount of capitalization for the IFRS company remains constant and does not grow, then the ROA will be slightly higher for the U.S. GAAP company that solely expenses because it will have a higher net income in relation to total assets. Figure 3A presents a graphic representation of the differences between ROA for the two companies. In the four-year period studied for Ford and Volvo, Ford's ROA is higher in all but one year, and in that year, both companies have very similar ROAs. Ford

has a significantly higher ROA in 2011 due to a release of a tax allowance in that year, artificially boosting net income (Ford Motor Company 10-K, 2012). However, in other years, the two companies' ROAs track each other, with Ford's being higher. This differs from the expectation that IFRS companies will achieve a higher ROA, especially since Volvo's amount capitalized varies but is generally growing. There are most likely other variables affecting these results.

An analysis of asset turnover also presents a different picture from expected according to the theory developed in the fictitious example. The company that expenses should have a higher asset turnover or at least a very close asset turnover to the company that capitalizes R&D expenditures. If the company that solely expenses has a lower asset turnover, it should be very close. Surprisingly, Ford has a significantly lower asset turnover over the years studied. Figure 3B demonstrates this result. Overall, Volvo better utilizes its assets and turns them into revenues. Proportionally, Volvo uses fewer assets to create the same amount of revenues. Because Volvo capitalizes and amortizes R&D costs, there should be an increase in assets on the balance sheet relative to Ford, decreasing asset turnover. This, however, is not the case, and footnotes within the Ford financial statements give no indication that it currently holds more assets than normal, which would explain these results. Again this indicates that there are probably other variables and differences between Ford and Volvo affecting the company results.

Finally, Figures 3C and 3D demonstrate the differences in margins for Volvo and Ford. Volvo is expected to have a higher EBIDTA and profit margin for all 5 years studied if it capitalizes its R&D. Volvo has a higher EBITDA over the time period but a lower profit margin than Ford. This raises the question of whether Volvo has some expense below operating income significantly higher than Ford's which affects and decreases its profit margin. These potential expenses may also explain why Volvo's asset turnover is higher but its ROA is lower than Ford's. When analyzing the change from operating income to net income, it seems that Volvo has higher taxes and interest expenses. In 2013 and 2014, it also has higher than normal R&D expenses as well as higher than normal other

operating income and expenses due to litigations and revaluations of assets. This causes its EBITDA to be inflated compared to its profit in relation to Ford. Although not perfect, comparing Ford and Volvo helps demonstrate the potential for differences in these ratios in companies that use U.S. GAAP and IFRS.

Because several other factors affect the comparison between Volvo and Ford, analyzing one company and converting between IFRS and U.S. GAAP standards, may develop a clearer picture of the differences that arise with regard to R&D expenditures under different accounting standards. This helps isolate the specific effect associated with this accounting choice. Converting the capitalized R&D expenses from IFRS to U.S. GAAP for The Volvo Group helps to illustrate this concept. The conversion to U.S. GAAP is more feasible because switching from U.S. GAAP to IFRS requires making assumptions about what percentage of R&D expenditures would have been capitalized if the Company could capitalize. Conversely, the IFRS company discloses amounts capitalized, so adding that capitalization to expense converts IFRS to U.S. GAAP. Figure 4A shows the variation in ROA, which is in line with expectations. At this point in the firm's life cycle, with capitalization growing, IFRS ROA should be consistently higher than U.S. GAAP ROA, which is the case after conversion. Similarly, if expensing, asset turnover (under U.S. GAAP) should be greater. Again, Figure 4B demonstrates that after the conversion, Volvo under U.S. GAAP has a slightly higher asset turnover.

Lastly, EBITDA and profit margin should be larger under capitalization than expensing, with the size variability of both depending on how much R&D is amortized each year in proportion to sales. Figure 4C and 4D both demonstrate that over the period from 2010 – 2014, EBITDA and profit margin vary as would be expected. Comparing the same company under U.S. GAAP and IFRS eliminates much of the noise and excess variability that results from using two different companies. The two firms have different business strategies and use accounting standards that vary in more ways than just R&D expenditure treatment. The results of this comparison also align with the R&D theory developed about after analyzing the fictitious Company ABC.

Conclusion

Analyzing and converting other companies may produce similar results, which analysts should be conscious of when studying companies. All of this depends on the amount of R&D the company has as a percentage of sales and the amount of R&D the IFRS company capitalizes in relation to total expenditures. For example, Volvo, which capitalizes R&D between 28% and 34% of its total intangibles from 2010 – 2014 and has its total R&D expense margin range from 4% - 6% over that same period, has several of its ratios change 0.5% to 1% as a result of converting its financials from IFRS to U.S. GAAP. Specifically, ROA changes 0.3% at the smallest (5.1% - 5.4% in 2011) at 0.6% at the largest (0.5% - 1.1% in 2013), EBITDA margin increases in a range from 0.7% (9.9% - 10.6% in 2012) to 1.1% (6.6% - 7.7% in 2014), asset turnover changes .04 points (.92 - .96 in 2012), and profit margin increases in a range from 0.5% (3.2% - 3.7% in 2012) to 0.8% (0.6% to 1.4% in 2013) when they change. This all depends on the year and the size of capitalized R&D within that year. Because the total amortization expense was large in relation to operating income, a considerable difference developed in the ratios after conversion. Although some prove small, these differences in ratios affect how potential investors might consider the company. For example, if an analyst does not realize that an IFRS company may have an ROA that is 1% higher solely because of a difference in accounting standards, that analyst might evaluate the firm incorrectly. Similarly, EBITDA, a number used often by analysts, may also be over 1% higher, and if an analyst carries this forward, throughout the entire evaluation, it could have a significant impact on results. R&D presents one of several differences between U.S. GAAP and IFRS that have the potential to affect analysts' assessment of companies if they do not recognize and adjust for these differences.

Appendix

Table 1A: Expense R&D

Forecasted Income Statement and Balance Sheet (All R&D Expensed)								
Income Statement								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales		1000	1000	1000	1000	1000	1000	1000
COGS		800	800	800	800	800	800	800
Gross Profit		200	200	200	200	200	200	200
SG&A		100	100	100	100	100	100	100
R&D		60	60	60	60	60	60	60
Pre-tax Income		40	40	40	40	40	40	40
Income tax exp.		12	12	12	12	12	12	12
Net Income		28	28	28	28	28	28	28
Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	928	956	984	1012	1040	1068	1096
Inventory		100	100	100	100	100	100	100
Land	1000	1000	1000	1000	1000	1000	1000	1000
R&D Intangible								
Total Assets	2000	2028	2056	2084	2112	2140	2168	2196
Liab & Equity								
Deferred Tax								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		28	56	84	112	140	168	196
Total Liab. & Equity	2000	2028	2056	2084	2112	2140	2168	2196
Ratios								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA		1.39%	1.37%	1.35%	1.33%	1.32%	1.30%	1.28%
EBITDA Margin		4%	4%	4%	4%	4%	4%	4%
Asset Turnover		0.50	0.49	0.48	0.48	0.47	0.46	0.46
Profit Margin		2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%

Table 1B: Capitalize R&D

Forecasted Income Statement and Balance Sheet (R&D Initially Capitalized, 3 year amortization period)								
Income Statement								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales		1000	1000	1000	1000	1000	1000	1000
COGS		800	800	800	800	800	800	800
Gross Profit		200	200	200	200	200	200	200
SG&A		100	100	100	100	100	100	100
Amort Expense		20	40	60	60	60	60	60
Pre-tax Income		80	60	40	40	40	40	40
Income tax exp.		24	18	12	12	12	12	12
Net Income		56	42	28	28	28	28	28
Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	928	956	984	1012	1040	1068	1096
Inventory		100	100	100	100	100	100	100
Land	1000	1000	1000	1000	1000	1000	1000	1000
R&D Intangible		60	120	180	240	300	360	420
Less: Accumulated Amortization		-20	-60	-120	-180	-240	-300	-360
Total Assets	2000	2068	2116	2144	2172	2200	2228	2256
Liab & Equity								
Deferred Tax		12	18	18	18	18	18	18
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		56	98	126	154	182	210	238
Total Liab. & Equity	2000	2068	2116	2144	2172	2200	2228	2256
Ratios								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA		2.8%	2.0%	1.3%	1.3%	1.3%	1.3%	1.2%
EBITDA Margin		10%	10%	10%	10%	10%	10%	10%
Asset Turnover		0.49	0.48	0.47	0.46	0.46	0.45	0.45
Profit Margin		5.6%	4.2%	2.8%	2.8%	2.8%	2.8%	2.8%

Table 2A: Expense with Growing R&D

Forecasted Income Statement and Balance Sheet (All R&D Expensed, R&D Growing)								
Income Statement								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales		1000	1200	1440	1728	2074	2488	2986
COGS		800	960	1152	1382	1659	1991	2389
Gross Profit		200	240	288	346	415	498	597
SG&A		100	120	144	173	207	249	299
R&D		60	72	86	104	124	149	179
Pre-tax Income		40	48	58	69	83	100	119
Income tax exp.		12	14	17	21	25	30	36
Net Income		28	34	40	48	58	70	84
Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	928	942	958	978	1001	1029	1063
Inventory		100	120	144	173	207	249	299
Land	1000	1000	1000	1000	1000	1000	1000	1000
R&D Intangible								
Total Assets	2000	2028	2062	2102	2150	2208	2278	2362
Liab & Equity								
Deferred Tax								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		28	62	102	150	208	278	362
Total Liab. & Equity	2000	2028	2062	2102	2150	2208	2278	2362
Ratios								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA		1%	2%	2%	2%	3%	3%	4%
EBITDA Margin		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Asset Turnover		0.50	0.59	0.69	0.81	0.95	1.11	1.29
Profit Margin		2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%

Table 2B: Capitalize with R&D Growth

Forecasted Income Statement and Balance Sheet (R&D Initially Capitalized, 3 year amortization period , R&D Growing

Income Statement

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7
Sales	1000	1200	1440	1728	2074	2488	2986
COGS	800	960	1152	1382	1659	1991	2389
Gross Profit	200	240	288	346	415	498	597
SG&A	100	120	144	173	207	249	299
Amort Expense	20	44	73	87	105	126	151
Pre-tax Income	80	76	71	85	103	123	148
Income tax exp.	24	23	21	26	31	37	44
Net Income	56	53	50	60	72	86	103

Balance Sheet

	Yr0	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7
Assets								
Cash	1000	928	944	966	994	1030	1076	1134
Inventory		100	120	144	173	207	249	299
Land	1000	1000	1000	1000	1000	1000	1000	1000
R&D Intangible		60	132	218	322	446	596	775
Less: Accumulated Amortization		-20	-64	-137	-224	-329	-455	-606
Total Assets	2000	2068	2132	2191	2265	2355	2466	2602
Liab & Equity								
Deferred Tax		12	23	32	46	65	89	122
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		56	109	159	219	291	377	480
Total Liab. & Equity	2000	2068	2132	2191	2265	2355	2466	2602

Ratios

	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Yr7
ROA	2.8%	2.5%	2.3%	2.7%	3.1%	3.6%	4.1%
EBITDA Margin	10%	10%	10%	10%	10%	10%	10%
Asset Turnover	49.2%	57.1%	66.6%	77.6%	89.8%	103.2%	117.8%
Profit Margin	5.6%	4.4%	3.5%	3.5%	3.5%	3.5%	3.5%

Table 3A: Volvo Income Statement

FINANCIAL PERFORMANCE

Improved underlying profitability

For the Volvo Group 2014 was a year with improved underlying profitability in a mixed economic environment.

INCOME STATEMENTS VOLVO GROUP

		Industrial Operations		Customer Finance		Eliminations		Volvo Group	
SEK M		**2014**	2013	**2014**	2013	**2014**	2013	**2014**	2013
Net sales	Note 6, 7	**275,999**	**265,420**	**10,111**	**9,539**	**(3,162)**	**(2,337)**	**282,948**	**272,622**
Cost of sales		(217,251)	(209,307)	(5,923)	(5,534)	3,162	2,337	(220,012)	(212,504)
Gross income		**58,748**	**56,113**	**4,188**	**4,005**	**-**	**-**	**62,937**	**60,118**
Research and development expenses		(16,656)	(15,124)	-	-	-	-	(16,656)	(15,124)
Selling expenses		(25,778)	(26,904)	(1,670)	(1,602)	-	-	(27,448)	(28,506)
Administrative expenses		(5,367)	(5,824)	(41)	(38)	-	-	(5,408)	(5,862)
Other operating income and expenses	Note 8	(6,931)	(2,710)	(766)	(843)	-	-	(7,697)	(3,554)
Income from investments in joint ventures and associated companies	Note 5, 6	46	96	-	-	-	-	46	96
Income (loss) from other investments	Note 5	49	(31)	1	-	-	-	50	(30)
Operating income		**4,111**	**5,616**	**1,712**	**1,522**	**-**	**-**	**5,824**	**7,138**
Interest income and similar credits		328	381	-	-	-	-	328	381
Interest expenses and similar charges		(1,994)	(2,810)	-	-	-	-	(1,994)	(2,810)
Other financial income and expenses	Note 9	931	11	-	-	-	-	931	11
Income after financial items		**3,377**	**3,199**	**1,712**	**1,522**	**-**	**-**	**5,089**	**4,721**
Income taxes	Note 10	(2,287)	(451)	(568)	(468)	-	-	(2,854)	(919)
Income for the period		**1,091**	**2,748**	**1,145**	**1,054**	**-**	**-**	**2,235**	**3,802**
Attributable to:									
Equity holders of the parent company								2,099	3,583
Minority interests	Note 11							136	219
								2,235	**3,802**
Basic earnings per share, SEK	Note 19							1.03	1.77
Diluted earnings per share, SEK	Note 19							1.03	1.76

OTHER COMPREHENSIVE INCOME

SEK M		**2014**	2013
Income for the period		**2,235**	**3,802**
Items that will not be reclassified to income statement:			
Remeasurements of defined benefit pension plans		(2,833)	3,904
Items that may be reclassified subsequently to income statement:			
Exchange differences on translation of foreign operations		5,998	(1,634)
Share of OCI related to joint ventures and associated companies		198	(135)
Accumulated translation difference reversed to income		33	37
Available-for-sale investments		3,067	470
Change in cash flow hedge reserve	Note 19	24	9
Other comprehensive income, net of income taxes		**6,487**	**2,651**
Total comprehensive income for the period		**8,722**	**6,453**
Attributable to:			
Equity holders of the parent company		8,334	6,196
Minority interests		388	257
		8,722	**6,453**

Table 3B: Volvo Balance Sheet

FINANCIAL POSITION

Strengthened financial position

Net debt in the Volvo Group's Industrial Operations amounted to SEK 26.4 billion at December 31, 2014, equal to 37.6% of shareholders' equity. Excluding provisions for post-employment benefits the Industrial Operation's net debt amounted to SEK 9.9 billion, which equal to 14.2% of shareholders' equity.

BALANCE SHEET VOLVO GROUP – ASSETS

		Industrial Operations		Customer Finance		Eliminations		Volvo Group	
SEK M		**Dec 31 2014**	Dec 31 2013	**Dec 31 2014**	Dec 31 2013	**Dec 31 2014**	Dec 31 2013	**Dec 31 2014**	Dec 31 2013
Assets									
Non-current assets									
Intangible assets	Note 12	37,010	36,479	105	109	–	–	37,115	36,588
Tangible assets	Note 13								
Property, plant and equipment		54,821	51,819	94	87	–	–	54,915	51,906
Investment property		266	327	–	–	–	–	266	327
Assets under operating leases		19,484	17,013	17,872	13,714	(6,138)	(5,055)	31,218	25,672
Financial assets									
Investments in joint ventures and associated companies	Note 5	4,821	4,377	–	–	–	–	4,821	4,377
Other shares and participations	Note 5	5,004	1,944	13	6	–	–	5,017	1,950
Non-current customer-financing receivables	Note 15	1,205	727	51,380	49,466	(1,254)	(6,401)	51,331	43,792
Deferred tax assets	Note 10	15,022	12,326	809	840	–	–	15,831	13,166
Prepaid pensions	Note 20	126	11	–	11	–	–	126	22
Non-current interest-bearing receivables	Note 16	1,041	550	22	34	378	(104)	1,441	480
Other non-current receivables	Note 16	3,528	3,017	150	128	(165)	(208)	3,513	2,937
Total non-current assets		**142,328**	**128,590**	**70,445**	**64,395**	**(7,179)**	**(11,768)**	**205,594**	**181,217**
Current assets									
Inventories	Note 17	45,364	40,964	169	189	–	–	45,533	41,153
Current receivables									
Customer-financing receivables	Note 15	623	679	48,063	40,854	(850)	(1,464)	47,836	40,069
Tax assets		2,918	1,692	496	57	–	–	3,414	1,749
Interest-bearing receivables	Note 16	1,736	1,645	345	473	(968)	(1,209)	1,113	909
Internal funding[1]		4,374	2,256	–	–	(4,374)	(2,256)	–	–
Accounts receivable	Note 16	30,495	29,170	400	245	–	–	30,895	29,415
Other receivables	Note 16	13,950	12,207	1,984	1,383	(1,265)	(936)	14,669	12,654
Non interest-bearing assets held for sale	Note 3	288	8,102	–	–	–	–	288	8,102
Interest-bearing assets held for sale	Note 3	–	2	–	–	–	–	–	2
Marketable securities	Note 18	6,927	2,570	385	21	–	–	7,312	2,591
Cash and cash equivalents	Note 18	24,178	25,660	2,470	1,679	(406)	(371)	26,242	26,968
Total current assets		**130,853**	**124,947**	**54,312**	**44,901**	**(7,863)**	**(6,236)**	**177,302**	**163,612**
Total assets		**273,181**	**253,537**	**124,757**	**109,296**	**(15,042)**	**(18,004)**	**382,896**	**344,829**

1 Internal funding is internal lending from Industrial Operations to Customer Finance.

BALANCE SHEET VOLVO GROUP – SHAREHOLDERS' EQUITY AND LIABILITIES

SEK M		Industrial Operations		Customer Finance		Eliminations		Volvo Group	
		Dec 31 2014	Dec 31 2013	**Dec 31 2014**	Dec 31 2013	**Dec 31 2014**	Dec 31 2013	**Dec 31 2014**	Dec 31 2013
Equity and liabilities									
Equity attributable to the equity holder of the Parent Company	Note 19	68,382	67,134	9,943	8,906	–	(8)	78,325	76,032
Minority interests	Note 11	1,723	1,333	–	–	–	–	1,723	1,333
Total equity		**70,105**	**68,467**	**9,943**	**8,906**	**–**	**(8)**	**80,048**	**77,365**
Non-current provisions									
Provisions for post-employment benefits	Note 20	16,580	12,249	103	73	–	–	16,683	12,322
Provisions for deferred taxes	Note 10	201	324	2,595	2,082	–	–	2,796	2,406
Other provisions	Note 21	12,463	6,005	231	183	46	2	12,740	6,190
Total non-current provisions		**29,244**	**18,578**	**2,929**	**2,338**	**46**	**2**	**32,219**	**20,918**
Non-current liabilities	Note 22								
Bond loans		68,877	46,585	–	–	–	–	68,877	46,585
Other loans		27,395	31,219	13,013	12,182	(1,254)	(6,537)	39,154	36,864
Internal funding[1]		(59,955)	(34,027)	42,997	35,761	16,958	(1,734)	–	–
Other liabilities		17,549	14,315	607	665	(4,424)	(3,503)	13,732	11,477
Total non-current liabilities		**53,866**	**58,092**	**56,617**	**48,608**	**11,280**	**(11,774)**	**121,763**	**94,926**
Current provisions	Note 21	**12,390**	**11,246**	**76**	**58**	**7**	**0**	**12,473**	**11,304**
Current liabilities	Note 22								
Loans		32,130	46,806	9,266	6,705	(1,443)	(1,959)	39,953	51,552
Internal funding[1]		(20,267)	(38,090)	42,002	39,659	(21,735)	(1,569)	–	–
Non interest-bearing liabilities held for sale	Note 3	130	332	–	–	–	–	130	332
Interest-bearing liabilities held for sale	Note 3	–	18	–	–	–	–	–	18
Trade payables		56,351	53,685	296	216	–	–	56,647	53,901
Tax liabilities		2,558	1,072	135	48	–	–	2,693	1,120
Other liabilities	Note 22	36,674	33,331	3,493	2,758	(3,197)	(2,696)	36,970	33,393
Total current liabilities		**107,576**	**97,154**	**55,192**	**49,386**	**(26,375)**	**(6,224)**	**136,393**	**140,316**
Total equity and liabilities		**273,181**	**253,537**	**124,757**	**109,296**	**(15,042)**	**(18,004)**	**382,896**	**344,829**

1 Internal funding is internal lending from Industrial Operations to Customer Finance.

Table 3C: Ford Income Statement

FORD MOTOR COMPANY AND SUBSIDIARIES
CONSOLIDATED INCOME STATEMENT
(in millions, except per share amounts)

	For the years ended December 31,		
	2014	2013	2012
Revenues			
Automotive	$ 135,782	$ 139,369	$ 126,567
Financial Services	8,295	7,548	6,992
Total revenues	144,077	146,917	133,559
Costs and expenses			
Automotive cost of sales	123,516	125,195	113,039
Selling, administrative, and other expenses	14,117	13,176	11,529
Financial Services interest expense	2,699	2,860	3,115
Financial Services provision for credit and insurance losses	305	208	77
Total costs and expenses	140,637	141,439	127,760
Automotive interest expense	797	829	713
Automotive interest income and other income/(loss), net (Note 18)	76	974	1,599
Financial Services other income/(loss), net (Note 18)	348	348	365
Equity in net income of affiliated companies	1,275	1,069	588
Income before income taxes	4,342	7,040	7,638
Provision for/(Benefit from) income taxes (Note 21)	1,156	(135)	2,026
Net income	3,186	7,175	5,612
Less: Income/(Loss) attributable to noncontrolling interests	(1)	(7)	(1)
Net income attributable to Ford Motor Company	$ 3,187	$ 7,182	$ 5,613
EARNINGS PER SHARE ATTRIBUTABLE TO FORD MOTOR COMPANY COMMON AND CLASS B STOCK (Note 23)			
Basic income	$ 0.81	$ 1.83	$ 1.47
Diluted income	0.80	1.77	1.41
Cash dividends declared	0.50	0.40	0.15

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME
(in millions)

	For the years ended December 31,		
	2014	2013	2012
Net income	$ 3,186	$ 7,175	$ 5,612
Other comprehensive income/(loss), net of tax (Note 17)			
Foreign currency translation	(602)	(501)	141
Derivative instruments	(182)	215	6
Pension and other postretirement benefits	(1,018)	4,914	(4,268)
Total other comprehensive income/(loss), net of tax	(1,802)	4,628	(4,121)
Comprehensive income	1,384	11,803	1,491
Less: Comprehensive income/(loss) attributable to noncontrolling interests	—	(7)	(1)
Comprehensive income attributable to Ford Motor Company	$ 1,384	$ 11,810	$ 1,492

Table 3D: Ford Balance Sheet

FORD MOTOR COMPANY AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEET
(in millions)

	December 31, 2014	December 31, 2013
ASSETS		
Cash and cash equivalents	$ 10,757	$ 14,468
Marketable securities	20,393	22,100
Finance receivables, net (Note 5)	81,111	77,481
Other receivables, net	11,708	9,828
Net investment in operating leases (Note 6)	23,217	19,984
Inventories (Note 8)	7,866	7,708
Equity in net assets of affiliated companies (Note 9)	3,357	3,679
Net property (Note 10)	30,126	27,616
Deferred income taxes (Note 21)	13,639	13,468
Other assets	6,353	5,847
Total assets	$ 208,527	$ 202,179
LIABILITIES		
Payables	$ 20,035	$ 19,531
Other liabilities and deferred revenue (Note 11)	43,577	40,886
Debt (Note 13)	119,171	114,688
Deferred income taxes (Note 21)	570	598
Total liabilities	183,353	175,703
Redeemable noncontrolling interest (Note 14)	342	331
EQUITY		
Capital stock (Note 23)		
Common Stock, par value $.01 per share (3,938 million shares issued of 6 billion authorized)	39	39
Class B Stock, par value $.01 per share (71 million shares issued of 530 million authorized)	1	1
Capital in excess of par value of stock	21,089	21,422
Retained earnings	24,556	23,386
Accumulated other comprehensive income/(loss) (Note 17)	(20,032)	(18,230)
Treasury stock (Note 23)	(848)	(506)
Total equity attributable to Ford Motor Company	24,805	26,112
Equity attributable to noncontrolling interests	27	33
Total equity	24,832	26,145
Total liabilities and equity	$ 208,527	$ 202,179

Table 4A: 2014 Top 10 Global Industries by R&D Margin

SIC Code	Industry	Average R&D Margin	Median R&D Margin
38	Instruments and Related Products	4.1%	3.1%
36	Electronic and Other Electric Equipment	3.6%	1.8%
28	Chemicals and Allied Products (includes Drug Development)	2.7%	0.1%
35	Industrial Machinery and Equipment	2.5%	1.5%
73	Business Services (includes Software Development)	2.1%	0.0%
1	Agricultural Production-Crops	1.6%	0.0%
39	Miscellaneous Manufacturing Industries	1.5%	0.3%
37	Transportation Equipment (includes Motor Vehicles)	1.5%	0.4%
89	Service, NEC	0.9%	0.0%
30	Rubber and Miscellaneous Plastics Products	0.9%	0.1%

Table 4B: 2014 Top 10 North American Industries by R&D Margin

SIC Code	Industry	Average R&D Margin	Median R&D Margin
36	Electronic and Other Electric Equipment	7.9%	4.4%
38	Instruments and Related Products	7.6%	6.5%
28	Chemical and Allied Products (includes Drug Development)	6.2%	2.4%
73	Business Services (includes Software Development)	6.0%	0.0%
35	Industrial Machinery and Equipment	4.6%	2.8%
39	Miscellaneous Manufacturing Industries	4.2%	3.2%
37	Transportation Equipment (includes Motor Vehicles)	3.3%	2.9%
47	Transportation Services	3.2%	0.0%
1	Agricultural Production-Crops	2.9%	0.3%
25	Furniture and Fixtures	2.1%	1.3%

Table 5: Car Manufacturing Company Sample both U.S. GAAP and IFRS

Companies in Sample	
IFRS	U.S. GAAP
Volvo AB	Honda Motor Co. LTD
Audi AG	Navistar International Corp.
Volkswagen AG	Paccar Inc.
Bayer Motoren Werke AG	Spartan Motors Inc.
Daimler AG	Oshkosh Corp.
Man SE	Drew Industries Inc.
Rheinmetall AG	Toyota Motor Corp.
Peugeot SA	Zap
Fiat Chrysler Automobiles NV	Chrysler Group LLC
Renault SA	Tower International Inc.
Avtovaz	Tesla Motors Inc.
Kamaz PTC	Federal Signal Corp.
Gaz	Ford Motor Co.
Sollers PJSC	General Motors Co.
Williams Grand Prix HLDGS	Saleen Automotive Inc.
Pininfarina SPA	
HWA AG	

Table 6: Ratios and Equations

Ratio	Equation
Return on Assets (ROA)	Net Income/ ((Beginning Total Assets + Ending Total Assets)/2)
Asset Turnover	Total Revenue/ ((Beginning Total Assets + Ending Total Assets)/2)
R&D as Percentage of Sales	R&D/ Total Revenue
EBITDA Margin	EBITDA/ Total Revenue
Profit Margin	Net Income/ Total Revenue

Figure 1: Ratios for the simple Company ABC Capitalize vs. Expense R&D

Figure 1A: ROA

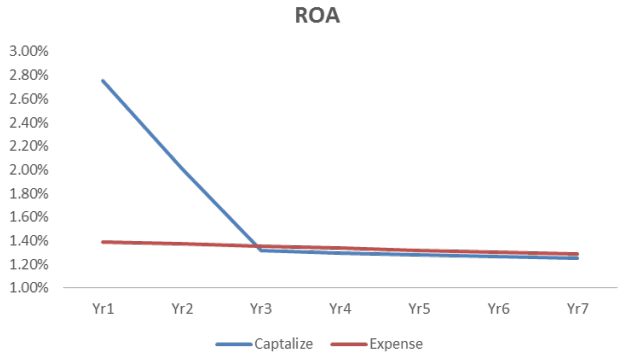


Figure 1B: Asset Turnover

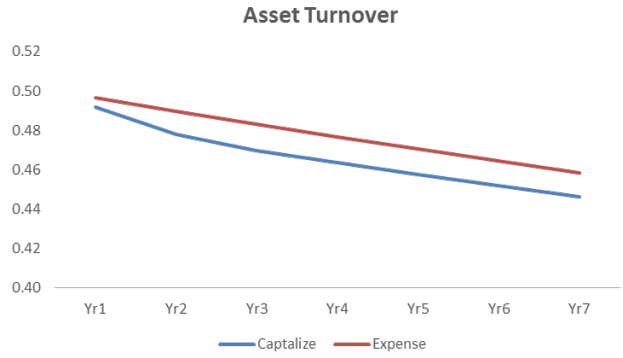


Figure 1C: EBITDA Margin

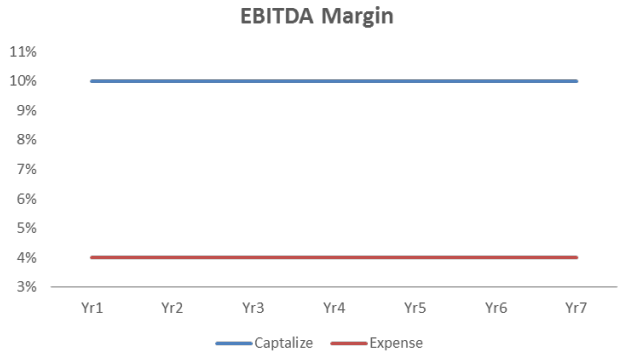


Figure 1D: Profit Margin

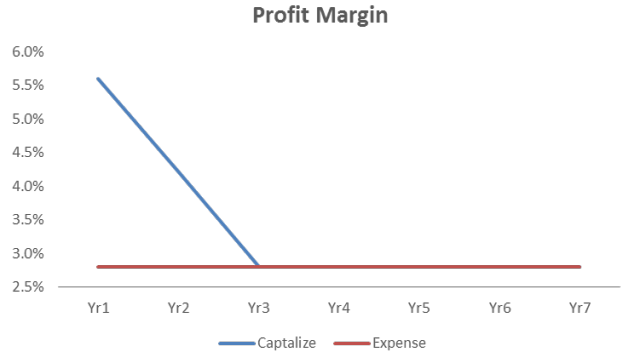


Figure 2: Ratios for the simple Company ABC Capitalize vs. Expense R&D with Growing sales and R&D

Figure 2A: ROA (R&D Growth)

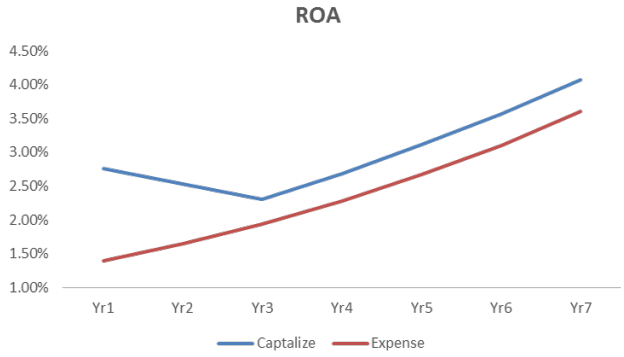


Figure 2B: Asset Turnover (R&D Growth)

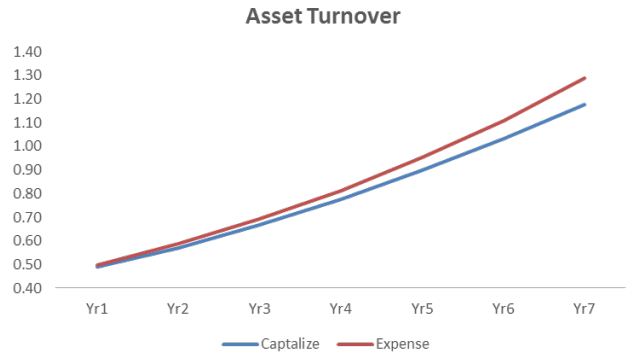


Figure 2C: EBITDA Margin (R&D Growth)

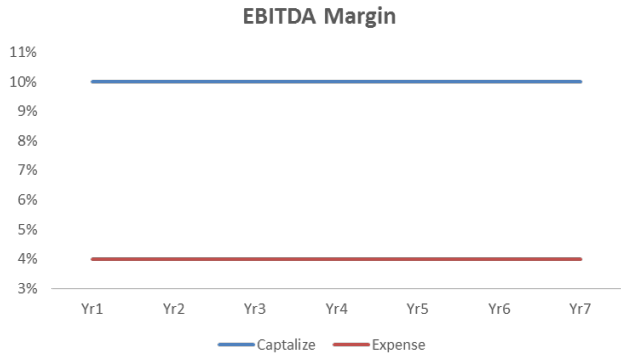


Figure 2D: Profit Margin (R&D Growth)

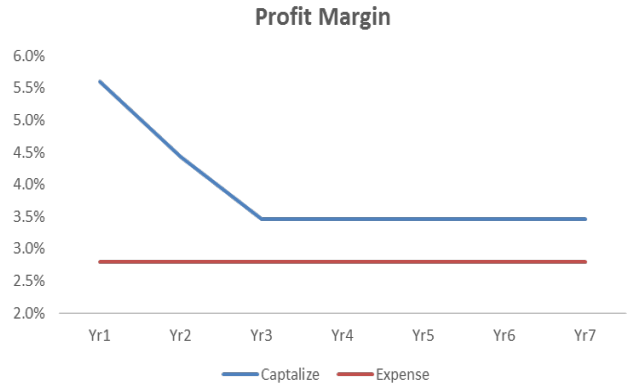


Figure 3: Ratios for Ford, which expenses, and Volvo, which capitalizes. No conversion.

Figure 3A: Ford and Volvo ROA

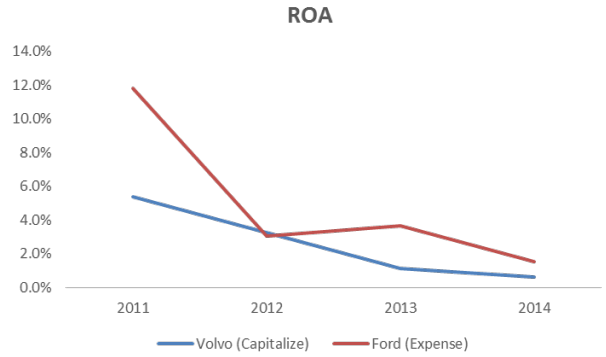


Figure 3B: Ford and Volvo Asset Turnover

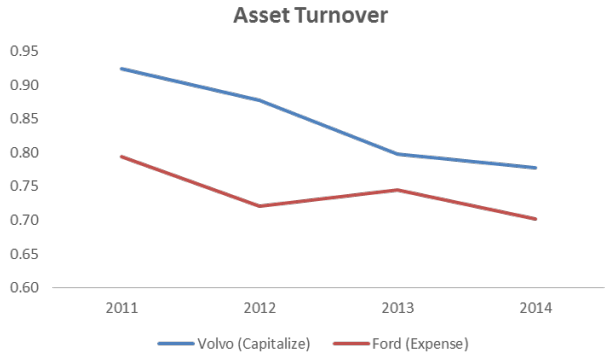


Figure 3C: Ford and Volvo EBITDA Margin

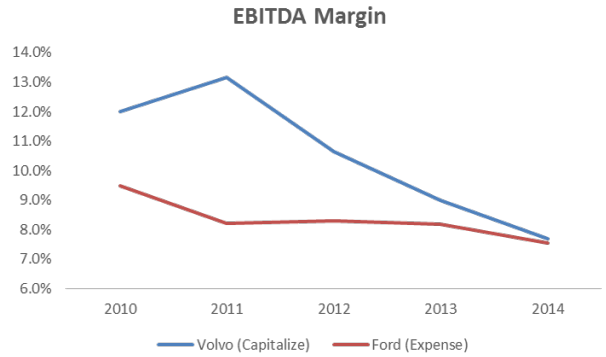


Figure 3D: Ford and Volvo Profit Margin

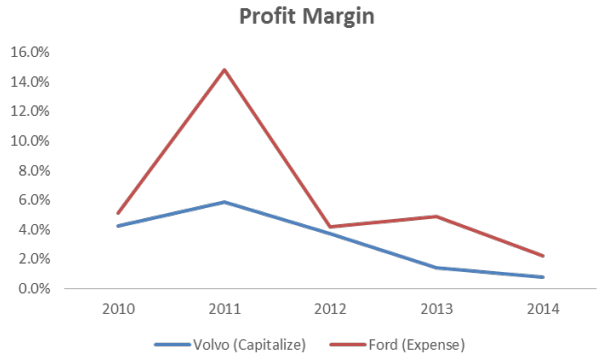


Figure 3E: Ford and Volvo R&D as a % of Sales

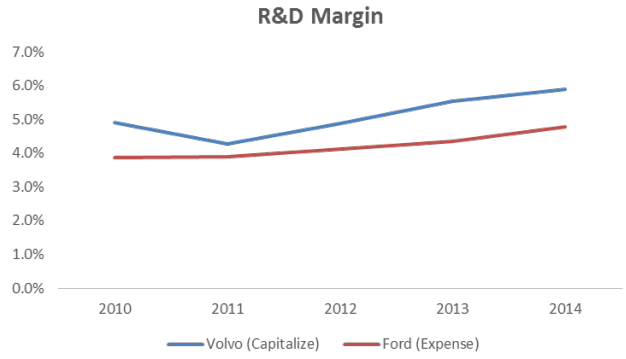


Figure 4: Ratios comparing Volvo capitalizing or expensing. Volvo adhering to either U.S. GAAP or IFRS standards

Figure 4A: Volvo U.S. GAAP vs IFRS ROA

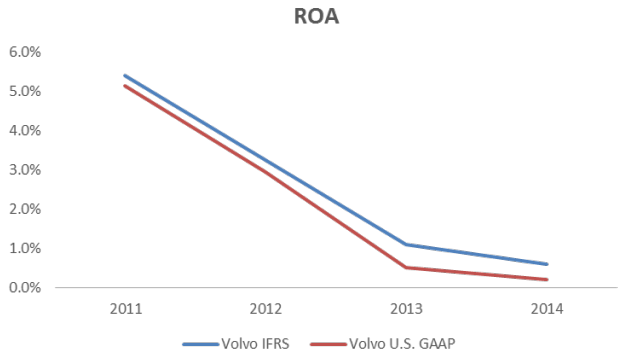


Figure 4B: Volvo U.S. GAAP vs IFRS Asset Turnover

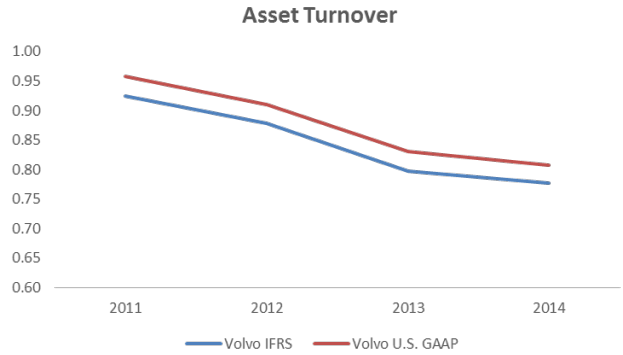


Figure 4C: Volvo U.S. GAAP vs IFRS EBITDA

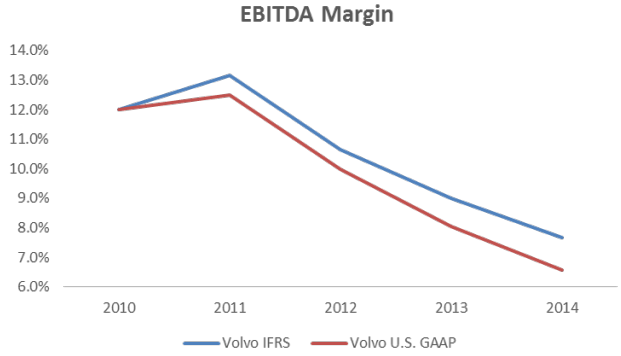


Figure 4D: Volvo U.S. GAAP vs IFRS Profit Margin

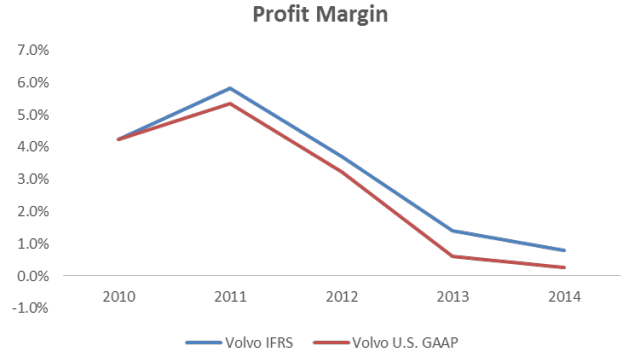


Figure 4E: Volvo U.S. GAAP vs IFRS R&D Margin

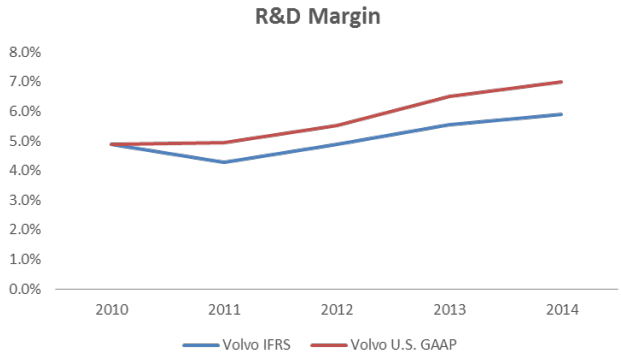


Figure 5: Ratios comparing Volvo and Ford, both adhering to U.S. GAAP standards

Figure 5A: Volvo U.S. GAAP vs Ford ROA

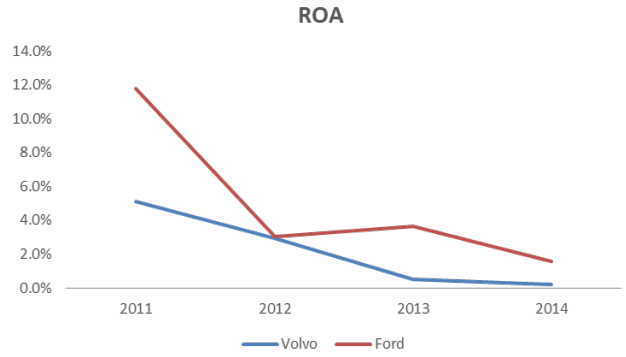


Figure 5B: Volvo U.S. GAAP vs Ford Asset Turnover

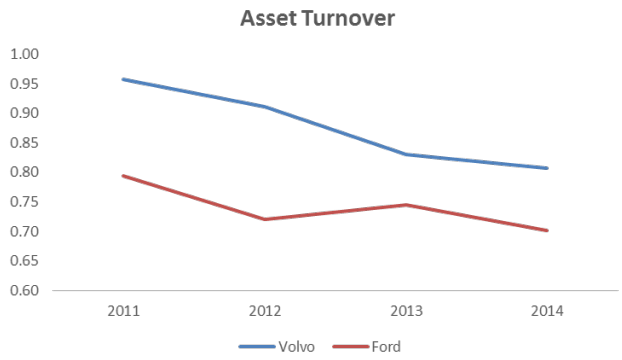


Figure 5C: Volvo U.S. GAAP vs Ford EBITDA

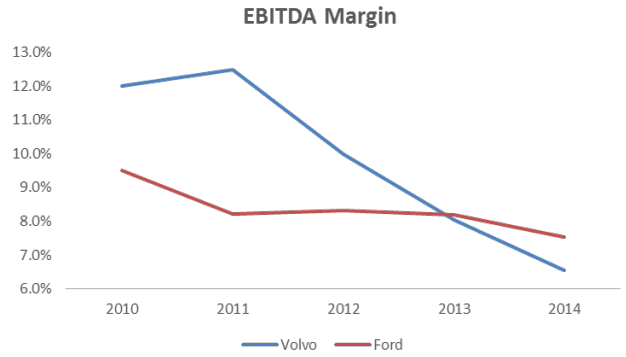


Figure 5D: Volvo U.S. GAAP vs Ford Profit Margin

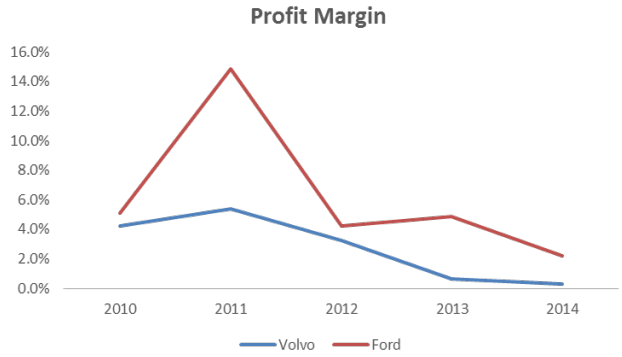


Figure 5E: Volvo U.S. GAAP vs Ford R&D Margin

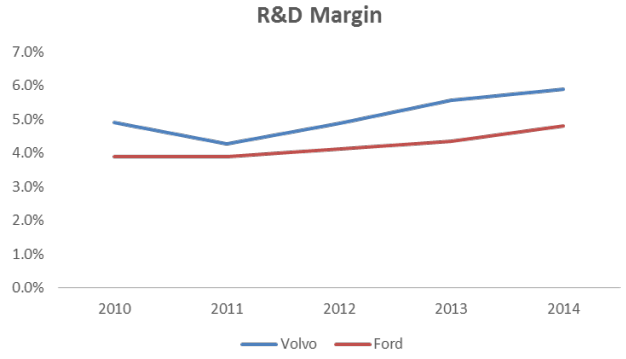


Figure 6: Compustat data comparing U.S. GAAP and IFRS companies' R&D margins over time

Figure 6A: U.S. GAAP and IFRS R&D Margin Average

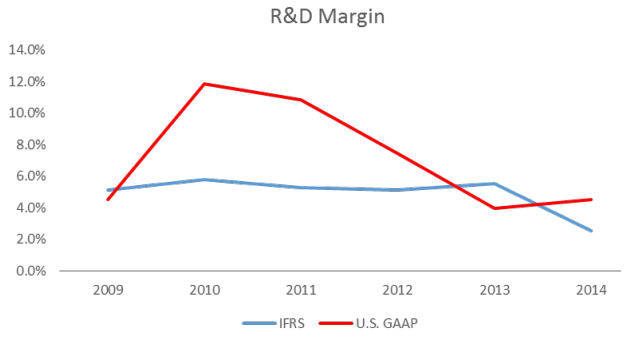
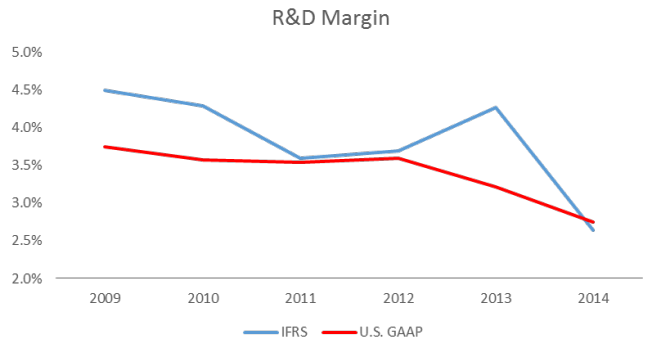


Figure 6B: U.S. GAAP and IFRS R&D Margin Median



Chapter 2: Inventory

Introduction

U.S. GAAP and IFRS differ in three key ways when accounting for inventory on the financial statements. These differences include inventory costing methods, inventory measurement, and reversal of inventory write-downs. It is likely that these all individually impact the ratios. These variations could cumulatively cause a larger effect, or conversely, the potential exists for these differences to cancel each other out causing no change in the ratios. This chapter however, solely addresses inventory costing methods.

When analyzing inventory, U.S. GAAP allows for the use of the Last-In First-Out (LIFO) inventory costing method, while IFRS prohibits the use of LIFO. ASC 330 discusses inventory; ASC 330-10-30-9 states that the inventory costing methods available include First-In First-Out (FIFO), (weighted) Average Cost, and Last-In First-Out. It recommends that companies use the costing method that "most clearly reflects periodic income." This allows companies to choose the inventory method best for the business. Also, if a company thinks that using one inventory method is insufficient, then it may use more than one method.

Conversely, IFRS defines different costing method rules, which are addressed in IAS 2, *Inventories*. IAS 2-23 states that the costs of inventory items not ordinarily interchangeable, that can be specifically identified, are assigned to that particular inventory item. However, IAS 2-25, addresses circumstances when this is not possible. If impossible, FIFO or the weighted average cost method must be used. Companies that use IFRS are not permitted to use LIFO as an inventory costing method.

If companies under U.S. GAAP choose not to use LIFO to measure their inventory, then the potential effect associated with the accounting standard variation will not occur. However, evidence suggests that a large percentage of U.S. GAAP companies do choose to use LIFO. The AICPA book, *Accounting Trends and Techniques: Today's Financial Reporting Practices,* reports on annual financial statements of "500 carefully selected non-regulated entities with fiscal periods ending

between January and December 2010," which all follow U.S. GAAP. The book analyzes choices and decisions companies make in all aspects of operations, including inventory costing methods. It reports that 22% of companies use LIFO for at least some portion of their inventories (some companies that also operate outside of the U.S. cannot use LIFO in their international locations), 42% use FIFO, and 15% use weighted average cost (Walters, 2012, p. 174). Table 1 presents the compilation from *Accounting Trends and Techniques* regarding the number of companies using LIFO, FIFO, and weighted average cost. *IFRS Accounting Trends and Techniques: Today's International Financial Reporting Practices,* presents similar analysis, studying 170 companies using IFRS. It shows that, of the companies in the sample, about 30% use FIFO, 52% use weighted average cost, and the remaining 18% use specific identification, fair value less cost to sell, or do not disclose a valuation method. The findings for IAS inventory methods from *IFRS Accounting Trends and Techniques* are presented in Table 2 (Petrino, et al., 2012, p. 315). If companies use methods other than LIFO and FIFO, such as weighted average cost, then the differences that result in the companies' financial statements will be muted or nonexistent. Companies have several inventory costing method options to use when measuring cost of goods sold, which leads to variation in financial ratios and affects understanding of financial performance.

Measurement of inventory also differs between IFRS and U.S. GAAP. Under U.S. GAAP, inventory is carried at lower of cost or market. ASC 330-10-35-1 states that, "a departure from the cost basis of pricing the inventory is required when the utility of the goods is no longer as great as their cost." Under IFRS, inventories are "measured at the lower of cost and net realizable value," (IAS 2-9). Measurement is essentially equivalent between the two standards in this regard; however, variation between the accounting standards occurs when determining inventory write-downs. ASC 330-10-35-4 states that managers can exercise judgment when determining if inventory should be written down and must only recognize a loss when there is clear evidence that a loss has been sustained. Under this requirement, impairment is not tested each year; in fact, management only tests

when it believes impairment occurs. In contrast, IAS requires more frequent measurement of inventory values. Under IAS 2-33, a "new assessment is made of net realizable value in each subsequent period." This raises the question: does impairment occur more often under IFRS than under U.S. GAAP as a result of the standard variations? If so, this could lead to differences in the companies' financial statements, as the same asset may be considered impaired and written down under IFRS, while it is not considered impaired and thus not written down under U.S. GAAP. An update to the U.S. GAAP standards, however, brings the lower of cost or market closer to IFRS standards. This impairment and subsequent write down has been observed in long-lived assets, as demonstrated by James Penner (2013) in his paper, "Long-Lived Asset Impairment in the Shipping Industry and the Impact on Financial Statement Ratios: Comparing U.S. GAAP and IFRS Standards." Penner finds that IFRS companies are much more likely to write down assets than U.S. GAAP companies. It is possible that similar write-down practices occur with inventory and long-lived assets; however, there is little literature discussing this effect and its likelihood on inventory (Penner, 2013).

Treatment of inventory after write-downs is another significant difference between U.S. GAAP and IFRS. Once inventory has been written down under U.S. GAAP, it creates a new cost basis for that inventory. ASC 330-10-35-14 states that the value of the written down goods is considered the "cost for subsequent accounting purposes." The SEC also takes a stance on this matter in S99-2; it answers the question regarding whether a write-down of inventory creates a new cost basis or whether changes in facts or circumstances, after the write-down, "allow for restoration of inventory value." The SEC argues that a write-down creates a new cost basis that cannot later be marked up. IFRS takes the complete opposite approach with regard to inventory write-down reversal. IAS 2-33 states that "when the circumstances that previously caused inventories to be written down below cost no longer exist," the write-down is reversed. Companies assess this each period. Overall,

IFRS rules cause more frequent measurement, and as a result, IFRS companies will likely have more frequent write-downs and write-down reversals.

Overall, inventory measurement and treatment of inventory write-downs seem to create relatively small differences for companies under the two accounting standards. Inventory costing methods on the other hand have the potential to create significant variation. Although U.S. GAAP and IFRS have differing rules regarding inventory measurement and treatment of inventory, literature research provides little evidence that these rules result in different accounting treatment and financial statement effects. Therefore, focusing on inventory costing methods will likely provide analysts the greatest insight into the causes of potential financial statement differences. Also, most literature discusses long-lived asset write-downs and subsequent measurement, not inventory. This is likely because, as a current asset, inventory is assumed to be sold within the year, before management has time to adequately revalue the asset. All of these differences between the two financial standards can impact the balance sheet and income statement. Ratios such as return on assets, profit margin, inventory turnover and various other margins can diverge as a result of these differences, with inventory costing methods having the greatest potential to affect understanding of company financial performance and operations.

Literature Review

The article, "Analyzing Financial Statements under IFRS – Opportunities and Challenges," addresses the differences between IFRS and U.S. GAAP and particularly the impact on companies choosing to use FIFO or LIFO inventory costing methods. A key assumption to consider for this analysis includes input pricing changes during the inventory valuation and financial statement analysis period. Are prices increasing or decreasing? Jeffers and Askew (2010) state that companies choosing the LIFO method in the U.S. have a lower taxable income than that generated with other inventory methods. This occurs because the LIFO inventory costing method results in a higher cost

of goods sold included on the income statement in that period. This causes a lower gross profit, a lower income, and a lower tax base. Taxes are not actually reduced; instead, they are deferred until a later date. However, companies could defer taxes indefinitely if their LIFO reserve remained intact and growing (Jeffers and Askew, 2010).

The balance sheet inventory numbers will also be lower because the inventory recently purchased at a higher cost will be included in cost of goods sold and the inventory that remains on the balance sheet is recorded or calculated from the inventory purchased at a lower cost. FIFO results in higher reported income and higher taxes in periods of rising prices. If the differences between FIFO and LIFO are large enough, company ratios can differ significantly. In order to make sure that the companies are more comparable, and the differences in ratios are solely due to business operation choices, converting the inventory costing method from LIFO to FIFO is necessary; however, if analysts do not take this into account, the ratios and subsequent valuation will be affected (Jeffers and Askew, 2010).

Choosing LIFO or FIFO may also impact future earnings and operating cash flow predictability. In their paper, "Further Evidence on the Ability of FIFO and LIFO Earnings to Predict Operating Cash Flows: An Industry Specific Analysis," Murdoch, Dehning, and Krause (2013) analyze this issue on an industry basis, studying six industry divisions: manufacturing; transportation; communications, electric, gas, and sanitary services; wholesale trade; retail trade; and finance, insurance, and real estate. Overall, they find the results vary by industry; for example, in the manufacturing, wholesale trade, retail, and services industries, LIFO provides incremental predictive power for both earnings and cash flows over a three-year time horizon. In all of these except retail, LIFO proves more accurate than FIFO in helping to indicate earnings and operating cash flows. This change in predictive accuracy may lead to differences in understanding of financial performance. Since IFRS companies cannot use LIFO, although it may more accurately describes their inventories

and cost structure, analysts' valuations may be incorrect if they do not take into account the inventory costing method: LIFO, FIFO, Average Cost, or another method (Murdoch, et al., 2013).

In their paper, "The Present and Future Outlook of the Last In First Out Inventory Methods," Harris, Kinkela, Stahlin, and Arnold (2014) conclude that the elimination of LIFO is very unlikely in the foreseeable future, which means analysts must continue to take the differences between U.S. GAAP and IFRS into account. Similarly, in their paper, "The LIFO, IFRS Conversion: An Explosive Concoction," Mock and Simon (2009) demonstrate that companies, which use LIFO, have collected over $89,700 billion in reserves that will then be taxed if United States lawmakers decide to converge U.S. GAAP with IFRS, eliminating LIFO. Therefore, these firms will be highly resistant to change because they prefer not to pay taxes on these reserves. Industries with large LIFO reserves as a percentage of total inventory include chemicals, machinery, petroleum and natural gas, and steel works. These industries have built up LIFO reserves ranging from $4 billion to $57.3 billion. All are more vulnerable than the average company to inflation and believe LIFO more accurately reflects their true costs. Table 3 demonstrates the industries with large LIFO reserves, according to Mock and Simon's paper (2009). The authors acquire this information from Standard and Poor's Compustat Database using the Fama-French (1997) industry classification system. Of the 5,345 publically traded companies found in the Standard and Poor's Compustat Database, only 346 firms used LIFO as a method of inventory accounting. Though relatively small in number, these firms have such high LIFO reserves that they will be resistant to change. Companies will advocate to maintain LIFO as an accounting choice because those with high LIFO reserves will resist requirements which suddenly cause them to pay taxes on those amounts.

Theory

Analyzing the fictitious Company DEF, using either U.S. GAAP or IFRS, and choosing LIFO or FIFO, over a seven-year period, demonstrates the effect of different inventory costing

methods on the Company's financial statements. For simplicity, this company holds very few assets and no liabilities, only equity. The assumptions include: SG&A is 10% of sales, and the tax rate is 30% of pre-tax income. It is also assumed that this is a period of rising prices with regard to inventory purchases. Two LIFO and FIFO scenarios help demonstrate their effect on financial statements and ratios.

In the first scenario, Company DEF makes three purchases a year in increments of 50 units. The initial price per unit is $5; however, with each new purchase, the price rises by $0.20. The selling price per unit is always $10, and the number of units sold each year increases from 75 per year to 175 per year. Tables 4A and 4B demonstrate the financial statement differences if Company DEF chooses to follow U.S. GAAP and LIFO or follow IFRS and FIFO. In the second scenario, much of the information remains the same; however, the sales price increases each year by $0.40. Thus, in the initial year, the selling price per unit is $10, but in year two it is $10.40, year three $10.80, and so on. This results in more realistic analysis for a company experiencing inflation or rising costs of input factors. As costs increase for Company DEF, it passes some of those costs on to the consumer. Tables 5A and 5B demonstrate the differences in the financial statements if Company DEF chooses to use LIFO or FIFO in this period of rising costs and sales prices.

Figure 1A shows ROA over the seven-year period, assuming constant sales prices. Overall, the company that uses FIFO has a higher ROA over the period, except in years six and seven, when the two methods produce very similar results. This is likely because the IFRS company has a lower COGS using the FIFO inventory costing method. The first inventory purchased purchases were bought at a lower price than the last purchases, and the inventory purchased first was that used to measure cost of goods sold for the company following IFRS. This results in a higher net income for the firm, which affects ROA. The LIFO/FIFO determination also affects total assets. This occurs because total assets include inventory levels. The FIFO inventory level will be larger than the LIFO inventory level, causing total assets to be larger under IFRS than under U.S. GAAP. The effect on net

income, however, proves greater in this instance, causing a higher ROA under IFRS than U.S. GAAP, although this may not always be the case.

Figure 1B shows asset turnover throughout the period. Asset turnover proves very similar between LIFO and FIFO; however, the LIFO company seems to have a consistently slightly higher turnover. Both companies have the same sales figures, but the LIFO company retains lower total assets because it sells the higher costing inventory, keeping the lower costing inventory on its books. As a result, the LIFO or U.S. GAAP company has a slightly higher asset turnover. Figure 1C shows inventory turnover, which paints a similar, although more distinct picture. Again, the U.S. GAAP company, which uses LIFO, has a consistently higher inventory turnover. This likely results because the LIFO company has a significantly higher COGS and lower total assets, specifically lower inventory, while the FIFO (IFRS) company has both a lower COGS and a higher total asset number, causing a lower overall inventory turnover under FIFO. The impacts on the balance sheet and income statement combine to cause a higher inventory turnover.

Lastly, Figures 1D, 1E, and 1F demonstrate the differences between EBITDA, gross profit, and profit margins over the time period. In both situations, the FIFO company has a higher EBITDA, gross profit, and profit margin for all years except the last two in which the three metrics closely align. This again results from a disparity between the LIFO and FIFO COGS. Because the FIFO company has a lower COGS its EBITDA, gross profit, and net income all remain higher than that of the LIFO company. As a result, the company has a higher EBITDA margin, gross profit margin, and profit margin. Year four, however, presents a turning point for all three of these metrics. After year four, the slope of the LIFO line decreases in relation to FIFO, which causes margin convergence for all three in the last two years. This occurs because the company that uses LIFO begins to tap into its LIFO reserve i.e., the inventory purchased earlier at a lower price. Thus, the COGS numbers get closer each year, and in year seven, the FIFO or IFRS COGS overtakes the LIFO or U.S. GAAP COGS, affecting the ratios.

The second scenario, which addresses LIFO and FIFO over a seven-year period, but involves increasing sales prices, provides similar results for all ratios: inventory turnover, asset turnover, ROA, EBITDA margin, profit margin, and gross profit margin. Figures 2A – F show the variation in these ratios. Although different sales prices cause the individual ratio numbers to diverge, their trajectory remains identical, telling the same general story. This helps confirm likely affects when comparing one company that follows U.S. GAAP, using LIFO, and another company that follows IFRS, using FIFO.

This simple example aides in building a theory about the overall trends that develop when using LIFO or FIFO. When analyzing these ratios, it is expected that they will follow the example with slight variation, as long as prices constantly rise. This means that return on assets will vary under FIFO and LIFO, at some points it might be larger under FIFO and at others it might be smaller, depending on how the size of COGS and inventory impacts net income vs. total assets; both asset turnover and inventory turnover will be greater under LIFO, with inventory turnover having a larger disparity between the two accounting methods; and for profit margin, gross profit margin, and EBITDA margin FIFO will remain greater than LIFO. If the two companies experience a period of declining prices, the result will likely reverse from that mentioned above. It must be noted, however, that many companies actually use some combination of LIFO, FIFO, average cost, and/or other methods. As a result, the variation may not be as stark as evidenced by the example.

Company Analysis

As mentioned in Chapter 1, R&D Expenditures, it is unlikely that inventory costing methods will be the only factor that differs between U.S. GAAP and IFRS companies; instead, multiple variations between accounting standards will affect each individual company. For example, when comparing top companies with large R&D as a percentage of sales (Tables 4A and 4B in the R&D Expenditures chapter) and companies with large LIFO reserves as a percentage of total inventory

(Table 6), both tables include the Industrial Machinery and Equipment, Furniture and Fixtures, and Rubber and Miscellaneous Plastics Products industries. Therefore, companies in each of these sectors likely have both variations in R&D and inventory when using either U.S. GAAP or IFRS. Although, both standard variations likely influence company comparability, this chapter solely focuses on differences in inventory for companies, specifically inventory costing methods.

To analyze the effects on financial performance as a result of inventory costing methods, an individual industry must be chosen. Table 6 shows the Top 10 industries with LIFO reserves in 2014 based on two digit SIC codes, as found in Standard and Poor's Compustat Database. The results from this table vary slightly from the LIFO Reserves by Industry (Table 3). Table 3 is taken from Mock and Simon's (2009) article, "The LIFO, IFRS Conversion: An Explosive Concoction," which uses the Fama – French industry classifications. The variation between tables likely occurs due to a combination of different measurement years and industry classifications. Table 6 also includes only companies holding over 100 million in total inventory, which results in a sample size of 217 companies with LIFO reserves out of a total sample of 1,586. In Table 3, the top three industries are Petroleum and Natural Gas, Machinery, and Chemicals. In Table 6, however, the top three industries are Tobacco Products, Petroleum and Coal Products, and Nonmetallic Minerals, Except Fuels. In this analysis, only the Petroleum industry overlaps.

The Petroleum industry, however, proves unsatisfactory for study because it includes differences between U.S. GAAP and IFRS exclusive to that sector. One key variation involves companies' exploration and evaluation of mineral resources. IFRS 6 allows companies to use their existing accounting practices for exploration and evaluation as long as they apply policy consistently. Further, IFRS 6-8 states, "exploration and evaluation assets shall be measured at cost." U.S. GAAP affords companies two different options: full cost and successful efforts (ASC 932-360, 25-1 and 25-2). Under successful efforts, firms only capitalize the exploration costs directly related to oil and gas reserves; other costs are charged to expense, according to ASC 932-360-25-3. SEC Regulation S-X

Rule 4-10 discusses full cost, stating that all costs associated with the particular cost center, or area searching for oil, shall be capitalized within that cost center (S-99-1-C).

Application of IFRS 6 partially complies with both the full cost method and the successful efforts method but is not completely aligned with either method. IFRS 6 partially follows full cost because it allows an entity to group units when assessing impairment. It also partly complies with the successful efforts method, considering costs are capitalized, but the costs not directly related to oil and gas reserves are not capitalized. Because differences develop between the two standards within the petroleum industry and IFRS combines elements of both options allowed in U.S. GAAP, this may create extraneous differences affecting the reliability of the results if analyzing this sector. Therefore, studying another top industry will provide a clearer and more accurate representation of how inventory costing methods affect understanding of company financial performance.

Machinery, the second industry on Table 3 proves promising for study even though Table 6 shows other sectors have larger LIFO reserves. Machinery is unfortunately the 10th industry on Table 6. However, further analysis shows that most of the industries above Industrial Machinery and Equipment on Table 6, with larger average LIFO reserves, have very small sample sizes, which likely results in artificially higher averages. For example, Tobacco Products includes a sample size of six companies, with three having abnormally large LIFO reserves; Nonmetallic Minerals includes 6 companies, with 2 having LIFO reserves; Food Stores includes 17, with 7 having LIFO reserves; Furniture and Fixtures includes 15, with 7 having LIFO reserves; and Rubber and Miscellaneous Plastic Products includes 14, with 5 having LIFO reserves. The industry with the second highest number of companies is Wholesale Trade-Durable Goods, containing a sample size of 55, with 13 having LIFO reserves; however, it includes several companies with extremely high LIFO reserves (those greater than 40% of total inventory), which likely skews the results. Industrial Machinery and Equipment's 96 companies almost doubles that of Wholesale Trade-Durable Goods, and 33 of its companies have LIFO reserves. In general, industries other than Industrial Machinery and Equipment

contain small sample sizes with a few firms recording abnormally large LIFO reserve numbers (from 30 – 50% of total inventory), preventing them from being the best comparison. Conversely, Industrial Machinery and Equipment companies consistently have LIFO reserves, are relatively easy to understand, and have readily identifiable comparable companies; therefore, analysis of a U.S. GAAP and an IFRS company in the Industrial Machinery and Equipment sector provides a worthwhile comparison for this study.

After identifying the Industrial Machinery and Equipment industry via SIC code, narrowing it further into a 3 digit SIC code, provides a more specific group for study. This SIC code, 353, or Construction and Related Machinery provides a large enough sample size within the Compustat data, while also being distinct. An added benefit from this industry classification is that overall, it includes a relatively large number of companies with LIFO reserves in the sample. The U.S. GAAP sample size results in 25 companies, with 8 having LIFO reserves, which is about 32% of the total sample size, compared to 217 in 1,587 or about 13% in the entire industrial machinery and equipment sample (SIC code 35). Figure 3 shows the average LIFO reserve for the companies within this industry from 2008 – 2014; it ranges from 9% to 15% of total inventory.

Compustat data provides a sample of 48 IFRS companies and 8 U.S. GAAP companies to study ratios and perform further analysis on how LIFO and FIFO affect these companies operating under different standards. Studying inventory turnover, profit margin, and gross profit margin over the period from 2008 – 2014, also offers evidence that the choice to use LIFO or FIFO affects these ratios. However, profit margin, for both the median and average calculations, shows a different result than expected.

Figures 4A and 4B show the profit margin averages and medians over time which may or may not align with the simple fictitious example, depending on whether prices rise or fall. The FIFO or IFRS company is expected to have a higher profit margin because it has an overall lower COGS if prices are rising; however, in both cases, the IFRS company has a lower profit margin in all but one

year (2008 for the averages and 2009 for the medians). One potential explanation for this is that several expenses for the IFRS company, other than COGS, likely affect and decrease the profit margin. For example, the IFRS firm may have a higher income tax burden or larger depreciation expense.

Conversely, overall prices may be decreasing, and if decreasing, the U.S. GAAP company will have a higher profit margin. According to The Manufacturing Institute, in its *Facts About Manufacturing* report, sales prices decreased by three percent between 1995 and 2010 (2012). The profit margin, both average and median, may be in line with expectations if input prices have also been decreasing. The Manufacturing Institute report, however, only discusses manufacturing consumer prices. It ignores input costs for the manufacturing companies, but decreasing costs of inventory purchases could potentially explain this decrease in sales prices. However, since the report ignores it, there is the possibility that these companies experience increased costs of inputs, which increases their COGS, but to remain competitive they decrease their selling prices. This may cause overall margins to decline if the company cannot use another method, such as increasing efficiency, to decrease costs. The key variable here is rising or falling prices. If prices are falling, the Compustat data seems in line with expectations; if they are rising, the Compustat data differs from expectations. Nevertheless, the profit margin ratio provides insight into the causes behind differences that develop between the U.S. GAAP and IFRS companies as a result of inventory costing method choices.

The Compustat data regarding inventory turnover also provides information with regard to how U.S. GAAP and IFRS diverge. All else equal, companies using LIFO should have higher inventory turnovers during periods of rising prices. However, if prices decrease, companies using LIFO should have lower inventory turnovers. Figures 4C and 4D show the average and median inventory turnovers from 2009 – 2014. The median inventory turnover supports the original example if input prices rise, following the expected trend. Average inventory departs from expectations. For three out of the six years, the U.S. GAAP inventory turnover is higher, but for the other three years

the IFRS inventory turnover is higher. The inventory turnover should be greater over the entire time period, if prices rise, for the U.S. GAAP or LIFO company because it has a higher COGS.

Nonetheless, if prices decrease, the median inventory turnover diverts from the original hypothesis, because the U.S. GAAP company should have a lower inventory turnover as a result of lower COGS and higher total assets. If this is the case, outliers provide a potential explanation for the diversion from expectations. Some companies with large turnovers may affect the results, and because of the small sample size for the U.S. GAAP companies, this may cause the companies to have an unusually high median inventory turnover. Meanwhile, the average inventory turnover contradicts both ideas. If prices increase, the U.S. GAAP inventory turnover should be greater; if prices decrease, the U.S. GAAP inventory turnover should be smaller. However, neither prove true over the time period; they both occur half of the time. This makes it more difficult to glean information from the average results because it neither proves, nor disproves the theory. Although inconclusive, the Compustat data provides an example of the potential inventory turnover differences resulting from using LIFO or FIFO.

Finally, gross profit margin, shown in Figures 4E and 4F, follows the previously identified explanations for the variations resulting from accounting standards. During periods of rising prices, the IFRS or FIFO company is expected to have a higher gross profit margin because it has a lower COGS. This proves accurate in both the median and the average gross profit margins over the period from 2008 – 2014. If prices decrease, however, the results should be reversed; the U.S. GAAP company should have a higher gross profit margin because it has a lower COGS. The gross profit margin ratio also provides the clearest picture of differences in inventory costing methods because it only analyzes gross profit (a function of revenue and COGS). There is very little opportunity for variables other than COGS to affect this ratio, making it a strong indicator for how inventory costing methods affect outcomes. Although very dependent on the direction of input prices for

manufacturers, gross profit margin provides a worthwhile perspective on the differences between LIFO and FIFO for U.S. GAAP and IFRS companies.

An analysis of one construction and machinery manufacturer complying with U.S. GAAP, Caterpillar Inc. (Caterpillar), and one complying with IFRS, Soosan Heavy Industries Co., Ltd. (Soosan), helps to demonstrate the impact of the FIFO or LIFO choice on company financial statements and ratio calculations. A key consideration to take into account before discussing the complete analysis of these companies includes the fact that, although very similar in operations and product offerings, these two companies otherwise vary. They develop distinct business plans, operate in different countries and under different jurisdictions, and have individual corporate structures. Similarly, other variation between U.S. GAAP and IFRS may affect the analysis and impact accounts used to calculate the ratios. This prevents companies' use of LIFO vs. FIFO from being the only variable impacting the ratios and financial statements.

Analysis of the differences that develop between these two companies' ratios helps to determine if the original ideas about U.S. GAAP and IFRS prove true. If they deviate from the original example, other variables may explain why they differ. One explanation is that when prices are increasing, the ROA should remain larger for the FIFO company if the impact on net income is larger than the impact on total assets. Prices, however, decrease for Caterpillar in all years except 2012, and Soosan's financial statements give no indication of how prices change. Figure 5A shows the ROA from 2011 – 2014. For the first two years, the IFRS company, Soosan, has a larger ROA, and in the final years the ROA is larger for the U.S. GAAP company, Caterpillar. Therefore, the companies generally comply with the original fictitious example because the ROA varies depending on how the size of COGS or inventory impacts net income vs. total assets. The ROAs for both companies in the final years move close together. Overall, this generally follows the original example of how ROA responds to differences in LIFO and FIFO inventory costing methods; the variability, however, makes it difficult to draw conclusions from the results. The ROA is also affected by many

other factors; all of the other accounts that make up total assets and are used to calculate net income are included, which may cause the variation in the first two years (Caterpillar Inc. 10-K, 2014). Later analysis, which compares Caterpillar in both U.S. GAAP and IFRS, as well as analysis that compares Soosan in IFRS and Caterpillar in IFRS, provide better understanding of the effects of all ratios, including ROA.

The effect of accounting standard variation on asset turnover, presented in Figure 5B, complies with the prediction. According to the simple example, the LIFO or U.S. GAAP company will have a slightly higher asset turnover throughout the period, if prices increase. For the period from 2011 to 2014, however, prices decrease in all years but 2012. Thus, because the IFRS company has a consistent and significantly higher asset turnover, it follows the original example. That being said there are likely reasons other than just the inventory costing method decision affecting these results and causing the discrepancy in asset turnover; for example, Caterpillar may hold significantly more long-lived assets on its balance sheet than Soosan. Inventory represents only about 15% of total assets for Caterpillar while it represents about 30% of total assets for Soosan; as a result, other assets on Caterpillar's balance sheet influence the ratio.

Figure 5C shows that inventory turnover for the two companies contradicts the theory about the effect of inventory costing methods on the ratio. The original example shows that inventory turnover should remain consistently lower for the company that uses LIFO during periods of decreasing prices. And yet, for all four years, the LIFO company, Caterpillar, has a higher inventory turnover. This example contradicts the concept, that lower inventory totals and higher COGS result in higher inventory turnovers for the LIFO company. Despite this discrepancy, throughout the time period, Caterpillar and Soosan's, turnover numbers stay relatively close together, never varying more than one turnover cycle. One key consideration for why this result contradicts expectations, includes the fact that Caterpillar does not record all of its inventory under the LIFO method. Any inventory under international subsidiaries, following IFRS rules, cannot use LIFO; as a result, this likely affects

the inventory turnover ratio. Applying LIFO, FIFO, and perhaps also average cost dilutes the effect of solely using LIFO. Thus, it is less likely that Caterpillar will have a consistently lower inventory turnover because it uses LIFO for only portions of its inventory. This helps to explain why results prove different than expected.

Figure 5D shows EBITDA margin, and according to the Company DEF example, the IFRS standard causes a higher EBITDA margin in periods of rising prices but a lower margin in periods of decreasing prices. Indeed, from 2010 to 2014, Caterpillar has a consistently higher EBITDA margin. Although this confirms the theory, several other potential factors affect these numbers and cause the Caterpillar EBITDA margin to be significantly higher than Soosan's. Caterpillar may have consistently higher depreciation and amortization making its EBITDA larger than Soosan. Caterpillar may also manage expenses more effectively than Soosan, which potentially contributes to Caterpillar's higher EBITDA.

Finally, Figures 5E and 5F show profit margin and gross profit margin, which prove inconclusive relative to the effects of different standards on financial statements. The original example shows that the IFRS company will have a consistently lower profit and gross profit margin in periods of decreasing prices and consistently higher margins in periods of increasing prices. For both margins, Soosan has a higher ratio about half of the time. The rest of the time, Caterpillar has a higher margin. With decreasing prices, Soosan should have higher margins the entire time. Although not in line with expectations, the LIFO vs. FIFO decision affects the ratios. It may not show in the analysis, but FIFO COGS decreases profit and gross profit margin more than LIFO COGS. Soosan may also have changed between 2013 and 2014, hiring new management or restructuring its business, which caused these results to differ from expectations. For inventory turnover, profit margin, and gross profit margin, the ratios were not in line with the theory, but in 2012, for profit margin and gross profit margin, that changed and the ratios fell in line with expectations. Overall,

despite individual variation, several of the ratios fall in line with expectations for U.S. GAAP and IFRS companies.

Because many other factors impact the results of the ratios for Soosan and Caterpillar, a comparison of only one of these companies using both IFRS and U.S. GAAP standards may develop a clearer picture of and isolate the specific differences arising when using FIFO or LIFO. It is not possible to convert an IFRS company that uses FIFO to U.S. GAAP and LIFO; as a result, Caterpillar must be converted to IFRS and FIFO. This, however, differs from Chapter 1, which converts the IFRS compliant company to U.S. GAAP. Table 9B shows the formulas used to convert Caterpillar to IFRS standards. This was done using the LIFO reserve found on the Company's financial statements. The LIFO reserve is the difference between LIFO and FIFO inventory if the company adopted FIFO. For example, $FIFO\ Inventory = LIFO\ Inventory + LIFO\ reserve$. To convert FIFO inventory to LIFO inventory only the LIFO reserve must be added. Similarly,
$FIFO\ Assets = LIFO\ Total\ Assets + LIFO\ reserve$. The two more difficult conversions are FIFO COGS and FIFO net income. These equations are
$FIFO\ COGS = LIFO\ COGS - Change\ in\ LIFO\ Reserve$ and
$LIFO\ Net\ Income = FIFO\ Net\ Income + After\ Tax\ Change\ in\ LIFO\ Reserve$. The change in LIFO reserve refers to the increase or decrease in the account year over year, and the after tax change in LIFO reserve eliminates the impact of taxes on the LIFO reserve so that it can be included in net income. To eliminate the impact of taxes, the statutory tax rate is used for estimation.

Figures 6A – 6F show the impact of converting Caterpillar's ROA, asset turnover, inventory turnover, EBITDA margin, profit margin, and gross profit margin on financial statements prepared under different accounting standards. Figure 6A shows ROA from 2011 to 2014. In periods of rising or decreasing prices, the IFRS ROA may be higher or lower, depending on whether the change in assets or net income is greater. Net income will be affected by the COGS balance, while total assets

will be affected by the inventory balance. In this case, the change in LIFO reserve is negative, indicating that prices decrease in all years except 2012. Although it is difficult to determine whether the ROA for the IFRS company is expected to be lower or higher than the U.S. GAAP company, conversion results in a change in the ratio. In this case, the ROA for the IFRS company is lower, meaning the change in total assets has a greater effect on ROA than the change in net income. This proves true throughout the period.

Figures 6B and 6C present asset turnover and inventory turnover. According to the original example, the U.S. GAAP company will likely have a higher asset and inventory turnover in periods of rising prices but a lower asset and inventory turnover in periods of declining prices. In the conversion, adding the LIFO reserve to include it in inventory and asset turnovers affects the results. Under U.S. GAAP, the LIFO reserve is not included in inventory or asset totals, and with the conversion, IFRS totals suddenly include it. This causes the IFRS inventory and asset turnover numbers to be artificially deflated. They contain significantly larger total asset and total inventory balances, while only slightly larger COGS; IFRS ratios then remain lower, when expected to be higher in periods of declining prices.

Finally, for EBITDA, profit, and gross profit margin, the FIFO company should have slightly higher margins in periods of consistently higher prices; however, prices decline in all years except 2012. As a result, the FIFO or IFRS company is expected to have a lower profit margin, EBITDA margin, and gross profit margin in all years except 2012. This proves true for all three ratios. Also, because the LIFO reserve changes are very small, the result of conversion proves smaller for these. Figures D, E, and F demonstrate these changes.

Comparing Soosan and Caterpillar, after converting Caterpillar to FIFO, moves many of the ratios closer in line with expectations, but they still do not completely adhere to theory. This confirms that other variables affect these ratios. Figures 7 A – F demonstrate the differences in the ratios that result. Converting Caterpillar to IFRS proves that several of the ratios not in line with the

original example are still unlikely to align, even if Caterpillar reports using IFRS. For example, even after conversion, Caterpillar's asset turnover is lower than Soosan's (Figure 7B). Asset turnover, however, did increase albeit lower, moving it more in line with expectations. This confirms the concept that factors other than FIFO likely cause Caterpillar's asset turnover to be low. Similarly, even after conversion, Caterpillar's ROA (Table 7A), gross profit margin (Table 7F), and profit margin (Table 7E) are lower than Soosan's until after 2012, indicating that other variables affect these ratios. All three ratios, however, move in the expected direction, making the comparison more meaningful. It is clear that factors, other than the LIFO and FIFO decision, influence these ratios; the business operations and the companies' financials impact the ratios as well. Similarly, the LIFO or FIFO choice is not the only difference between U.S. GAAP and IFRS; it is not even the only difference between the two accounting standards for inventory. So again, other variables affect these results. Regardless, conversion of Caterpillar from U.S. GAAP to IFRS, proves in line with expectations, and the ratios comparing Soosan and Caterpillar, with both using IFRS, move in the correct direction. This helps make the comparison of Soosan to Caterpillar more significant, and the results provide a clearer picture for the differences between the companies and their operations.

Conclusion

Analyzing and converting other companies between U.S. GAAP and IFRS may produce similar results, but key variables to consider, which affect the size of the irregularity in ratios, are inventory levels in relation to total assets, the change in LIFO reserve in relation to total inventory, the change in LIFO reserve in relation to COGS, and the percentage of inventory recorded using LIFO. Financial experts must understand this and the particular accounting standards and rules companies follow when analyzing and valuing them. For example, Caterpillar which has an average LIFO reserve of between 17% and 27% of total inventory from 2010 to 2014 and has total inventory levels of between 14% and 18% of total assets, has several ratios change between 0.5% and 1% as a

result of the conversion to IFRS. Specifically, for ROA, the percent change in ratios ranges from -0.7% to 7.6%; for EBITDA margin, the percent change ranges from -2.4% to 5.9%; for asset turnover, the change ranges from 2.9% to 3.4%; for inventory turnover it ranges from 17.9% to 20.3%; for profit margin it ranges from -3.6% to 11.2%; and for gross profit margin it ranges from -1.7% to 3.6%. ROA changes 0.2% (4.2% - 4.4% in 2014) at the smallest and 0.3% (4.0% - 4.3% in 2013) at the largest. EBITDA margin changes 0.1% (19.4% - 19.5% in 2014) at the smallest and 1.1% (18.1% - 19.2% in 2010) at the largest. Asset turnover changes 0.03 in 2011, when it moves from 0.79 to 0.76. Inventory turnover changes 0.61 in 2011, when it moves from 3.00 to 3.61. Profit margin changes 0.1% (6.6% - 6.7% in 2014) at the smallest and 0.7% (6.2% - 6.9% in 2010) at the largest. Gross profit margin changes 0.1% (33.5% - 33.6% in 2014) at the smallest and 1.1% (22.8% - 23.8% in 2010) at the largest. However, if the LIFO reserve were greater in relation to total inventory, it may have caused an even larger effect for ratios that use balance sheet accounts and if the LIFO reserve were greater in relation to COGS, it may have caused an even larger effect for ratios that use income statement accounts.

As aforementioned, the effect of conversion from LIFO to FIFO is highly dependent on both the change in LIFO reserve and the size of the LIFO reserve relative to total inventory. The change in LIFO reserve helps explain the relative size of the changes in the ratios as a result of adapting Caterpillar to IFRS. Converting COGS for the company solely depends on the change in LIFO reserve, which is only 4.5% of total inventory at its largest (in 2010) and 0.6% of total inventory at its smallest (in 2014). If the change in LIFO reserve proves small in relation to the total inventory size, then several of these ratios will alter little when converting between U.S. GAAP to IFRS. In particular, the inventory turnover, profit margin, and gross profit margin ratios are affected by this change. One sees this in Figures 6E and 6F, which show Caterpillar's profit margin and gross profit margin over time. Conversion from LIFO to FIFO affects these ratios; however, they closely track each other because the company has a small change in LIFO reserve. Similarly, if the LIFO reserve is

large in comparison to total inventory, all ratios will be affected, particularly inventory turnover and asset turnover. Caterpillar's LIFO reserve ranges from 27% to 19% of total inventory, and as a result, its inventory turnovers and asset turnovers change significantly after conversion. This must be considered when evaluating the differences between U.S. GAAP and IFRS because it will likely impact the observed change in ratios after conversion.

Although at times not significant changes, these differences in ratios influence company consideration and analysis. For example, if an analyst does not realize that the company using FIFO could have an inventory turnover ratio 0.5 points higher or lower, a gross profit margin 1% higher or lower, and an EBITDA margin 1% higher or lower, solely because of a difference in accounting standards, that analyst might over or undervalue the company. If the unchanged EBITDA number was carried forward throughout the analyst's entire valuation, then this could significantly impact calculations. As mentioned previously, however, there are inventory costing methods other than just LIFO and FIFO. If either of the companies used weighted average cost (which 52% of the companies studied in *IFRS Accounting Trends and Techniques* did) the effects on the ratios would decrease (Petrino, et al., 2012, p. 315). Inventory costing methods present one of several differences between U.S. GAAP and IFRS that have the potential to affect analysts understanding of companies if they fail to recognize and adjust for these differences. Similarly, although not discussed in depth, the other inventory variations, including inventory measurement and reversal of inventory write-downs, have the potential to alter companies' financial statements.

Appendix

Table 1: U.S. GAAP Inventory Cost Determination 2008 - 2010

Table 2-4: Inventory Cost Determination	Number of Entities		
	2010	2009	2008
Methods			
Not Disclosed	55	N/C*	N/C*
First in, First out (FIFO)	316	325	323
Last in, First out (LIFO)	166	176	179
Average cost	113	147	146
Standard costs	15	N/C*	N/C*
Retail method	21	N/C*	N/C*
Other	74	18	17
Use of LIFO			
All inventories	4	4	7
50% or more of inventories	83	82	86
Less than 50% of inventories	54	78	72
Not determinable	25	12	74
Addition LIFO Information			
LIFO discontinued for all or portion of inventories	1	N/C*	N/C*
LIFO Liquidation	28	N/C*	N/C*
Effect on income from using LIFO	50	N/C*	N/C*
Dollar value LIFO used to calculate LIFO inventory cost	1	N/C*	N/C*

Source: Petrino, R.J., Cohen, D., Kraft, K., Illuzzi, K., and Patel, A. *Accounting Trends and Techniques: Today's Financial Reporting Practices* (65th ed.).

Table 2: IFRS Inventory Cost Determination 2009-2011

Table 3-3: Inventory Cost Determination			
	2011	**2010**	**2009**
First-in, First-Out (FIFO)	50	52	51
(Weighted) average Cost	96	88	78
Specific Identification	13	10	9
Fair value less cost to sell (broker-dealer exemption)	7	8	4
Other	4	3	4
No valuation method disclosed	18	14	16
No inventory or not material	21	28	27
Total	209	203	189
Less: Companies disclosing at least two valuation methods	(30)	(27)	(27)
Companies disclosing at lease three valuation methods	(4)	(6)	(2)
Total Companies in Sample	175	170	160

Source: Walters, P.D. (2012). *IFRS Accounting Trends and Techniques: Today's International Financial Reporting Practices U.S. Edition* (3rd ed.). New York, NY: The American Institute of Certified Public Accountants, Inc.

Table 3: LIFO Reserves by Industry (2007)

Industry	LIFO as a Percentage of Total Inventory	LIFO Reserves in Billions
Petroleum and Natural Gas	31.0%	57,306
Machinery	9.8%	5,314
Chemicals	9.6%	4,756
Steel Works, Etc.	8.4%	4,474
Business Supplies	5.3%	1,172
Construction Materials	4.9%	953
Rubber and Plastic Products	4.1%	183
Wholesale	4.0%	2,732
Shipping Containers	3.9%	233
Printing and Publishing	3.8%	107
Tobacco Products	3.0%	830
Insurance	2.7%	151
Automobiles and Trucks	2.6%	3,326
Alcoholic Beverages	2.5%	382
Agriculture	2.5%	82
Aircraft	2.3%	838
Defense	2.2%	49
Miscellaneous	1.8%	974
Transportation	1.7%	165
Retail	1.6%	3,317
Consumer Goods	1.6%	523
Shipbuilding, Railroad Equipment	1.5%	122
Electrical Equipment	1.2%	315
Food Products	1.1%	661
Coal	1.1%	14
Fabricated Products	1.0%	4
Textiles	0.9%	30
Business Services	0.8%	90
Candy and Soda	0.7%	30
Measuring and Control Equipment	0.6%	54
Nonmetallic Mines	0.5%	143
Medical Equipment	0.5%	71
Apparel	0.4%	86
Pharmaceutical Products	0.2%	167
Utilities	0.1%	73

Source: Harris, P.; Kinkela, K.; Stahlin, W., and Washington Arnold, L. (2014). The Present and Future Outlook of the Last In First Out Inventory Methods. *Global Conference on Business and Finance Proceedings,* 9(1), 183-187.

Table 4A: LIFO Constant Sales Price

Forecasted Income Statement and Balance Sheet (Constant Sales Price)							
Income Statement							
	Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales	750	1000	1250	1500	1750	1750	1750
COGS	400	590	805	1050	1295	1370	1460
Gross Profit	350	410	445	450	455	380	290
SG&A	75	100	125	150	175	175	175
Pre-tax Income	275	310	320	300	280	205	115
Income tax exp.	83	93	96	90	84	61	35
Net Income	193	217	224	210	196	144	81

Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	813	750	819	1029	1380	1663	1884
Inventory		380	660	815	815	660	520	380
Land	1000	1000	1000	1000	1000	1000	1000	1000
Total Assets	2000	2193	2410	2634	2844	3040	3183	3264
Liab & Equity								
Deferred Tax								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		193	410	634	843	1040	1183	1264
Total Liab. & Equity	2000	2193	2410	2634	2844	3040	3183	3264

Ratios							
	Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA	9.2%	9.4%	8.9%	7.7%	6.7%	4.6%	2.5%
EBITDA Margin	36.7%	31.0%	25.6%	20.0%	16.0%	11.7%	6.6%
Asset Turnover	0.36	0.43	0.50	0.55	0.59	0.56	0.54
Profit Margin	25.7%	21.7%	17.9%	14.0%	11.2%	8.2%	4.6%
Inventory Turnover		1.13	1.09	1.29	1.76	2.32	3.24
Gross Profit Margin	46.7%	41.0%	35.6%	30.0%	26.0%	21.7%	16.6%

Table 4B: FIFO Constant Sales Price

Forecasted Income Statement and Balance Sheet (Constant Sales Price)								
Income Statement								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales		750	1000	1250	1500	1750	1750	1750
COGS		380	540	730	960	1235	1355	1480
Gross Profit		370	460	520	540	515	395	270
SG&A		75	100	125	150	175	175	175
Pre-tax Income		295	360	395	390	340	220	95
Income tax exp.		89	108	119	117	102	66	29
Net Income		207	252	277	273	238	154	67
Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	807	729	775	958	1291	1570	1797
Inventory		400	730	960	1050	955	830	670
Land	1000	1000	1000	1000	1000	1000	1000	1000
Total Assets	2000	2207	2459	2735	3008	3246	3400	3467
Liab & Equity								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		207	459	735	1008	1246	1400	1467
Total Liab. & Equity	2000	2207	2459	2735	3008	3246	3400	3467
Ratios								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA		9.8%	10.8%	10.6%	9.5%	7.6%	4.6%	1.9%
EBITDA Margin		39.3%	36.0%	31.6%	26.0%	19.4%	12.6%	5.4%
Asset Turnover		0.36	0.43	0.48	0.52	0.56	0.53	0.51
Profit Margin		27.5%	25.2%	22.1%	18.2%	13.6%	8.8%	3.8%
Inventory Turnover			0.96	0.86	0.96	1.23	1.52	1.97
Gross Profit Margin		49.3%	46.0%	41.6%	36.0%	29.4%	22.6%	15.4%

Table 5A: LIFO Increasing Sales Price

Forecasted Income Statement and Balance Sheet (LIFO, Increasing Sales Price)							
Income Statement							
	Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales	750	1040	1350	1680	2030	2100	2170
COGS	400	590	805	1050	1295	1370	1460
Gross Profit	350	450	545	630	735	730	710
SG&A	75	104	135	168	203	210	217
Pre-tax Income	275	346	410	462	532	520	493
Income tax exp.	83	104	123	139	160	156	148
Net Income	193	242	287	323	372	364	345

Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	813	775	907	1230	1758	2262	2747
Inventory		380	660	815	815	660	520	380
Land	1000	1000	1000	1000	1000	1000	1000	1000
Total Assets	2000	2193	2435	2722	3045	3418	3782	4127
Liab & Equity								
Deferred Tax								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		193	435	722	1045	1418	1782	2127
Total Liab. & Equity	2000	2193	2435	2722	3045	3418	3782	4127

Ratios							
	Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA	9.2%	10.5%	11.1%	11.2%	11.5%	10.1%	8.7%
EBITDA Margin	36.7%	33.3%	30.4%	27.5%	26.2%	24.8%	22.7%
Asset Turnover	0.36	0.45	0.52	0.58	0.63	0.58	0.55
Profit Margin	25.7%	23.3%	21.3%	19.3%	18.3%	17.3%	15.9%
Inventory Turnover		1.13	1.09	1.29	1.76	2.32	3.24
Gross Profit Margin	46.7%	43.3%	40.4%	37.5%	36.2%	34.8%	32.7%

Table 5B: FIFO Increasing Sales Price

Forecasted Income Statement and Balance Sheet (FIFO, Increasing Sales Price)								
Income Statement								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Sales		750	1040	1350	1680	2030	2100	2170
COGS		380	540	730	960	1235	1355	1480
Gross Profit		370	500	620	720	795	745	690
SG&A		75	104	135	168	203	210	217
Pre-tax Income		295	396	485	552	592	535	473
Income tax exp.		89	119	146	166	178	161	142
Net Income		207	277	340	386	414	375	331
Balance Sheet								
	Yr0	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
Assets								
Cash	1000	807	754	863	1160	1669	2169	2660
Inventory		400	730	960	1050	955	830	670
Land	1000	1000	1000	1000	1000	1000	1000	1000
Total Assets	2000	2207	2484	2823	3210	3624	3999	4330
Liab & Equity								
Capital Stock	2000	2000	2000	2000	2000	2000	2000	2000
Retained Earnings		207	484	823	1210	1624	1999	2330
Total Liab. & Equity	2000	2207	2484	2823	3210	3624	3999	4330
Ratios								
		Yr1	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**	**Yr7**
ROA		9.8%	11.8%	12.8%	12.8%	12.1%	9.8%	8.0%
EBITDA Margin		39.3%	38.1%	35.9%	32.9%	29.2%	25.5%	21.8%
Asset Turnover		0.36	0.44	0.51	0.56	0.59	0.55	0.52
Profit Margin		27.5%	26.7%	25.1%	23.0%	20.4%	17.8%	15.3%
Inventory Turnover			0.96	0.86	0.96	1.23	1.52	1.97
Gross Profit Margin		49.3%	48.1%	45.9%	42.9%	39.2%	35.5%	31.8%

Table 6: Industries with top LIFO reserves 2014 Compustat

SIC Code	Industry	Average LIFO Reserve as % of Total Inventory
21	Tobacco Products	20.05%
29	Petroleum and Coal Products	11.11%
14	Nonmetallic Minerals, Except Fuels	9.78%
33	Primary Metal Industries	7.44%
54	Food Stores	7.28%
25	Furniture and Fixtures	5.90%
30	Rubber and Miscellaneous Plastics Products	5.49%
55	Automotive Dealers and Service Stations	4.78%
50	Wholesale Trade-Durable Goods	4.43%
35	Industrial Machinery and Equipment	4.11%

Table 7A: Caterpillar Income Statement

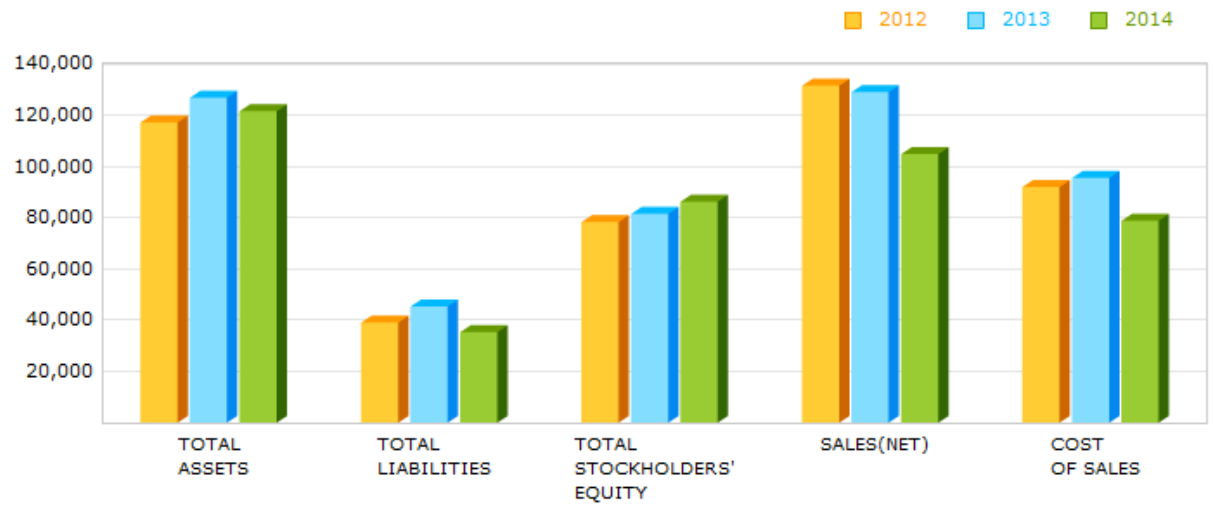
STATEMENT 1 Consolidated Results of Operations for the Years Ended December 31 (Dollars in millions except per share data)	Caterpillar Inc.		
	2014	2013	2012
Sales and revenues:			
Sales of Machinery, Energy & Transportation	$ 52,142	$ 52,694	$ 63,068
Revenues of Financial Products	3,042	2,962	2,807
Total sales and revenues	55,184	55,656	65,875
Operating costs:			
Cost of goods sold	39,767	40,727	47,055
Selling, general and administrative expenses	5,697	5,547	5,919
Research and development expenses	2,135	2,046	2,466
Interest expense of Financial Products	624	727	797
Goodwill impairment charge	—	—	580
Other operating (income) expenses	1,633	981	485
Total operating costs	49,856	50,028	57,302
Operating profit	5,328	5,628	8,573
Interest expense excluding Financial Products	484	465	467
Other income (expense)	239	(35)	130
Consolidated profit before taxes	5,083	5,128	8,236
Provision (benefit) for income taxes	1,380	1,319	2,528
Profit of consolidated companies	3,703	3,809	5,708
Equity in profit (loss) of unconsolidated affiliated companies	8	(6)	14
Profit of consolidated and affiliated companies	3,711	3,803	5,722
Less: Profit (loss) attributable to noncontrolling interests	16	14	41
Profit [1]	$ 3,695	$ 3,789	$ 5,681
Profit per common share	$ 5.99	$ 5.87	$ 8.71
Profit per common share — diluted [2]	$ 5.88	$ 5.75	$ 8.48
Weighted-average common shares outstanding (millions)			
- Basic	617.2	645.2	652.6
- Diluted [2]	628.9	658.6	669.6
Cash dividends declared per common share	$ 2.70	$ 2.32	$ 2.02

[1] Profit attributable to common stockholders.
[2] Diluted by assumed exercise of stock-based compensation awards, using the treasury stock method.

Table 7B: Caterpillar Balance Sheet

STATEMENT 3 Consolidated Financial Position at December 31 (Dollars in millions)	Caterpillar Inc.		
	2014	2013	2012
Assets			
Current assets:			
Cash and short-term investments	$ 7,341	$ 6,081	$ 5,490
Receivables – trade and other	7,737	8,413	9,706
Receivables – finance	9,027	8,763	8,860
Deferred and refundable income taxes	1,739	1,553	1,547
Prepaid expenses and other current assets	818	900	988
Inventories	12,205	12,625	15,547
Total current assets	38,867	38,335	42,138
Property, plant and equipment – net	16,577	17,075	16,461
Long-term receivables – trade and other	1,364	1,397	1,316
Long-term receivables – finance	14,644	14,926	14,029
Investments in unconsolidated affiliated companies	257	272	272
Noncurrent deferred and refundable income taxes	1,404	594	2,011
Intangible assets	3,076	3,596	4,016
Goodwill	6,694	6,956	6,942
Other assets	1,798	1,745	1,785
Total assets	$ 84,681	$ 84,896	$ 88,970
Liabilities			
Current liabilities:			
Short-term borrowings:			
Machinery, Energy & Transportation	$ 9	$ 16	$ 636
Financial Products	4,699	3,663	4,651
Accounts payable	6,515	6,560	6,753
Accrued expenses	3,548	3,493	3,667
Accrued wages, salaries and employee benefits	2,438	1,622	1,911
Customer advances	1,697	2,360	2,638
Dividends payable	424	382	—
Other current liabilities	1,754	1,849	2,055
Long-term debt due within one year:			
Machinery, Energy & Transportation	510	760	1,113
Financial Products	6,283	6,592	5,991
Total current liabilities	27,877	27,297	29,415
Long-term debt due after one year:			
Machinery, Energy & Transportation	9,493	7,999	8,666
Financial Products	18,291	18,720	19,086
Liability for postemployment benefits	8,963	6,973	11,085
Other liabilities	3,231	3,029	3,136
Total liabilities	67,855	64,018	71,388
Commitments and contingencies (Notes 21 and 22)			
Stockholders' equity			
Common stock of $1.00 par value: Authorized shares: 2,000,000,000 Issued shares: (2014, 2013 and 2012 – 814,894,624 shares) at paid-in amount	5,016	4,709	4,481
Treasury stock: (2014 – 208,728,065 shares; 2013 – 177,072,282 shares; and 2012 – 159,846,131 shares) at cost	(15,726)	(11,854)	(10,074)
Profit employed in the business	33,887	31,854	29,558
Accumulated other comprehensive income (loss)	(6,431)	(3,898)	(6,433)
Noncontrolling interests	80	67	50
Total stockholders' equity	16,826	20,878	17,582
Total liabilities and stockholders' equity	$ 84,681	$ 84,896	$ 88,970

Table 8: Soosan Financial Information



Item		201212 (Closing Account)	201312 (Closing Account)	201412 (Closing Account)
Balance Sheet	TOTAL ASSETS (mil.KRW)	117,184	126,841	121,600
	TOTAL LIABILITIES (mil.KRW)	38,976	45,337	35,376
	TOTAL STOCKHOLDERS' EQUITY(mil.KRW)	78,208	81,503	86,224
Income Statement	SALES(NET) (mil.KRW)	131,602	129,071	104,846
	COST OF SALES (mil.KRW)	91,904	95,550	78,736
	NET INCOME (mil.KRW)	12,955	4,718	4,730

Table 9A: Ratios and Equations

Ratio	Equation
Return on Assets (ROA)	Net Income/ ((Beginning Total Assets + Ending Total Assets)/2)
Asset Turnover	Total Revenue/ ((Beginning Total Assets + Ending Total Assets)/2)
Inventory Turnover	Cost of Good Sold/ ((Beginning Inventory + Ending Inventory)/2)
Gross Profit Margin	Gross Profit/ Sales Revenue
EBITDA Margin	EBITDA/ Total Revenue
Profit Margin	Net Income/ Total Revenue

Table 9B: LIFO to FIFO Conversion Formulas

Conversion	Formula
FIFO Inventory	LIFO Inventory + LIFO reserve
FIFO Assets	LIFO Total assets + LIFO reserve
FIFO COGS	LIFO COGS - Change in LIFO reserve
FIFO Net Income	FIFO Net Income + After tax change in LIFO reserve

Table 10: U.S. GAAP and IFRS Companies used in the Compustat Comparison

U.S. GAAP	IFRS	
ACTUANT CORP -CL A	SANDVIK AB	MS INDUSTRIE AG
CATERPILLAR INC	KONE CORP	PPK GROUP LTD
MANITOWOC CO	MS INTERNATIONAL PLC	IMDEX LTD
OSHKOSH CORP	SCHINDLER HOLDING AG	XIAMEN XGMA MACHINERY CO LTD
CAMERON INTERNATIONAL CORP	ZARDOYA OTIS SA	BAUER AG
COLUMBUS MCKINNON CORP	VALLOUREC SA	BRADKEN LTD
FMC TECHNOLOGIES INC	SKAKO AS	AUSTIN ENGINEERING LTD
HILLENBRAND INC	METSO OYJ	CARGOTEC OYJ
	OMZ PJSC	PLEXUS HLDGS PLC
	JUNGHEINRICH AG	TEREX MATERIAL HANDLING
	HYUNDAI ELEVATOR CO LTD	BOLZONI SPA
	PERROT DUVAL HOLDING SA	FAMUR SA
	SOOSAN HEAVY INDUSTRIES CO	OUTOTEC OYJ
	MAX AUTOMATION	SMT SCHARF AG
	KESLA OYJ	WACKER NEUSON SE
	KONECRANES PLC	PRESSURE TECHNOLOGIES PLC
	SCHOELLER BLECKMANN OILF EQP	MOJ SA
	INTERROLL HOLDING AG	TUIMAZINSKIY ZAVOD AVTOBET
	MANITOU B F	ARMAX GAZ SA
	PALFINGER AG	HYDROTOR SA
	HAULOTTE GROUP	PATENTUS SA
	KLEEMAN HELLAS SA	MATRIX COMPOSITES
	TTS GROUP ASA	TESMEC SPA
	DOOSAN INFRACORE CO	UNIO SA

Figure 1: Ratios for the simple Company DEF comparing LIFO and FIFO where the sales price for goods remains constant

Figure 1A: LIFO / FIFO ROA Comparison Constant Sales Price

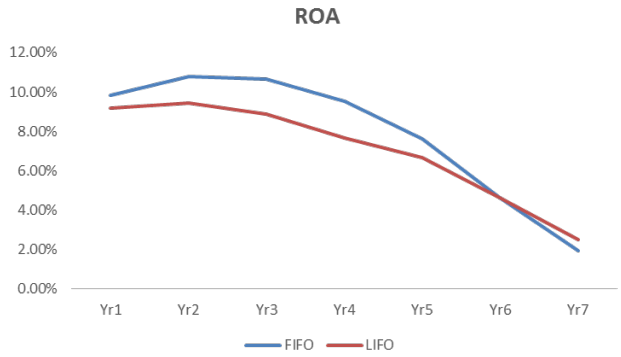


Figure 1B: LIFO / FIFO Asset Turnover Comparison Constant Sales Price

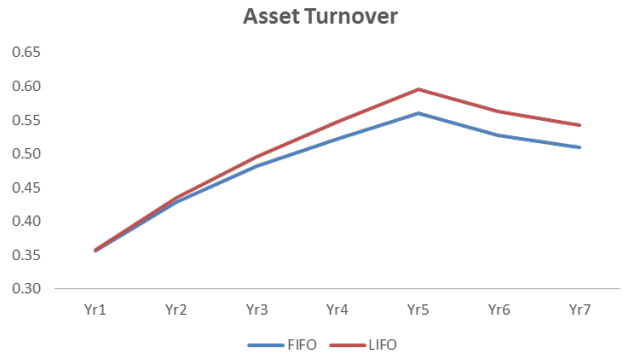


Figure 1C: LIFO / FIFO Inventory Turnover Comparison Constant Sales Price

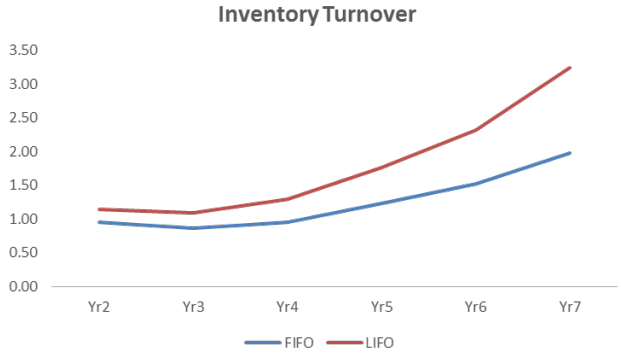


Figure 1D: LIFO / FIFO EBITDA Margin Comparison Constant Sales Price

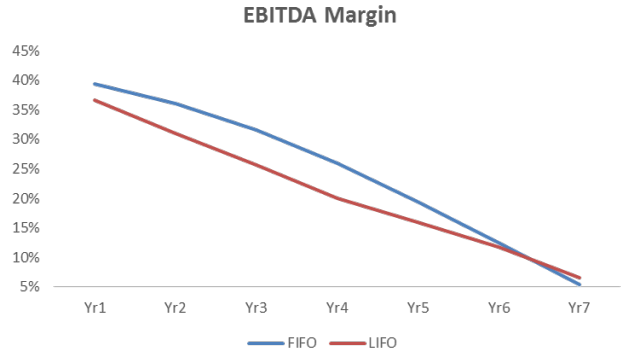


Figure 1E: LIFO / FIFO Profit Margin Comparison Constant Sales Price

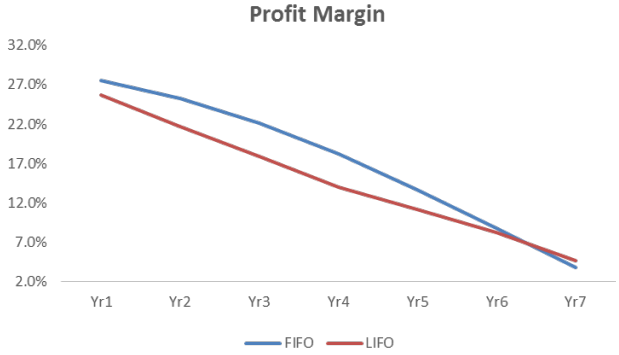


Figure 1F: LIFO / FIFO Gross Profit Margin Comparison Constant Sales Price

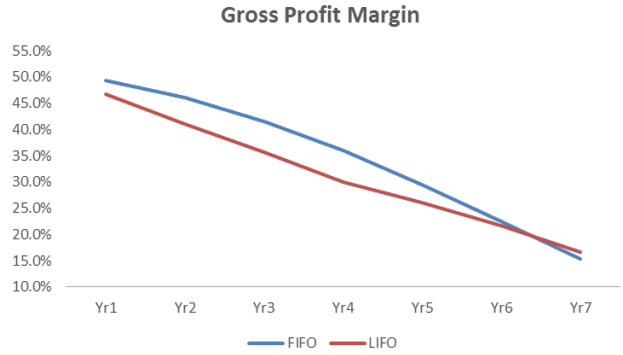


Figure 2: Ratios for the simple Company DEF comparing LIFO and FIFO where the sales price for goods increases each year

Figure 2A: LIFO / FIFO ROA Comparison Increasing Sales Price

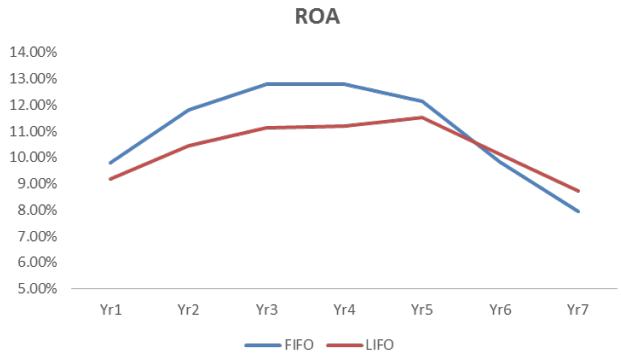


Figure 2B: LIFO / FIFO Asset Turnover Comparison Increasing Sales Price

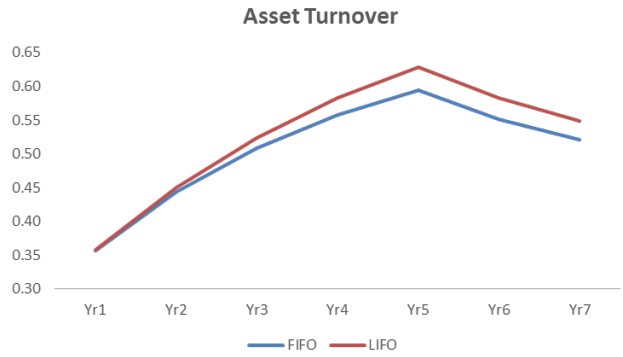


Figure 2C: LIFO / FIFO Inventory Turnover Comparison Increasing Sales Price

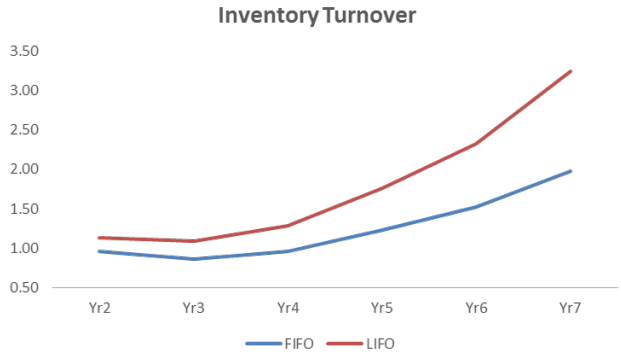


Figure 2D: LIFO / FIFO EBITDA Margin Comparison Increasing Sales Price

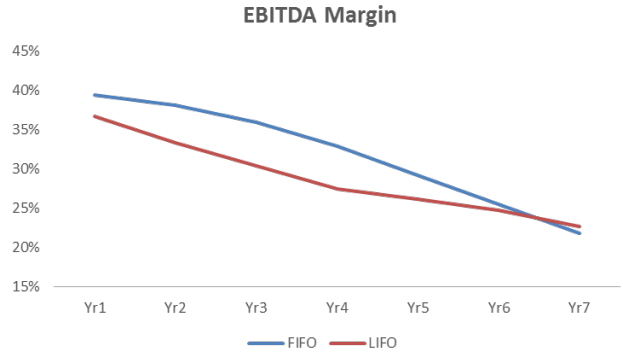


Figure 2E: LIFO / FIFO Profit Margin Comparison Increasing Sales Price

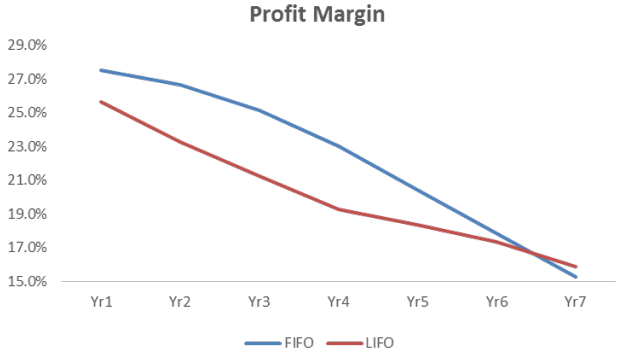


Figure 2F: LIFO / FIFO Gross Profit Margin Comparison Increasing Sales Price

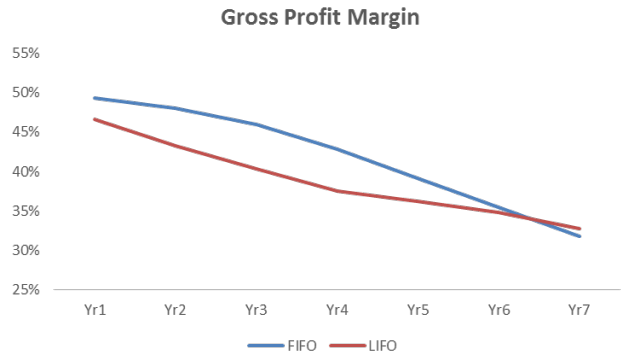


Figure 3: Average LIFO Reserve Compustat

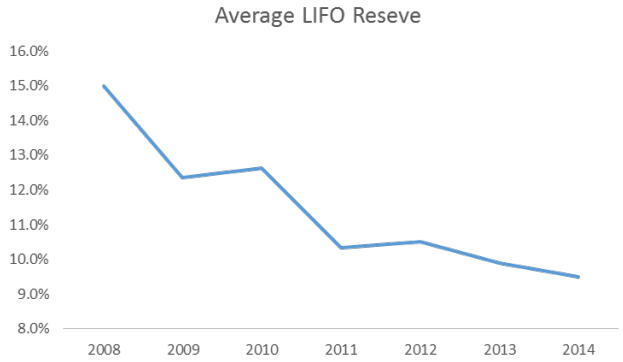


Figure 4: Comparison of averages and medians for U.S. GAAP and IFRS companies over the period from 2008 – 2014 using Compustat company data. With a U.S. GAAP sample size of 8 companies using LIFO and an IFRS sample size of 48 companies using FIFO (or another acceptable method)

Figure 4A: Average Profit Margin Compustat

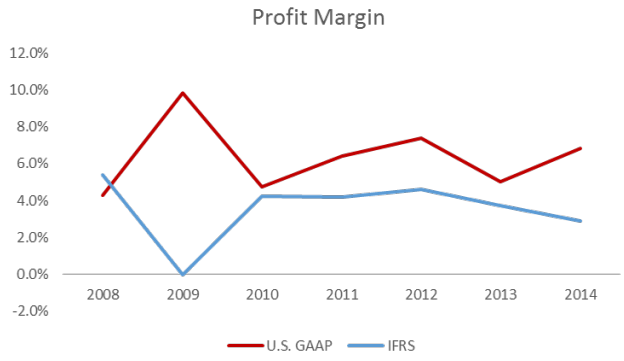


Figure 4B: Median Profit Margin Compustat

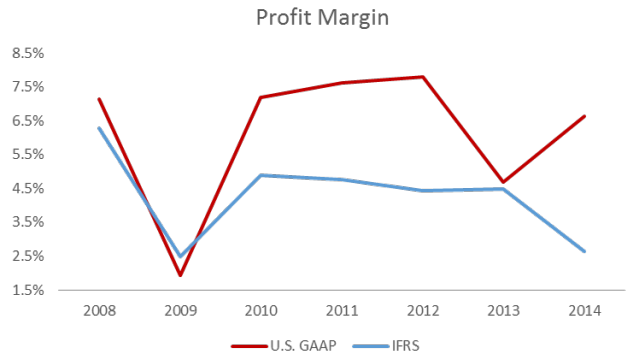


Figure 4C: Average Inventory Turnover Compustat

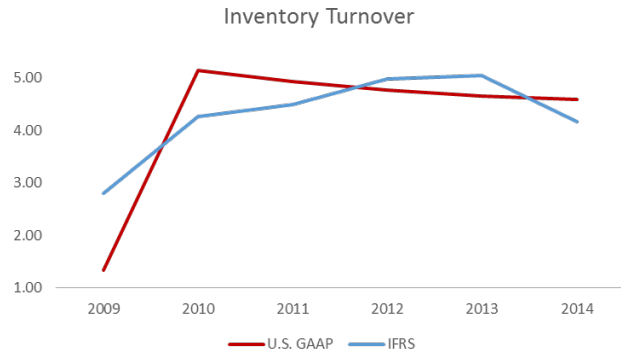


Figure 4D: Median Inventory Turnover Compustat

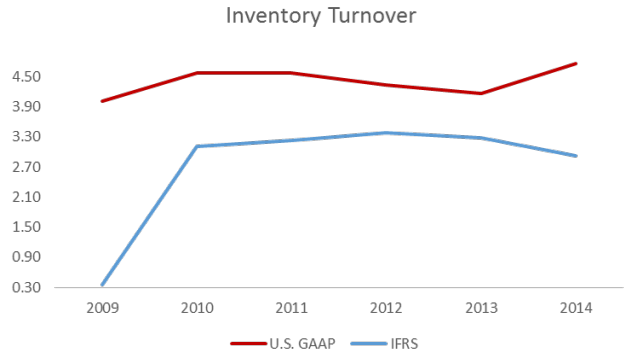


Figure 4E: Average Gross Profit Margin Compustat

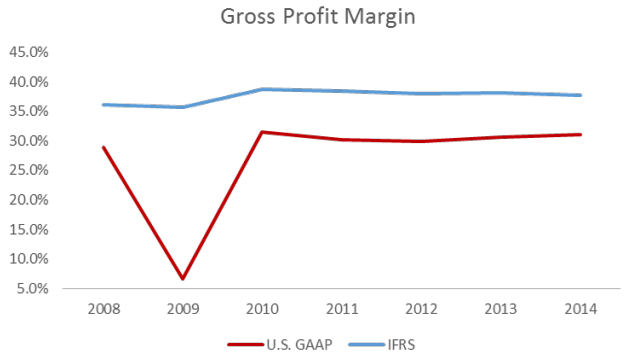


Figure 4F: Median Gross Profit Margin Compustat

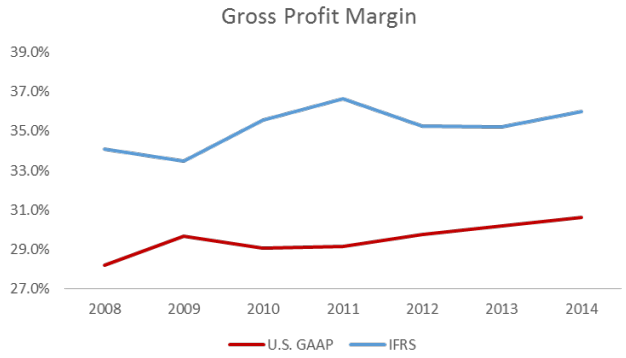


Figure 5: Comparison of Soosan and Caterpillar ratios with no alterations

Figure 5A: Soosan vs. Caterpillar ROA

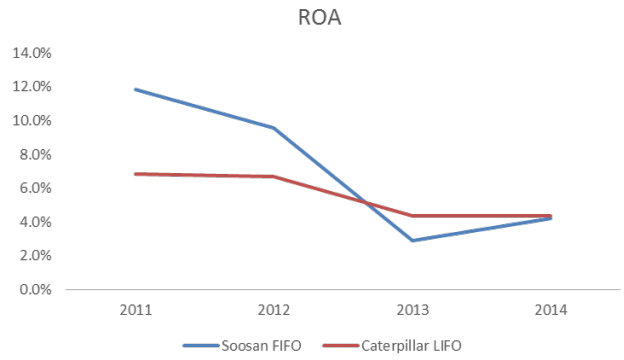


Figure 5B: Soosan vs. Caterpillar Asset Turnover

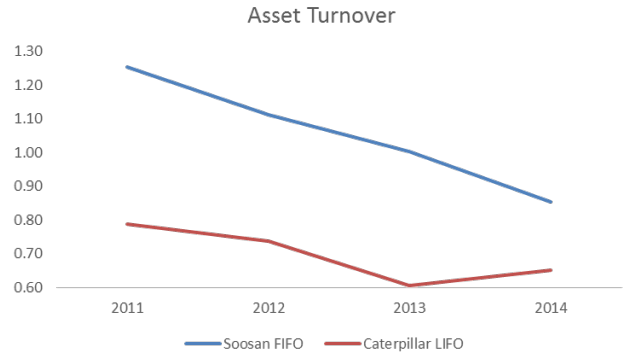


Figure 5C: Soosan vs. Caterpillar Inventory Turnover

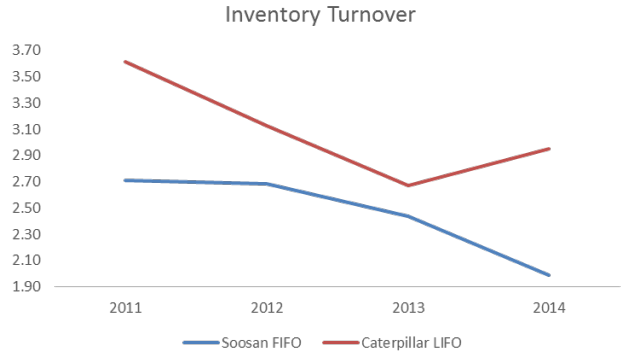


Figure 5D: Soosan vs. Caterpillar EBITDA Margin

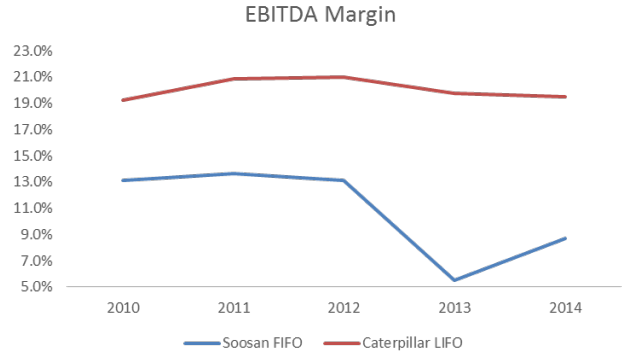


Figure 5E: Soosan vs. Caterpillar Profit Margin

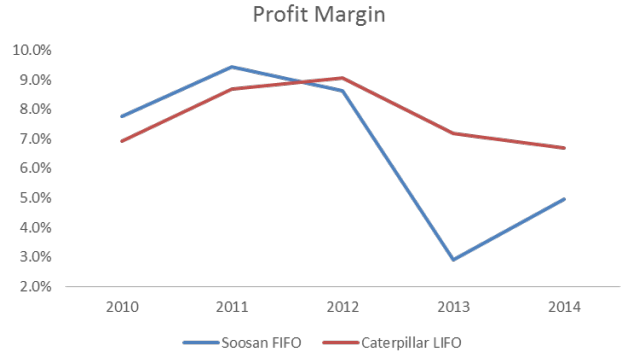


Figure 5F: Soosan vs. Caterpillar Gross Profit Margin

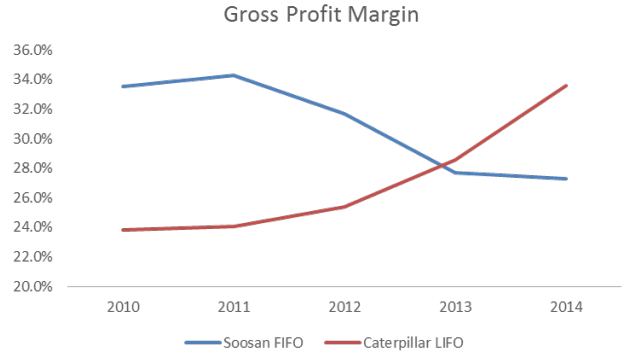


Figure 6: Comparison of Caterpillar converted from U.S. GAAP to IFRS

Figure 6A: Caterpillar IFRS vs U.S. GAAP ROA

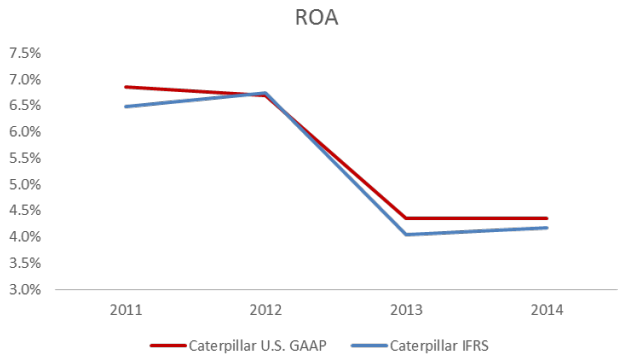


Figure 6B: Caterpillar IFRS vs U.S. GAAP Asset Turnover

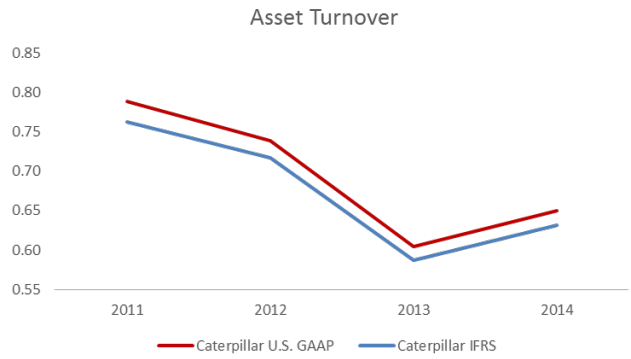


Figure 6C: Caterpillar IFRS vs U.S. GAAP Inventory Turnover

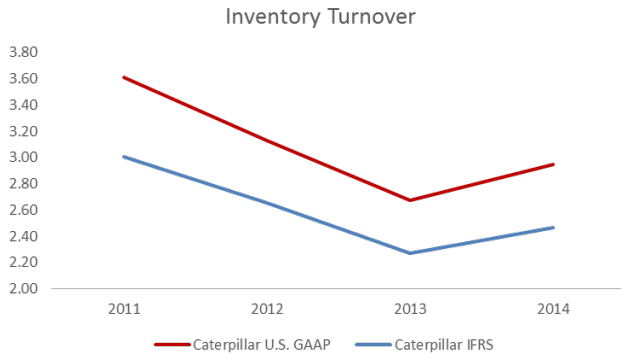


Figure 6D: Caterpillar IFRS vs U.S. GAAP EBITDA Margin

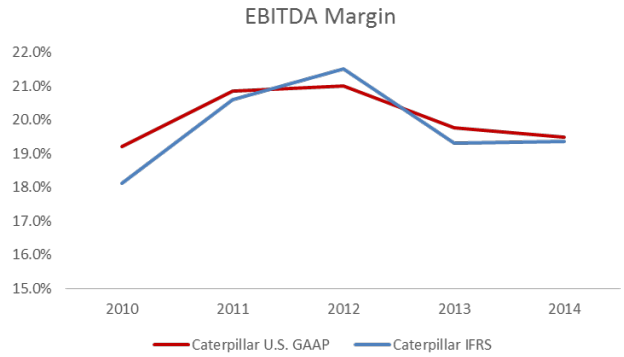


Figure 6E: Caterpillar IFRS vs U.S. GAAP Profit Margin

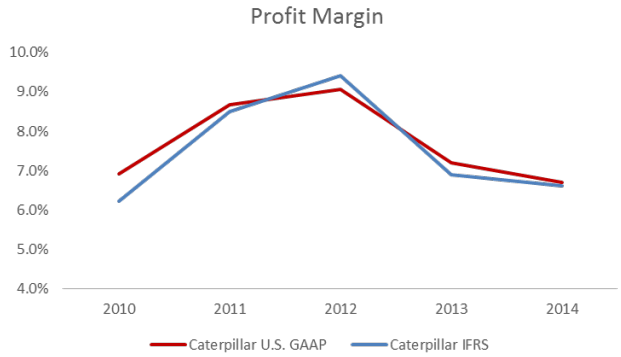


Figure 6F: Caterpillar IFRS vs U.S. GAAP Gross Profit Margin

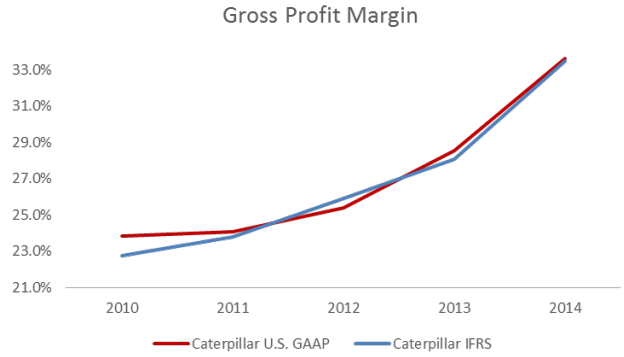


Figure 7: Comparison of Soosan and Caterpillar both using IFRS and FIFO

Figure 7A: Soosan and Caterpillar ROA

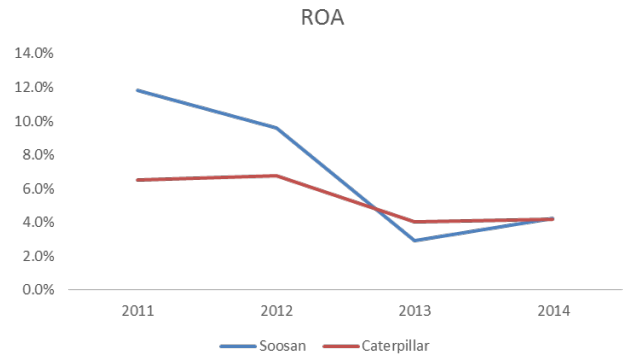


Figure 7B: Soosan and Caterpillar Asset Turnover

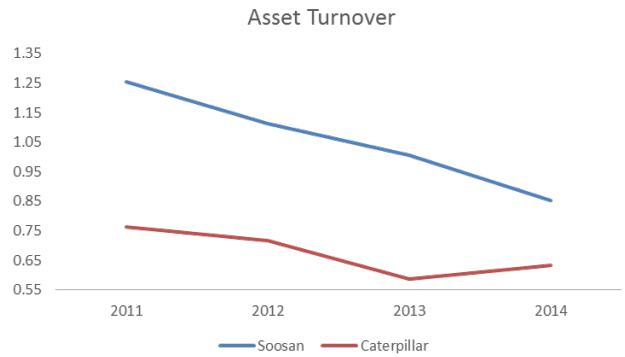


Figure 7C: Soosan and Caterpillar Inventory Turnover

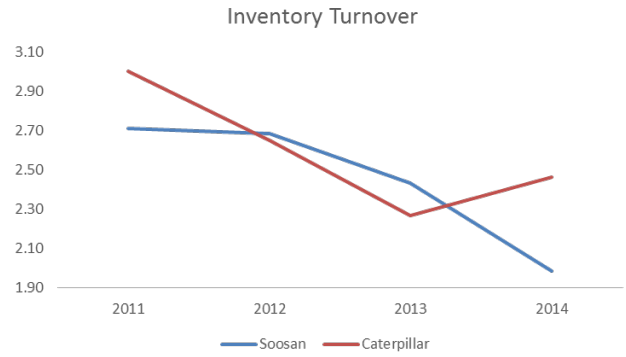


Figure 7D: Soosan and Caterpillar EBITDA Margin

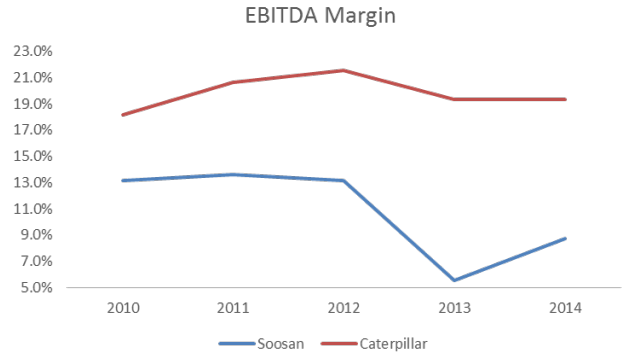


Figure 7E: Soosan and Caterpillar Profit Margin

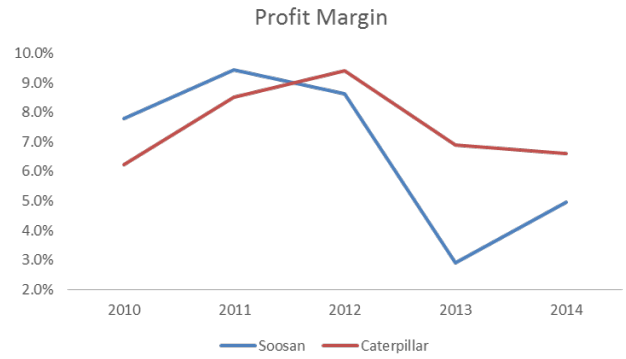
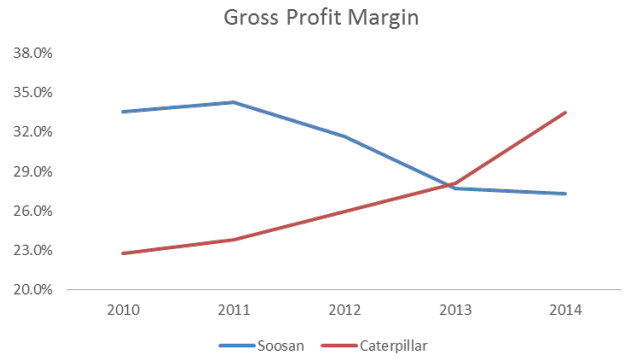


Figure 7F: Soosan and Caterpillar Gross Profit Margin



Conclusion

Treatment of research and development expenditures and inventory costing methods are two significant variations between U.S. GAAP and IFRS, which can affect analysts understanding of companies' financial performance. As a result, if individuals do not consider differences such as these when analyzing companies, this can lead to inaccurate understanding of firms and their financial performance. However, as previously mentioned, the two accounting standards diverge in several other ways all of which serve as potential areas of further research. Two such areas are long-lived asset and options expense treatment.

Long-lived Assets

Long-lived assets vary in several key ways. The differences between the standards include criteria for determining write-downs, subsequent measurement and revaluation of written down assets, measurement and valuation on financial statements, and depreciation of asset components.

U.S. GAAP and IFRS use different methods for measuring and carrying long-lived assets on companies' financial statements. ASC 306-10-30-1 states that companies carry the assets at historical cost plus interest. Historical cost includes those incurred to "bring it to the condition and location necessary for its intended use." This also includes interest costs. IFRS companies carry their long-lived assets using different methods. Initially, these assets are "measured at cost" according to IAS 16-15; however, with measurement after recognition, companies have the choice to use the cost model or the revaluation model for measurement (IAS 16-29). According to IAS 16-30, under the cost model, companies choose to measure assets at "cost less any accumulated depreciation and any accumulated impairment losses." According to IAS 16-31, the revaluation choice allows companies to recognize these assets at fair value "less any subsequent accumulated depreciation and subsequent accumulated impairment losses." Under IFRS, companies must apply their selection to the entire class of assets; they cannot pick and choose depending on the asset. *IFRS Accounting Trends and Techniques: Today's International Financial Reporting Practices* reports on 170 international

companies using IFRS and shows that, when electing what inventory valuation method to use, 163 use cost, 11 use revaluation, 3 do not disclose the information, and 7 companies use a combination of the two (Walters, 2012). This means that only 6.5% use revaluation method, but the companies that use the revaluation method will experience variation. Although not long-lived assets, this inventory example provides an analogy for how IFRS companies handle and value their assets.

The two standards also treat assets and depreciation of components differently. IAS 16-43 states that, "Each individual part of property, plant and equipment with a significant value or cost in relation to the total cost of the item shall be depreciated separately." U.S. GAAP does not discuss this when providing guidance for general depreciation. Some industries use component depreciation; however, it is not common under U.S. GAAP. Although a small difference between the two standards, if the component depreciation proves significant enough, there may potentially be differences in financial ratios.

The third key difference involves asset fair value measurement and the need for write-downs. Under U.S. GAAP, following ASC 360-10-35-21, "long-lived assets are tested for recoverability whenever events or circumstances indicate that its carrying amount may not be recoverable." Examples of when this might occur include, a significant decrease in the market price of the asset, an adverse change in the manner in which the long-lived asset is used, or an adverse change in legal factors or business climate. This test is not necessary every year; managers can be somewhat subjective when determining if circumstances dictate that the current carrying amount may not be recoverable and the tests are necessary. This can lead to managers waiting to test and perform a write-down until a later year or prematurely writing down, depending on what is in the best interest of the business. IFRS takes a different stance on impairments. In IAS 36, *Asset Impairment,* an entity shall assess at the end of each reporting period whether there is any indication of asset impairment, irrespective of whether there is any actual indication (IAS 36-9). This means that companies are

required to constantly test for impairment, thus they will more likely notice an impairment than a U.S. GAAP company.

The final difference with regard to long-lived assets is revaluation of asset write-downs. Under U.S. GAAP, like the treatment of inventories, an impairment loss creates a new cost basis and the "new cost basis shall be depreciated over the remaining useful life of that asset," prohibiting restoration (ASC 360-10-35-20). IFRS allows for restoration and revaluation of assets. IAS 16-31 allows for revaluation of an asset, and IAS16-39 states that the increase in asset value that is a result of revaluation, "shall be recognized in other comprehensive income and accumulated in equity under the heading of revaluation surplus. However, the increase shall be recognized in profit or loss to the extent that it reverses a revaluation decrease of the same asset previously recognized in profit or loss." This allows for the potential of several significant differences between IFRS and U.S. GAAP companies that have asset impairments and the revaluation abilities.

Considerable discussion has emerged among academics regarding long-lived assets; one area of study involves how the differences impact the market's interpretation of and reaction to an asset write-down. In the paper, "The Association between Market Returns and Long-Lived Asset Impairment under U.S. GAAP and IFRS," Paik and Lee analyze companies that take write-downs. Those that take them under U.S. GAAP, typically perform worse financially and in earnings during the write-down year than companies taking write-downs under IFRS. This points to the concept that U.S. GAAP companies might participate in the "big bath" approach: they have a bad year financially and attempt to contain all of the bad financial news, including write-downs, in one year. Because U.S. GAAP companies do not need to test for impairment every year, they potentially have more discretion with regards to when they record the asset impairment. In this study, IAS write-downs tend to be much smaller, because they can be written back up and happen more frequently, creating little opportunity for impairments to build. Paik and Lee conclude that markets tend to react more positively to IFRS companies taking write-downs because these companies likely still perform

normally. Conversely, the market does not react as positively to write-downs under U.S. GAAP because the companies are performing poorly in other aspects of their business when they take write-downs (Paik and Lee).

In another article, "Long-lived Asset Impairments in the Shipping Industry and the Impact on Financial Statement Ratios: Comparing U.S. GAAP and IFRS Standards," James Penner (2013) discusses how financial reporting standards for asset impairment affect the shipping industry. During the 2008 financial crisis, there were significant differences between long-lived asset treatment for those that followed U.S. GAAP and those that followed IFRS. Companies adhering to IAS 16 were much more likely than companies adhering to ASC 360 to write down assets. Many U.S. companies tested for impairment of their assets but did not find impairment, while international companies who used IFRS impairment testing, found impairments. The U.S. GAAP standards allowed the U.S. GAAP companies to circumvent testing for and concluding asset impairment, so that it would not negatively affect their financials. Consequently, U.S. GAAP companies had lower asset turnover ratios because the U.S. GAAP companies had larger total asset balances. Differences in the two standards allow for management to potentially use discretion with write-downs under U.S. GAAP and have varied results. Penner argues that this difference created significant variation in the shipping industry during this time because companies within the shipping industry hold large amounts of long-lived assets overall (Penner, 2013).

Long-lived asset impairments are even used to predict future operating cash flows under U.S. GAAP and IFRS. Elizabeth Gordon and Hsiao-Tang Hsu (2014) discuss this in their paper, "Long-Lived Asset Impairment and Future Operating Cash Flows under US GAAP and IFRS." The authors use a sample of firms following either U.S. GAAP or IFRS from 26 countries over the period from 2005-2011 to analyze the impact of asset impairments, assessing a total of 5,362 firms. Gordon and Hsu use *Compustat North America* and *Compustat Global* databases for this information. To determine the asset impairments future operating cash flow predictive ability, Gordon and Hsu

employ “one-year-ahead operating cash flows as the dependent variable” (2014, pg. 19). They conclude that under U.S. GAAP future operating cash flows have little association with impairments of long-lived tangible and intangible assets. For IFRS companies, however, impairments are consistently, negatively related to future operating cash flows. Also analyzing each long-lived asset type provides clearer results. For example, “Tangible long-lived asset impairments under IFRS better predict future operating cash flows (in the expected direction) than under US GAAP” (Gordon and Hsu, 2014, pg. 36). Conversely, intangible long-lived asset impairments have little relation to expected future cash flows for either U.S. GAAP or IFRS (Gordon and Hsu, 2014).

To further develop this hypothesis, Gordon and Hsu question whether different institutional settings within each country, including components such as legal enforcement, have an impact on the predictive ability of these long-lived asset impairments. They conclude that impairment losses under IFRS are more informative in high enforcement countries, suggesting that when investor protection and reporting enforcement is high it increases financial statement informativeness. Overall, Gordon and Hsu find that the IFRS reporting standard provides a greater indication of operating cash flows with regards to long-lived asset impairments; however, this still depends on the enforcement abilities of the country where the company operates (Gordon and Hsu, 2014).

Options Expense

Treatment of stock option expense is a second key area in which accounting standard differences cause areas of concern for individuals analyzing and valuing companies. The differences are important here; yet, this standard variation currently lacks research regarding the outcomes on these differences on financial statements and comparability. The key differences regarding stock option expense are share-based payment transactions with nonemployees, measurement and recognition of expense awards, and employee election equity repurchase features.

U.S. GAAP and IFRS have different definitions of employees. U.S. GAAP under ASC 550-50-20 defines employees in a much more limited way than IFRS, which defines employees and discusses share-based payments in IFRS 2. U.S. GAAP uses the common law definition of an employee, while IFRS has a more general definition of employees, including those that "provide similar services" to employees (IFRS 2, IN5(a)). Because of these different definitions in employees, the treatment of stock based compensation is more likely to occur under the employee definition for IFRS companies than U.S. GAAP, causing variation.

The next variation, measurement and recognition of expense awards deals with graded vesting for companies. Under ASC 718-10-55-25, companies can recognize award compensation through two different straight line methods; either by straight line method of the entire reward, or straight line method of each individual portion of the award. Under IFRS 2, however, the company must recognize on an accelerated basis, measuring each individual tranche separately. This is a slight difference but may still affect understanding of each company.

Employee equity repurchase features also diverge within the standards. According to ASC 718-10-25, equity repurchase features are classified as liabilities for the company. This permits the employee to avoid bearing the risks associated with owning the equity share. However, if the employee does bear "the risks and rewards" of ownership for a reasonable time, which is considered to be six months from vesting, then the company is not required to classify the feature as a liability (ASC 718-20-25-9). IFRS 2 outlines slightly different rules. According to IFRS 2-28, a liability is required for classification. There are no exceptions, and the six-month rule does not apply. All of these differences can impact "company's reported earnings, effective tax rate, and cash flows" (Abahoonie and De Grave, 2008).

Currently, there has been little study regarding these differences; however, many analysts and financial experts see these differences as a real concern in understanding and evaluating companies using various accounting standards. A conversation with Patricia Luscombe, a Managing Director in

the Valuations and Options Group at Lincoln International, shed light on this and confirmed that it is a concern for financial experts. These standard differences can cause noncash changes in companies' earnings; there is dilution of earnings that financial experts must consider when comparing companies. When options become vested companies book options expense, which affects earnings but not cash. The variances in share count as a result of exercising options also have an effect.

Luscombe discussed that when standards change, not just when they are different, it adds confusion to how investors analyze and understand companies. As a result, they must re-adjust and learn how these standards, particularly ones that affect cash flows or influence components such as earnings but are noncash in nature, effect understanding of companies' financial performance. Experts know that there are many differences that they must consider when comparing companies under multiple standards, and if they miss one, it could affect their understanding of the operations of those businesses. Options expense is an area where one financial expert thinks that the information is lacking regarding various accounting standards and their effects on company valuation (Luscombe, personal communication, January, 21 2016). Further research into this area could potentially provide much needed insight.

Considerations/ Limitations

This paper has provided insight and discussion into different accounting standards and their effect on comparing companies; however, there are limitations to the results. Three limitations include: differences in tax rates, differences in general operations of the businesses studied, and a different choice of ratios, rather than the ones used, may show more compelling results or provide new, better insights. With regard to tax rates, in the simple example for both the U.S. GAAP company and the IFRS company a 30% tax rate was used, but this does not likely represent the actual U.S. tax rate or the tax rate of a global company following IFRS. The U.S. marginal tax rate is 35%, but many companies have lower effective tax rates. Thirty-percent is likely close to the average rate

for many U.S. companies. Being implemented in over 100 different countries presents a challenge for determining an average rate for IFRS companies. 30% is not likely the average for all companies that follow IFRS, as there are many tax codes and policies across the countries using IFRS. This likely affects the accuracy of the original example's comparisons. Similarly, the companies in the real examples have different marginal and effective tax rates. For example, Ford's effective tax rate for 2014 was 37.7% and in 2013 it was (2.3)%. Conversely, Volvo had an effective tax rate of 33.1% and 30.7% in 2014 and 2013 respectively. These different tax rates can have a huge impact on earnings for the companies that then translates into the ratios analyzed. Taking into account the variation in tax rates, could provide a more accurate representation of how individual differences in accounting standards such as R&D expenditures and inventory costing methods affect companies.

Another limitation of the study is that by using different companies, which have different operations, there will always be variation in the ratios, solely because of business strategies and company operations. No matter how comparable, and similar the companies are in their products, sales, or other measures, there will always be some difference between them. These divergences in operations, products, management, or other factors affect the ratios, preventing them from being completely comparable. Also in the company analysis, the other variance between U.S. GAAP and IFRS are not eliminated. They are still included in the companies' accounting practices and as a result, are on the companies' financial statements. These could also influence the ratio analysis. Solely analyzing one company and converting it between standards eliminates some of the externalities. For example, converting Volvo to U.S. GAAP and Caterpillar to IFRS. This, however, is less realistic than actually using two companies, one that uses each accounting standard. This study has eliminated this limitation in some ways, but it still must be considered when reading the analysis.

The final potential limitation is that this study does not analyze the correct ratios to determine the differences and effect of U.S. GAAP and IFRS on understanding of companies and their operations. For example, book value per common share, earnings per share, average collection

period, or working capital could be better valuation metrics than the ones used in the study. Although there are other ratios and potentially more specific ratios out there, which deal with the individual accounts affected by the standard differences, the ratios chosen are simple, common, and understandable ratios that can be used in analysis of the differences between U.S. GAAP and IFRS.

Key Takeaways

This paper provides insight in to two key differences between U.S. GAAP and IFRS, R&D expenditures and inventory costing methods. These are not the only differences however, the accounting standards vary in many other ways. Two of these areas are long-lived asset treatment and stock options expense. Overall, U.S. GAAP and IFRS are slowly moving towards convergence, as evidenced by their treatment of revenue recognition and lease treatment, but it is not likely that complete convergence will happen any time soon. The discussion about convergence that grew in the early 2000's has died down in the past few years. U.S. companies appreciate the rules based FASB standards, while IFRS companies appreciate the more principles based IFRS standards, giving managers slightly more discretion in their practices. Financial experts, particularly in the banking world, believe that they would benefit from convergence between standards, as they would not need to make sure they understand all of the nuances and differences between each standard. Instead, they could just focus on the one, unified standard when analyzing companies. This, however, will not likely happen in the near future, and as a result, analysis of the differences and the effects on financial statements can help individuals understand companies in different regions and under different standards better, increasing their overall comparability.

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