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The Value Relevance of Goodwill Impairment and the Impact of Financial Leverage: Evidence from Sweden

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ABSTRACT

The aim of this study is first to examine the value relevance of goodwill impairment losses, and second, to examine the impact of financial leverage on value relevance. Value relevance is defined as the statistical association between the market reaction of earnings announcement and the reported goodwill impairment loss. Goodwill impairment losses are considered value relevant if the association between the market reaction and the reported goodwill impairment loss is statistically significant and non-zero. The sample consists of firms listed on Nasdaq OMX Stockholm with recognized goodwill impairment losses between 2005 and 2013. The value relevance analysis is carried out with two separate multivariate OLS regressions. The results suggest, in contrast to most prior value relevance studies, that goodwill impairment losses on average are non-value relevant for investors on the Swedish equity market. Similarly, goodwill impairment losses are non-value relevant for investors of firms with low financial leverage. However, for firms with high financial leverage, goodwill impairment losses cause a negative market reaction and are considered value relevant by the investors. The value relevance of goodwill impairment is therefore determined by financial leverage. This study therefore supports prior research stating that the market reaction to goodwill impairment becomes more negative with financial leverage. A robustness test is also carried out, suggesting that debt covenants play a crucial part in explaining why value relevance is determined by financial leverage.

Keywords: Value relevance, IFRS, Goodwill, Impairment, Financial leverage.

LIST OF ABBREVIATIONS

IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
IAS	International Accounting Standards
GAAP	General Accepted Accounting Principles
FASB	Financial Accounting Standards Board
SFAS	Statement of Financial Accounting Standards
OLS	Ordinary Least Square
CAR	Cumulative Abnormal Returns
GWIL	Goodwill Impairment Loss

DEFINITIONS

Value relevance	Defined in the literature as the statistical association between accounting amounts and stock market values or returns (Barth, Beaver & Landsman, 2000).
Financial leverage	Defined as total liabilities deflated by shareholders' equity. Financial leverage is therefore used interchangeably with debt equity ratio.

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Background	1
1.2 Purpose and findings.....	4
1.3 Delimitations	5
1.4 Outline of the report.....	5
2. GOODWILL ACCOUNTING UNDER IFRS.....	5
3. PRIOR VALUE RELEVANCE STUDIES.....	7
3.1 Results.....	7
3.2 Methods	11
3.3 Identified gap within research on value relevance	12
4. HYPOTHESIS DEVELOPMENT.....	13
4.1 The value relevance hypothesis.....	13
4.2 The leverage hypothesis	15
5. SAMPLE AND DATA COLLECTION	17
6. METHOD	19
6.1 Research approach to value relevance.....	19
6.2 Regression variables.....	20
6.2.1 Dependent variable	20
6.2.2 Main independent variable.....	23
6.2.3 Control variables	24
6.3 The multivariate OLS regressions	27
6.4 Descriptive statistics	30
6.5 Discussion of econometric issues.....	31
7. RESULTS	33
7.1 The value relevance hypothesis.....	33
7.2 The leverage hypothesis	34
7.2.1 Robustness test	36
8. DISCUSSION OF THE RESULTS	37
9. CONCLUSIONS	40
9.1 Future research	41
REFERENCES	43
Articles	43
Accounting standard setting regulations.....	45
Other sources.....	45
APPENDICES.....	47

1. INTRODUCTION

1.1 Background

In 2002 and 2005, respectively, FASB and IASB, the two most influential accounting standard-setters, decided to change accounting method to finally resolve the long debate of goodwill accounting.

Traditionally, most firms nowadays following IFRS used to amortize goodwill on a straight-line basis¹ (Laghi, Mattei & di Marcantonio, 2013). The amortization method was built on the concept of mean-reverting operating returns (Nissim & Penman, 2001) and it was therefore theoretically sound to systematically decrease the value of the goodwill asset with annual amortization charges. For the individual firm, however, it is difficult to predict when operating returns start to revert towards the mean. The amortization method was therefore conservative, as management of the individual firm could not match the amortization charges with the underlying consumption of the goodwill asset (Hamberg, Paananen & Novak, 2011). Hence, the strength of the amortization method, limiting opportunistic behavior of the individual manager, was also its weakness as the method failed to produce value relevant information. Instead the amortization method created noise and complicated forecasting of future earnings (Jennings, LeClere & Thompson, 2001).

The objective of financial reporting is according to IASB's conceptual framework to: *"provide financial information about the reporting entity that is useful to present and potential equity investors, lenders and other creditors in making decisions about providing resources to the entity"* (IASB conceptual framework, paragraph OB2).

Clearly, the amortization method failed to provide useful financial information, as the goodwill asset did not reflect its underlying economic value and as the annual amortization charges complicated forecasting of future earnings. Hence, the IASB decided in 2005 to abandon the amortization method in favor of a strict and

¹ Local GAAP was used prior to the inception of IFRS and the amortization method was the prevailing accounting method for goodwill in most local GAAPs.

operational impairment method that would make the financial information of the goodwill asset useful (IASB, 2004).

The current impairment method requires the management of the individual firm to test the value of the goodwill asset at a specific annual occasion and when indications of a value decrease in the goodwill asset exist (IAS 36). If the impairment test indicates that the book value of the goodwill asset exceeds the recoverable amount², the goodwill asset must be impaired. The goodwill asset capitalized in the balance sheet represents excess future cash flows (Hamberg, et al, 2011) and the excess cash flows could in theory last for a few years or as long as infinite. Consequently, the impairment method has a strong theoretical foundation, as the value of the goodwill asset only should decrease if the excess future cash flows would decrease. Impairment of goodwill can therefore be said to be a source of communication through which management makes private information of a firm's future prospects public³. The value relevance of goodwill impairment losses is therefore not direct but rather indirect as investors and analysts revise their earnings expectations based on the information conveyed by the impairment test (Li, Shroff, Venkataraman & Zhang, 2011).

Joint studies on the value relevance of goodwill impairment provide support for the new impairment model (Xu, Anandarajan & Curtola, 2011; AbuGhazaleh, Al-Hares & Haddad, 2012; Lapointe-Antunes, Cormier & Magnan, 2009). The studies suggest that the impairment method produces value relevant information in contrast to the former amortization method (KPMG, 2014; Jennings et al., 2001). However, opponents of the impairment method criticize the new method of being complex and highly subjective (Liberatore & Mazzi, 2010). One particular concern is that the management of the firm performs the impairment test of the goodwill asset. Hence, the impairment method opens up for management taking a "bath" in order to enhance future year's earnings (Zang, 2008). The freedom of the impairment method can therefore risk distort the value relevance of the goodwill impairment losses. Prior research also indicates that management tends to delay the reporting of impairment losses (Francis, Hanna & Vincent, 1996; Gu and Lev, 2011; Li et al.,

² The recoverable amount is defined as the higher of fair value less costs of disposal and value in use

³ Goodwill impairment is said to have a signaling value.

2011) and an article by Laghi et al., (2013) finds goodwill impairment losses to be non-value relevant except for in periods of significant financial distress. Hans Hoogervorst, chairman of the IASB, has also added fuel to the value relevance discussion by stating that the “*impairment tests do not always seem to be done with sufficient rigour*” (Hoogervorst, 2012, p.2), and that in many cases “*share prices reflect the impairment before the company records it on the balance sheet*” (Hoogervorst, 2012, p.2). It is therefore uncertain if the impairment method is value relevant and thus fulfills the objective of the financial reporting stated in the conceptual framework.

Prior research also indicates that the value relevance of goodwill impairment losses vary depending on firm specific conditions. Such firm specific conditions include profitability (Xu et al., 2011), the relative size of the impairment (Li, Amel-Zadeh & Meeks, 2010) and financial leverage (Zang, 2008).

Financial leverage is a particularly interesting variable because the economies of today are characterized by quantitative easing and record low bond yields (The Economist 2014). Hence, it is reasonable to assume that the cheap financing that debt markets currently offer will attract firms when future acquisitions are undertaken. The goodwill asset capitalized on the balance sheet is a result of past acquisitions, and acquisitions are in turn often financed with debt (Denis & McKeon, 2010). Hence, the goodwill asset is in many cases a driver of financial leverage. If the goodwill asset fails to produce the expected excess future cash flows, impairment losses are eventually inevitable, and as a result shareholders’ equity will decrease. However, the debt used to finance the acquisition will remain unchanged, and thus financial leverage will increase if goodwill is impaired. The origin of the goodwill asset and potential impairment losses can therefore distort the capital structure of companies. Public and private debt can also be issued with debt covenants that are assumed to be more common in firms with high financial leverage (Duke & Hunt, 1990). Debt covenants could therefore be violated if they are affected by goodwill impairment losses (Zang, 2008), and violated debt covenants could decrease cash flows, and thus decrease market value of equity. One could therefore expect the value relevance of goodwill impairment losses to differ depending on the amount of financial leverage carried by the firm.

1.2 Purpose and findings

Accounting standards should help financial users in their decision-making and value relevant financial information is therefore a requirement. The implementation of the impairment method was meant to increase the value relevance of the goodwill asset; however, as for now, it is uncertain if the new impairment method is value relevant and thus satisfies the objective of financial reporting. Prior research also indicates that the value relevance of goodwill impairment losses is determined by firm-specific conditions (Xu et al., 2011; Li et al., 2010; Zang, 2008), and with the current debt markets it would be interesting to examine if financial leverage is a determinant of value relevance. Consequently, the purpose of this study is twofold. The study aims firstly to examine the value relevance of goodwill impairment losses, and secondly to examine the impact of financial leverage on value relevance. This study is important, as it will help clarify if investors find the impairment method value relevant and if the value relevance of goodwill impairment is affected by financial leverage.

The value relevance analysis is carried out with two separate multivariate OLS regressions. Value relevance is defined in this study as the statistical association between the market reaction of the earnings announcement⁴ and the reported goodwill impairment loss. Goodwill impairment losses are considered value relevant if the association between the market reaction and the reported goodwill impairment loss is significant and non-zero. The goodwill asset, on the other hand, is only considered value relevant if the association between the market reaction and the reported goodwill impairment loss is negative and significant.

The sample consists of firms listed on Nasdaq OMX Stockholm and the results indicate that goodwill impairment losses on average are non-value relevant for investors on the Swedish equity market. The results also hold true for investors of firms with low financial leverage⁵. However, for firms with high financial leverage⁶, goodwill impairment losses cause a negative market reaction and are considered value relevant by investors. The results therefore suggest that the value relevance of

⁴ Impairment of goodwill is released in the quarterly reports. Hence the market reaction of the earnings announcement is examined.

⁵ Defined as debt equity ratio below 1.52 in this study.

⁶ Defined as debt equity ratio above 1.52 in this study.

goodwill impairment, and thus the goodwill asset, is determined by financial leverage. This study therefore provides partial support for the impairment method.

1.3 Delimitations

The study is delimited to the Swedish equity market, and more specifically to firms listed on Nasdaq OMX Stockholm with reported non-zero goodwill impairment losses from 2005 to 2013. The data is considered cross-sectional and each goodwill impairment loss is therefore assumed to be unaffected by time. Prior studies indicate that several firm specific variables can impact the value relevance of goodwill impairment losses. This study, however, focuses solely on financial leverage as a firm specific variable, because a limited number of studies have been performed on the area.

1.4 Outline of the study

This study is structured in nine sections, including the introduction. The study will continue with the second section presenting the current goodwill accounting rules under IFRS. The study will then continue with the third section discussing prior value relevance studies. Thereafter, the fourth section describing the development of the hypotheses is presented, followed by the fifth section of sample and data collection and the method as the sixth section. Furthermore, the seventh section presents the results, which are discussed in the eighth section to the background of the hypotheses and the prior value relevance studies. The study finally ends in the ninth section presenting the conclusions.

2. GOODWILL ACCOUNTING UNDER IFRS

The goodwill asset capitalized in the balance sheet is a result of past acquisitions, and more specifically the acquisition premium, which is paid to acquire the target firm. IFRS 3 states that the goodwill asset is equal to the residual of the acquisition price and the fair value of the net assets identified in the target firm. Goodwill is therefore an unidentifiable asset that can be described as excess future cash flows

(Hamberg et al., 2011), a result of synergy effects that are expected to arise when the assets of the acquirer and the assets of the target are combined.

The identified goodwill should be allocated to one or several cash-generating units that are expected to benefit from the synergies (IAS 36). The cash-generating unit is the smallest group of assets within the firm, which independently generates cash flows (IAS 36). Conversely, the largest cash-generating unit to carry goodwill is that of an operating segment (IAS 36, IFRS 8).

According to IAS 36, the goodwill asset is considered to have an indefinite useful life, meaning that the excess future cash flows in theory could last for infinite. However, IAS 36 requires the management of the firm to test the goodwill asset of each cash-generating unit for impairment both annually and whenever there is an indication of a reduction in the excess future cash flows.

If the recoverable amount of the cash-generating unit falls short of the carrying amount, an impairment loss must be recognized. The recoverable amount is defined as the higher of the fair value less costs of disposal and the value in use (IAS 36). Presumably, few or no cash-generating units are traded on any active markets, and therefore should no fair value exist. Hence, the value in use is compared to the carrying amount. The value in use is the present value of the cash flows expected to be generated by the cash-generating unit, and consequently both internal and external factors determine if an impairment loss should be recognized (IAS 36). Internal factors include failure to materialize the excess future cash flows and external factors include the required rate of return that investors demand on the capital markets.

A recognized impairment loss is first allocated to the goodwill asset of the cash-generating unit and the remaining impairment amount is then allocated to the other assets of the cash-generating unit. Unlike regular write-offs, a goodwill impairment loss cannot be reversed (IAS 36).

3. PRIOR VALUE RELEVANCE STUDIES

3.1 Results

Most prior value relevance studies agree on that the current impairment method is value relevant and that the association between the share price and the goodwill impairment loss is negative (AbuGhazaleh et al., 2012; Lapointe-Antunes et al., 2009; Li, et al., 2011; Li et al., 2010). However, Liberatore and Mazzi (2010) find in their study of long-term effects that the market reaction is more negative prior to the goodwill impairment loss announcement and that the market tends to reabsorb post the announcement. A more striking result by Laghi et al., (2013) suggests that goodwill impairment losses only are relevant in periods of significant financial distress. The study by Laghi et al., (2013) also examines country specific value relevance in Europe. The results indicate that goodwill impairment losses only are value relevant in France and non-value relevant in Germany, Italy, Spain, Portugal and the UK. Moreover, Cao, Goedhart and Koller (2014) find that out of 99 impairment losses of at least \$2 billion, half of the cases showed a negative reaction while the other half showed either a positive or a neutral reaction. The two latter studies indicate that investors can react differently to goodwill impairment losses and that macroeconomic circumstances is one reason.

Li et al., (2010) find that firms with a larger goodwill-asset ratio have a greater negative association compared to firms with a smaller ratio. Laghi et al., (2013) and Fahlqvist and Sennerstam (2014) also study value relevance related to size, but explore goodwill impairment in relation to total goodwill. The results of these two studies suggest that the negative market reaction in the share price due to the goodwill impairment loss is larger for firms with a lower goodwill impairment ratio. All three studies conclude that size determines how the share price is affected by goodwill impairment.

Similarly to other studies, Xu et al., (2011) find a negative association between share price and goodwill impairment. However, Xu et al., (2011) also examine how profitability impacts the association, and the results show that goodwill impairment losses are negatively associated with share price for profitable firms and positively associated with share price for unprofitable firms. Xu et al., (2011) conjecture that

goodwill impairment losses in the unprofitable firms can be viewed as a restructuring announcement that investors react positively to. The article by Xu et al., (2011) can therefore help explain why investors react as differently as suggested by Cao et al., (2014).

Zang (2008) examines financial strength from a debt perspective with leverage defined as total debt deflated by total assets. The findings suggest that highly leveraged firms are more reluctant to recognize impairment losses, and that the association between goodwill impairment losses and cumulative abnormal returns⁷ (CAR) is more negative for firms with high leverage compared to firms with low leverage. Hence, value relevance of goodwill impairment is dependent on the leverage carried by the individual firm.

Zang (2008) argues that debt covenants, which are assumed to be more common in highly leveraged firms, provide managers with incentives to avoid recognizing impairment losses. Violated debt covenants due to goodwill impairment losses can affect a firm's future financing and investment decisions negatively, which in turn can have a negative impact on the share price. However, not all debt covenants are affected by goodwill impairment losses, and interestingly Zang (2008) finds in his robustness test that firms with high leverage and debt covenants unaffected by goodwill impairment losses still are reluctant to impair. A theoretical framework built solely on debt covenants can therefore not fully explain why highly leveraged firms are unwilling to impair goodwill.

Concerning the value relevance of goodwill impairment, Zang (2008) assumes that the debt covenant theory explains why the negative association between the goodwill impairment loss and the cumulative abnormal returns becomes greater with leverage. However, as no test for the covenant theory is performed, the findings of Zang (2008) cannot guarantee that investors' market reaction to goodwill impairment is fully attributable to an increased tightness of debt covenants. Hence, until a test of the debt covenant theory is performed it is not possible to exclude other factors from explaining why the market reaction becomes more negative with leverage.

⁷ CAR is in the study of Zang (2008) a measure for the market reaction of the earnings announcement.

As seen in table 1, most prior value relevance studies are conducted on the U.S equity market and examines the FASB impairment method that was introduced with SFAS 142 in 2002. The results from these studies should still be valid for IFRS firms because the IASB and FASB impairment methods are similar in nature, although they can produce slightly different results (Bini & Penman, 2013). It is evident from a study by Bini and Penman (2013) that firms following IFRS tend to generate smaller but more frequent impairment charges in contrast to firms following US GAAP. This could potentially have an impact on the association between goodwill impairment losses and share price because Laghi et al., (2013) and Fahlqvist and Sennerstam (2014) find that size determines the reaction in the share price. Smaller impairments tend to generate a greater reaction in the share price compared to larger impairments. As IFRS firms tend to generate smaller impairment losses (Bini and Penman, 2013), this could imply that the regression coefficient measuring the association between the goodwill impairment loss and the share price could be larger in absolute terms for IFRS firms compared to US GAAP firms. Nonetheless, most value relevance studies suggest a negative regression coefficient between goodwill impairment losses and share prices for firms reporting under both regulations. Hence, one should be able to generalize value relevance studies using either the FASB or IFRS impairment model.

Most of the studies use an observation period near 2002 or 2005, corresponding to the implementation of the two impairment models. Hamberg et al., (2011) state that the adoption of new accounting standards can be driven by individual- and firm-specific incentives, leading to so called transitional effects, which in turn could impact the results of studies that fully or partially rely on transitional data. The adoption of SFAS 142 illustrates the possibility of transitional effects. The initial task for managers after the adoption of SFAS 142 was to allocate goodwill to reporting units. SFAS 142 required managers to allocate goodwill in a manner that was “*reasonable and supportable*” (SFAS 142, paragraph 32-35), meaning that managers had to use their subjective judgment to carry out the allocation. The initial allocation of goodwill therefore opened up to big-bath accounting, as managers who wished to minimize the initial impairment loss would allocate as much goodwill as possible to reporting units with a carrying value and an implied fair value of the goodwill asset high enough to pass the impairment test. Conversely, managers who wished to

Table 1. Key facts of prior value relevance studies.

Authors	Journal	Published	Accounting regulation	Time period	Market	GWIL Observations	Method
AbuGhazaleh, N., Al-Hares, O & Haddad, A	International Journal of Economics and Finance	2012	IFRS	2005 - 2006	UK	109	Regression
Cao, B., Goedhart, M., Koller, T	McKinsey Global Institute	2014	FASB (prior SFAS 142)	2007 - 2011	US	99	N/A
Fahlqvist & Sennerstam	--	2014	IFRS	2006 - 2012	Europe	1758	Regression
Jennings, R., LeClere, M & Thompson, R	Financial Analysts Journal	2001	FASB (prior SFAS 142)	1993 - 1998	US	N/A	Regression
Laghi E., Mattei, di Marcantonio, M	International Journal of Economics and Finance	2013	IFRS	2008 - 2011	Europe	N/A	Regression
Lapointe-Antunes, P., Cormier, D & Magnan, M	The International Journal of Accounting	2009	FASB (post SFAS 142)	N/A	Canada	342	Regression
Li, K., Amel-Zadeh, A & Meeks	--	2010	FRS 11	1997 - 2002	UK	87	Regression and CAR
Li, Z., Shroff, P., Venkataraman, R & Zhang, I. X	Review of Accounting Studies	2011	FASB (post SFAS 142)	2002 - 2006	US	854	Regression
Liberatore, G & Mazzi, F	Advances in Accounting, incorporating Advances in International Accounting	2010	IFRS	2005 - 2008	Europe	N/A	CAR
Xu, W., Anandarajan, A & Curatola, A	Research in Accounting Regulation	2011	FASB (post SFAS 142)	2003 - 2006	US	431	Regression
Zang, Y	Review of Accounting and Finance	2008	FASB (prior and post SFAS 142)	2001 - 2003	US	255	Regression

Notes: Eight of the articles on value relevance have been published in accounting journals, and the risk of those articles providing an incorrect picture of goodwill impairment as a research phenomenon should be low, as the articles have been reviewed. The article by Li et al., (2010) and the master thesis by Fahlqvist and Sennerstam (2014) are unpublished and are therefore not assessed as thoroughly as the earlier mentioned articles. All ten studies share, however, a common objective, which is to contribute to accounting research. The article by Cao et al., (2014) is published by McKinsey's Global Institute and the research is therefore conducted to render knowledge that can be sold as consulting services, and not to contribute to accounting research. Consequently, the results of Cao et al., (2014) must be evaluated to this background.

maximize the initial impairment loss would allocate the goodwill in the opposite way (Zang, 2008). The results of studies that examine the transition phase, such as Zang (2008) and AbuGhazaleh et al., (2012), could therefore differ to the results of studies with time periods stretching beyond the transition phase.

3.2 Methods

Zang (2008), Fahlqvist and Sennerstam (2014), Li et al., (2010) and Liberatore and Mazzi (2010) adopt an event study methodology to study the market reaction of goodwill impairments. Zang (2008) and Fahlqvist and Sennerstam (2014) are the only two studies to examine the short-term behavior of investors, using an event window of three and five days respectively. The method used by Fahlqvist and Sennerstam (2014) can, however be questioned as the impairment observations are based on information from annual reports, although the information on goodwill impairment losses most often are released in the quarterly reports. The method enables the authors to collect a rich sample, as seen in table 1, but at the cost of validity as the incorrect announcement effect is examined. Liberatore and Mazzi (2010) and Li et al., (2010) use a longer time perspective with the shortest event window of 101 and 131 days, respectively. According to MacKinlay (1997), the largest effect in cumulative abnormal return occurs close to the event. A longer event window increases the possibility of capturing abnormal returns that are due to other events than the goodwill impairment loss announcement. One can therefore question the method of Liberatore and Mazzi (2010) and Li et al., (2010). To conclude, the method of Zang (2008), although possibly affected by transitional effects, should best reflect the short-term behavior of investors.

The distribution of the goodwill impairment loss observations used in the studies is wide, but it can be attributable to the different time periods, different samples and different analysis methods. Several studies include zero-goodwill impairments in addition to the non-zero goodwill impairment losses (e.g. AbuGhazaleh et al., 2012; Laghi et al., 2013; Lapointe-Antunes et al., 2009 & Zang, 2008). The rationale for including zero-goodwill impairments is that any outcome of the impairment test has a signaling value that potentially could affect the market reaction of the investors. Including zero-goodwill impairments could possibly affect the results. Laghi et al., (2013) find that goodwill impairment losses are value relevant in the UK when non-

zero goodwill impairment losses are included. However, goodwill impairment losses are non-value relevant when only non-zero goodwill impairment losses are examined.

Concerning analysis methods, all studies, except for Liberatore and Mazzi (2010) and Li et al., (2010) use multivariate OLS regressions to examine the value relevance of goodwill impairment losses. Four of the multivariate OLS regressions (AbuGhazaleh et al., 2012; Xu et al., 2011; Lapointe-Antunes et al., 2009; Laghi et al., 2013) are based on a valuation framework by Ohlson⁸ that relates valuation and accounting numbers (Lo and Lys, 2000). The Regressions based on Ohlson's valuation framework use market value of equity, or share price, as the dependent variable and book value of equity, earnings and the goodwill impairment loss as independent variables. The study of Zang (2008) adopts an event study methodology and uses the market reaction, CAR, as the dependent variable and goodwill impairment losses as the main independent variable, along with other independent variables controlling for profitability, growth, momentum and risk.

The difference between the OLS regressions based on the Ohlson valuation framework and that of Zang (2008) is that the former examines how accounting numbers, including the goodwill impairment, are associated with market value while the latter examines how goodwill impairment and various other control variables are associated with the market reaction of investors surrounding the earnings announcement. A more technical difference between the two types of OLS regressions is the difference in explanatory power (R-squared). The studies of AbuGhazaleh et al., (2012) and Xu et al., (2011) report an R-squared of 76.57% and 68.60%, respectively, compared to the R-squared of only 2.64% in the study of Zang (2008).

3.3 Identified gap within research on value relevance

Zang (2008) is the only prior value relevance study to examine leverage as a firm specific variable. As the results of Zang (2008) are aging and could be affected by

⁸ See Ohlson, James A. (1995). Earnings, Book values and Dividends in Equity Valuation. *Contemporary Accounting Research*; Spring 1995; 11, 2; ABI/INFORM Global pg. 661.

transitional effects (Hamberg et al., 2011), a new study on leverage would be beneficial. The multivariate OLS regression adopted by Zang (2008) also differs from the multivariate OLS regressions of a majority of the prior value relevance studies that are based on a valuation framework by Ohlson. A study adopting a similar multivariate OLS regression as Zang (2008) could therefore help verify his results. Moreover, the study of Zang (2008) is like most prior value relevance studies conducted on the U.S equity market, and as suggested by Laghi et al., (2013), the value relevance of goodwill impairment could be affected by country specific differences. Hence, a study exploring a different equity market could possibly render different results, and thus new contributions to research on value relevance. Finally, as Zang (2008) does not test the theory about debt covenants, such a test could provide new insights on how leverage impacts value relevance.

4. HYPOTHESIS DEVELOPMENT

4.1 The value relevance hypothesis

The efficient market hypothesis states that all available information should be reflected in the market prices (Fama, 1970). Therefore, it is theoretically impossible to make abnormal returns by exploiting information about a particular event such as a goodwill impairment loss announcement unless the market is not fully efficient. However, most prior value relevance studies suggest a negative association between goodwill impairment losses and share prices for firms following IFRS and U.S GAAP (e.g. AbuGhazaleh et al., 2012; Xu et al., 2011). One must therefore consider to what extent the efficient market hypothesis is valid. Fama (1970) defines three levels of efficiency; weak form, semi-strong form and strong form. The weak form states that the historical information is reflected in market prices. The semi-strong form states that all publicly traded information is reflected in market prices and the strong form states that both private and public information is reflected in market prices (Fama, 1970). Based on the empirical evidence, a requirement for the impairment model to produce value relevant information is neither a weak nor a strong form of market efficiency. This study therefore assumes semi-strong market efficiency in line with most capital market research in accounting (Deegan & Unerman, 2006).

Stock markets are forward looking and driven by expectations, and therefore it is only unexpected goodwill impairment losses, not priced into the current market valuation, that can cause a market reaction (Zang, 2008). Goodwill represents excess future cash flows and prior research suggests that investors consider capitalized goodwill to be value relevant as the association between firm value and goodwill is found to be positive (Dahmash, Durand & Watson, 2009; Hamberg et al., 2011; Jennings, Robinson, Thompson & Duvall, 1996). Hence, one could expect investors to react negatively to goodwill impairment losses, because a decrease in the goodwill asset represents a reduction in the future economic benefits. Goodwill impairment losses should therefore be value relevant for investors.

However, a positive or neutral market reaction of goodwill impairment losses could also occur for several reasons. First, if the goodwill impairment loss is priced into the market valuation prior to the impairment announcement, a lower than expected goodwill impairment loss should result in a positive or neutral market reaction as the market has overestimated the actual goodwill impairment loss. Second, a study by Francis, Hanna and Vincent (1996) indicates that markets react positively to restructuring announcements, and goodwill impairment losses may be viewed as such restructuring announcements according to Xu et al., (2011). An example could be goodwill impairment losses attributable to questionable acquisitions. The market can view the information of such impairment losses as a positive sign of management finally giving up on projects that has proven unprofitable and that would continue to prove unprofitable in the future. Third, prior research suggests that information asymmetry could be a decisive factor in determining the market reaction of goodwill impairment losses (Bens, Heltzer & Segal, 2011). Firms with low information asymmetry between investors and managers should therefore react neutral or weaker to goodwill impairment losses compared to goodwill impairment losses in firms with high information asymmetry. Fourth, empirical evidence by Laghi et al., (2013) suggests that goodwill impairment losses only are value relevant in periods of significant financial distress. Hence, most goodwill impairment losses cause no market reaction.

Although the market reaction is likely to vary depending on firm-specific circumstances, most empiric and theoretical evidence points towards goodwill impairment losses as being value relevant, causing a negative market reaction.

H1: Goodwill impairment losses are value relevant and cause a negative market reaction.

4.2 The leverage hypothesis

Prior research also suggests that the association between goodwill impairment losses and share prices depends on firm specific conditions such as profitability, size and leverage (Li et al., 2010; Xu et al., 2011; Zang, 2008). Financial leverage distinguishes itself from profitability and size because financial leverage is often a product of the acquisitions, which drive the amount of capitalized goodwill. Financial leverage is also a variable that could influence management's likelihood to impair goodwill, as private and public debt often is issued with debt covenants. If firms violate existing debt covenants, it is possible that the firms must pay an increased interest rate or repay the debt at a shorter maturity. Violated debt covenants can therefore decrease cash flows, increase default risk and hinder future investment opportunities, and thus reduce market capitalization. Consequently, managers have strong incentives to avoid or minimize goodwill impairment losses that increase the tightness of existing debt covenants (Zang, 2008).

All debt covenants are, however, not affected by goodwill impairment losses. In general debt covenants can be divided into two categories; affirmative and negative. Affirmative debt covenants include certain levels of accounting based ratios such as debt equity and profitability ratios that the firm is required to maintain (Sweeney, 1994). Negative debt covenants, on the other hand, include boundaries for investment and financing activities such as limitations on dividends (Sweeney, 1994). In practice, firms are more likely to violate affirmative covenants as negative covenants only can be violated from corporate actions by management itself. Affirmative covenants on the other hand, are affected by operating performance and goodwill impairment losses if the debt covenant is based on accounting ratios that include equity or net income.

A common assumption in accounting research is that firms with high leverage should be closer to violating existing debt covenants compared to firms with low leverage (DeFond & Jiambalvo, 1994). The assumption is not perfect as highly leveraged firms still can be financially strong and thus be far from their debt constraints (DeFond & Jiambalvo, 1994). However, a study by Duke and Hunt (1990) suggests that financial leverage, measured as total debt over shareholders' equity, is an appropriate proxy for the existence and tightness of debt covenants affected by retained earnings. Impairment of goodwill flows into the retained earnings and based on the assumption of financial leverage as a proxy for the existence and the tightness of debt covenants, goodwill impairment losses in firms with high financial leverage should bring those firms closer to their debt constraints compared to impairment losses in firms with low financial leverage. The closer a firm is to its debt constraints, the more likely the firm is to violate existing debt covenants, and violation of debt covenants could decrease market value. Hence, investors' market reaction to goodwill impairment losses should be greater in firms with high financial leverage compared to goodwill impairment losses in firms with low financial leverage. The argument is also supported by the results of Zang (2008).

Apart from the debt covenant theory, another implication could be that goodwill impairment losses cause a decrease in the net income, and thus lower shareholders' equity. Hence, goodwill impairment losses cause financial leverage to increase. Moreover, the increase in financial leverage will be relatively stronger for firms with already high financial leverage, because the equity base is smaller prior to the goodwill impairment loss. Assuming all else equal, an increase in financial leverage following a goodwill impairment loss should have at least three consequences.

First, if the financial performance, measured as return on assets, remains constant, financial leverage will determine a larger portion of the future return on equity⁹. Consequently, the earnings volatility should increase and thus the possibility of negative earnings surprises (Allayannis & Weston, 2003). Barnes (2001) finds that firm value is negatively associated with earnings volatility, meaning that a goodwill impairment loss that increases financial leverage should impact firm value negatively. Second, the cost of debt should remain fixed in the short run, however if

⁹ $ROE = ROA + \left[(ROA - R_d) \times \frac{D}{E} \right]$

a firm issues new public debt or raises new private debt, presumably the increase in financial leverage will result in a higher long-term cost of debt. Since markets are forward looking, the potential long-term increase in the cost of debt is presumably priced immediately after the goodwill impairment announcement. Finally, a third potential consequence of the increase in leverage is that debt markets will require stricter surety for new debt. Hence, an impairment loss could not only tighten current debt constraints, but also increase the likelihood of future debt covenants.

The arguments suggest that investors should react negatively to an increase in financial leverage caused by goodwill impairment losses. As firms with high financial leverage are affected to a greater extent by goodwill impairment losses, the market reaction should become stronger with financial leverage.

H2: Goodwill impairment losses cause a larger negative market reaction in firms with high financial leverage compared to firms with low financial leverage.

5. SAMPLE AND DATA COLLECTION

Most studies on the value relevance of goodwill impairment examine the U.S equity markets (see table 1). This study contributes with data from the Swedish equity market. The sample therefore consists of firms listed on Nasdaq OMX Stockholm (OMXS) for the time period 2005 to 2013. OMXS is a well-suited market for this study as it includes a wide range of firms with regard to both size and industry. The database Datastream was used to identify 293 listed firms constituting the Nasdaq OMX Stockholm as of 24th February, 2015.

Historical information on annual goodwill impairments for the 293 listed firms was retrieved from Datastream. The method of this study requires only firms with goodwill impairment losses. Hence, after deducting firms with zero goodwill impairment losses in any of the nine years, 171 firms are removed, thus leaving a sample of 122 firms with at least one annual goodwill impairment loss over the nine year period. Moreover, 18 of the 122 firms are removed because of dual-class shares. Finally, 27 firms with annual goodwill impairment losses are removed,

because of inaccurate or missing data in the database Datastream. Hence, the impairment sample consists of 77 firms.

Table 2. The sample selection process.

	Firms
OMXS (as listed by <i>DataStream</i> at 2015-02-24) for the financial years 2005 – 2013	293
Firms with zero goodwill impairment losses	-171
Firms with dual class shares	-18
Firms with insufficient/missing data	-27
Firms in the final goodwill impairment loss sample	77

Notes: The sample firms are listed in appendix 4.

Impairment of goodwill is recognized in the quarterly reports. The annual goodwill impairment loss listed by Datastream could therefore consist of four quarterly impairment losses. The method of this study requires the exact date of the goodwill impairment loss to derive the market reaction of the investors. The primary interest therefore lies in the quarterly goodwill impairment losses. Hence, the four quarterly reports, constituting each annual goodwill impairment loss as listed by Datastream, were retrieved from the sample firm's website.

Some firms, especially large cap firms, tend to only report goodwill impairment losses in the annual report. The annual report is an aggregation of the four quarterly reports, meaning that the goodwill impairment loss must already be recorded in the financial statements prior to the release of the annual report. However, it can be difficult to identify in which quarter goodwill has been impaired because value changes in the goodwill asset are not always specified in the quarterly report. When it is impossible to determine the quarter including the goodwill impairment loss, the goodwill impairment loss listed in the annual report is used. Goodwill impairment losses from annual reports represent 19.1% of the observations as seen in table 3.

After having manually extracted the goodwill impairment losses from the quarterly and the annual reports, the final sample consists of 188 goodwill impairment loss

observations. Hence, some of the 77 firms impair goodwill on several occasions throughout the nine-year time period.

Table 3. The distribution of the final goodwill impairment loss sample between the financial reports.

	Q1	Q2	Q3	Q4	AR
Reported goodwill impairment loss	5.3%	9.6%	19.7%	46.3%	19.1%

From the retrieved quarterly and annual reports, information on net income, shareholders' equity and total debt were collected in addition to the goodwill impairment losses. The announcement date of the annual or quarterly report was collected from either the report itself or from press releases of the report. The databases Datastream and Bloomberg were also used to collect data on adjusted close prices, market capitalization, annual revenue and return on equity.

Information on debt covenants was also collected for each of the 188 goodwill impairment loss observations. The information on debt covenants is based on the annual report including the goodwill impairment loss. The firms that do not explicitly state that they have debt covenants are assumed to have none.

6. METHOD

6.1 Research approach to value relevance

Studies that examine the value relevance of goodwill impairment can be divided into two research approaches. The first approach, the information content, studies the short-term market reaction caused by the goodwill impairment loss announcement (AbuGhazaleh et al., 2012). The rationale behind the approach is that if the market reacts to the goodwill impairment announcement, the accounting information is considered value relevant by the investors.

The issue with the information content approach is, however, that impairment of goodwill most often is included in the earnings announcement of the quarterly

report. Hence, it is difficult to examine the sole market reaction of the goodwill impairment loss. The issue can, however, be solved if a regression estimator is used to examine the association between the overall market reaction of the earnings announcement and the goodwill impairment loss.

The second approach, the association, uses regression estimators to study the association between the reported goodwill impairment loss and market value of equity or share price (AbuGhazaleh et al., 2012). The association approach can therefore explain if investors incorporate goodwill impairment losses in the equity valuation over a longer time perspective, and thus explain if goodwill impairment is considered value relevant by investors.

This study adopts the information content approach and examines the association between the short-term market reaction of the earnings announcement and the goodwill impairment loss. The data analysis is carried out with two separate multivariate OLS regressions that are based on regression variables similar to those of Zang (2008).

6.2 Regression variables

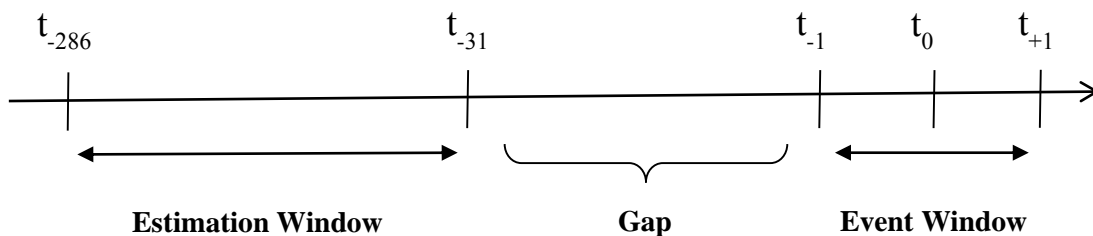
6.2.1 Dependent variable

MacKinlay (1997) argues that an event study methodology is appropriate in order to measure the market reaction of earnings announcements. Goodwill impairment losses are primarily released in earnings announcement of the quarterly reports. Hence, this study adopts an event study methodology to derive the market reaction of the earnings announcement. However, goodwill impairment losses can also be released in the annual report that also conveys information on earnings, although obsolete information. This study will however not distinguish between the earnings announcement of the quarterly report and the earnings announcement of the annual report. Both are included in the definition of earnings announcement. The event under study is therefore the release of the quarterly or the annual report that convey information on earnings as well as goodwill impairment.

To measure the impact of the event, it is necessary to define an event window to isolate the market reaction. A shorter event window increases the likelihood of measuring the direct effect of the event (MacKinlay 1997). However, information of the event can always leak prior to the announcement date (t_0) and it is therefore recommended to include a few trading days prior to the event. Including a few trading days post the event is also recommended, because the market reaction could also be delayed (MacKinlay, 1997). Similarly to the study of Zang (2008), the event window is set to three trading days.

This event study adopts a statistical model¹⁰ to derive the market reaction. The statistical model requires a set of parameters that are derived based on historical data prior to the event window. Hence, an estimation window is required in addition to the event window. The estimation window is set to 255 trading days, with 30 trading days separating the event window from the estimation window. The gap between the two windows ensures that the earnings announcement, does not bias the calculation of the parameters.

Figure 1. Illustration of the event study structure.



To measure the market reaction of the earnings announcement, the event study methodology distinguishes between actual and expected return (MacKinlay, 1997). All shares are expected to provide investors with positive returns; otherwise it would not be rational to invest in the first place. However, shares do not always yield what is expected, and the foundation of the event study is to compare the actual return with the expected return of the individual share (i). The difference between the two return measures is defined as the abnormal return, which indicates if the individual share has performed better or worse than expected.

¹⁰ The statistical model is later referred to as the market model

$$Abnormal\ return_i = Actual\ return_i - Expected\ return_i \quad (1)$$

The actual return of the individual share is defined as the daily return over the event window using adjusted close prices¹¹.

$$Actual\ return_i = \frac{P_{it_0} - P_{it_{-1}}}{P_{it_{-1}}} \quad (2)$$

Where:

P_{it} = adjusted close price for share i at time t.

The expected return of the individual share is calculated on a daily basis over the event window using the market model. The market model states that the expected return of the individual share primarily depends on the return of the market portfolio and the beta of the individual share (MacKinlay, 1997). In this study, the market portfolio constitutes all listed firms on Nasdaq OMX Stockholm, and the return of the market portfolio is defined as the daily return (equation 2 but for OMXS) over the event window using adjusted close prices.

$$Expected\ return_i = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (3)$$

Where:

α_i = intercept for share i

β_i = Beta for share i

R_{mt} = daily return of the market portfolio m (OMXS) at time period t

ε_{it} = zero mean disturbance term for share i at time period t

For the individual share, the market model parameters alpha and beta are derived with an OLS regression. The return of the individual share is used as the dependent variable and the return of the market portfolio is used as the independent variable in the OLS regression. The return of the market portfolio and the return of the individual share are based on daily returns (equation 2) over the estimation window. The zero mean disturbance term is assumed to be zero for the individual share.

¹¹ The adjusted close price takes corporate actions such as stock splits and dividends into consideration.

One single abnormal return does not provide much information of the event of interest. Hence, the daily abnormal returns of the individual share are aggregated over the three-day event window to derive the more informative cumulative abnormal return (CAR).

$$CAR_i = \sum_{t_{-1}}^{t_1} Abnormal\ return_i \quad (4)$$

The CAR of the individual share represents the short-term market reaction of investors to the earnings announcement, and is used as the dependent variable in the regression.

6.2.2 Main independent variable

According to Zang (2008), it is only unexpected goodwill impairment losses that can cause a market reaction. However, it is usually difficult for investors to anticipate goodwill impairment losses as they are a result of managerial discretion (Zang, 2008). This study therefore assumes the entire recognized goodwill impairment loss as unexpected.

The recognized goodwill impairment loss is measured in absolute value. Absolute value, however, provides no information of the relative size or the relative importance of the recognized goodwill impairment loss. The recognized goodwill impairment loss is therefore deflated by total assets to prevent the absolute size of the impairment loss from distorting the regression results. The operationalized variable is named GWIL and serves as the main independent variable in the regressions.

$$GWIL_i = \frac{Recognized\ goodwill\ impairment\ loss_{it_0}}{Total\ assets_{it_0}} \quad (5)$$

Where:

t_0 = the announcement date

6.2.3 Control variables

Proper inference about the value relevance of goodwill impairment can only be drawn if the two multivariate OLS regressions are unbiased. The zero conditional mean assumption¹² states that a multivariate OLS regression only can be unbiased if the regression includes all independent variables that correlates with the dependent and the main independent variable (Wooldridge, 2014).

The multivariate OLS regressions of this study will therefore control for return on equity, long-term growth, beta, size, market to book value and momentum, which all are confounding variables that otherwise could bias and distort the association between the market reaction of the earnings announcement and the reported goodwill impairment loss. The control variables are appropriate for the multivariate OLS regressions of this study because prior research suggest that the variables are related with equity valuations or share returns, and thus CAR. Similar control variables are also found in the multivariate OLS regression of Zang (2008).

6.2.3.1 Return on equity

Investors are primarily interested in the earnings announcement of the quarterly reports. The interest in earnings results in expectations that are priced into the market valuation prior to the release of the quarterly report. Consequently, it is only unexpected earnings announcements that can cause a market reaction. A common method to control for the market reaction of the unexpected earnings announcements is to compare analyst earnings forecasts with the reported earnings. Datastream, however, provides no or insufficient data on analyst earnings forecasts for a majority of the sample firms. Using analyst earnings forecasts is therefore not a viable method in this study.

Finance literature suggests, however, that return on equity (ROE) is a determinant of equity valuations, and thus share returns (Bini & Penman, 2013). Hence, Δ ROE is used as a proxy for the unexpected earnings announcements, and is thus included in

¹² The zero conditional mean assumption is one of five key assumptions constituting the Gauss-Markov theorem. If any of the assumptions are violated, OLS is no longer the best unbiased linear estimator.

the regression as a control variable. For the goodwill impairment loss observations that are based on annual reports, ΔROE is assumed to be zero because the earnings already are public prior to the release of the annual report.

ROE is defined as net income divided by the average opening and closing balance of common shareholders' equity. ΔROE is calculated for the individual firm by subtracting the average return on equity (\overline{ROE}) of the four prior quarters from the ROE of the financial report including the goodwill impairment loss.

$$ROE_{it_0} = \frac{Net\ income_{it_0}}{(Total\ equity_{it_0} + Total\ equity_{it_{-1}}) \times \frac{1}{2}} \quad (6)$$

$$\overline{ROE}_i = (ROE_{it_{-1}} + ROE_{it_{-2}} + ROE_{it_{-3}} + ROE_{it_{-4}}) \times \frac{1}{4} \quad (7)$$

$$\Delta ROE_i = ROE_{it_0} - \overline{ROE}_i \quad (8)$$

Where:

t_0 = the announcement date

6.2.3.2 Long-term growth

Finance literature also suggests that the long-term growth in earnings (*LTG*) is a determinant of equity valuations, and thus share returns (Bini & Penman, 2013). *LTG* is therefore included in the regression as a control variable.

LTG is calculated as a geometric average of the individual firm's sales for the time period 2000-2013. For firms with missing data for the time period, the longest possible time period is used. Firms with negative sales growth are adjusted using a squaring method to convert the negative *LTG* into positive *LTG*. Firms with a *LTG* exceeding 10% are adjusted downwards with a square root procedure.

$$LTG_i = \left(\frac{Net\ sales_{i\ 2013}}{Net\ sales_{i\ 2000}} \right)^{\frac{1}{9}} - 1 \quad (9)$$

6.2.3.3 Beta

Beta is a measure of the systematic risk that investors should be compensated for by investing in the firm. Beta is according to Zang (2008) a determinant of share returns and the variable is therefore included in the regression as a control. The beta of the individual firm is retrieved from the OLS regression used in the event study to derive the market model parameters.

6.2.3.4 Size

Research suggests that larger firms are less volatile compared to smaller firms (Wei & Zhang, 2006) and that larger firms also have a greater number of analysts compared to smaller firms (Fortin & Roth, 2007). The market reaction of the earning announcements could therefore differ among firms of different size, because volatility is viewed negatively by equity investors (Barnes, 2001). Moreover, a greater number of analysts could reduce information asymmetry, which according to Bens, Heltzer & Segal, (2011) can have an impact on the market reaction. Hence, the market capitalization of the individual firm is used as a proxy for firm size. The control variable is operationalized with the natural logarithm to prevent the absolute value of the market capitalization from distorting the regression results. The operationalized control variable is named *SIZE*.

$$SIZE_i = LN(\text{Market capitalization}_{it_0}) \quad (10)$$

Where:

t_0 = the announcement date

6.2.3.5 Market to book value

The market to book value (*MTB*) is according to Zang (2008) a determinant of share returns, and could therefore impact the market reaction of the earnings announcement. The variable is therefore an appropriate control in the regression. The variable is also used in the regression to control for the likelihood of impairment losses. Firms with a market to book value below one should in theory impair assets.

$$MTB_i = \frac{\text{Market value of equity}_{it_0}}{\text{Book value of equity}_{it_0}} \quad (11)$$

Where:

t_0 = the announcement date

6.2.3.6 Momentum

Research suggests that firms with six months of strong share returns tend to perform well over the following three months. The reverse is suggested for firms with a poor six months performance (Jegadeesh and Titman, 1993). The effect is a trading anomaly referred to as momentum (*MOM*) and is used in the regression to control for CAR that are a result of the investors trading on past performance.

$$MOM_i = \left(\sum_{-2}^{-127} \frac{P_{it_0} - P_{it_{-1}}}{P_{it_{-1}}} - \sum_{-2}^{-127} \frac{M_{t_0} - M_{t_{-1}}}{M_{t_{-1}}} \right) - 1 \quad (12)$$

Where:

P_{it} = adjusted close price for share i at time t

M_t = adjusted close price for OMXS at time t

t_0 = the announcement date

6.3 The multivariate OLS regressions

The regression variables are used to construct two multivariate OLS regressions that are employed to examine the value relevance hypothesis (H1) and the leverage hypothesis (H2). The regression variables are based on data from different time periods. The multivariate OLS regressions will, however, treat the data as pooled cross-sectional.

The value relevance hypothesis (H1) is examined with the multivariate OLS regression in equation 13. The primary interest of the regression estimator is the coefficient β_1 that represents the average market reaction caused by a goodwill impairment loss. Goodwill impairment losses are considered value relevant by investors on the Swedish equity market if the coefficient β_1 is statistically significant

and different from zero. The goodwill asset, on the other hand, is only considered value relevant if the coefficient β_1 is statistically significant and negative.

$$CAR_{it} = \beta_0 + \beta_1 GWIL_{it} + \beta_2 \Delta ROE_{it} + \beta_3 LTG_{it} + \beta_4 BETA_{it} + \beta_5 SIZE_{it} + \beta_6 MTB_{it} + \beta_7 MOM_{it} + \varepsilon \quad (13)$$

Where:

CAR = the cumulative abnormal return for firm *i* at time *t*.

GWIL = the goodwill impairment loss deflated by total assets for firm *i* at time *t*

ΔROE = the change in return on equity for firm *i* at time *t*

LTG = the long-term growth for firm *i* at time *t*

BETA = the beta for firm *i* at time *t*

SIZE = the natural logarithm of the market capitalization for firm *i* at time *t*

MTB = the market to book value for firm *i* at time *t*

MOM = the momentum for firm *i* at time *t*

ε = the error term

The multivariate OLS regression in equation 13 is extended with the independent variables *FLEV* and (*FLEV* x *GWIL*) to examine the leverage hypothesis. The multivariate OLS regression for the leverage hypothesis is seen in equation 14.

FLEV is a dummy variable that is used to divide the goodwill impairment loss observations into two financial leverage groups. The median debt equity¹³ ratio of 1.52 for the 188 goodwill impairment loss observations is used as a cut-off point for the two groups. Firms with a debt equity ratio less than 1.52 are coded as 0 and firms with a debt equity ratio greater than 1.52 are coded as 1. The firms in the former financial leverage group are defined as firms with low financial leverage and the firms in the latter financial leverage group are defined as firms with high financial leverage.

(*FLEV* x *GWIL*) is the interaction term that allows the association between *CAR* and *GWIL* to depend on financial leverage. The coefficient of the interaction term (β_9)

¹³ The debt equity ratio is calculated as total debt deflated by shareholders' equity at the announcement of the financial report including the goodwill impairment.

measures the difference in average market reaction caused by a goodwill impairment loss in the two financial leverage groups. The coefficient β_1 measures, on the other hand, the average market reaction caused by a goodwill impairment loss in the low financial leverage group. Hence, the average market reaction caused by a goodwill impairment loss in the high financial leverage group is derived by adding the coefficient of β_1 to the coefficient of β_9 .

A statistically significant and negative interaction term coefficient (β_9) can therefore indicate that goodwill impairment losses cause a larger negative market reaction in firms with high financial leverage compared to goodwill impairment losses in firms with low financial leverage. However, the analysis requires that β_1 also is negative, close to zero or not statistically significant. Hence, both β_1 and β_9 must be analyzed to understand if the market reaction to goodwill impairment becomes more negative with financial leverage.

$$CAR_{it} = \beta_0 + \beta_1 GWIL_{it} + \beta_2 \Delta ROE_{it} + \beta_3 LTG_{it} + \beta_4 BETA_{it} + \beta_5 SIZE_{it} + \beta_6 MTB_{it} + \beta_7 MOM_{it} + \beta_8 FLEV + \beta_9 (FLEV \times GWIL) + \varepsilon \quad (14)$$

Where:

CAR = the cumulative abnormal return for firm i at time t .

$GWIL$ = the goodwill impairment loss deflated by total assets for firm i at time t

ΔROE = the change in return on equity for firm i at time t

LTG = the long-term growth for firm i at time t

$BETA$ = the beta for firm i at time t

$SIZE$ = the natural logarithm of the market capitalization for firm i at time t

MTB = the market to book value for firm i at time t

MOM = the momentum for firm i at time t

$FLEV$ = the dummy variable for financial leverage for firm i at time t

$(FLEV \times GWIL)$ = the interaction term

ε = the error term

6.4 Descriptive statistics

The descriptive statistics in table 4 show that both the mean and the median CAR is slightly negative. Most Investors therefore react negatively to earnings announcements that include goodwill impairment losses. However, the negative market reaction could also be a result of a poor overall earnings announcement, because both the mean and the median Δ ROE are negative, indicating that most firms have performed worse than expected. The range of CAR is wide with the largest and smallest CAR of 15% and -45.9% respectively. However, the range is not surprising because goodwill impairment losses and earnings announcements can communicate both positive and negative news, thus resulting in a wide range of positive and negative market reactions.

The range of GWIL differs considerably with the largest and the smallest GWIL of 48% and 0.000109% respectively. The median GWIL of 0.39% indicates that most of the goodwill impairment losses in the sample are rather small in relation to total assets. The mean of 3.3% indicates on the other hand that some goodwill impairment losses must be considerably larger.

The descriptive statistics for SIZE are hard to interpret as the variable is reported in a logarithmic form. However, ex ante operationalization, the mean of SIZE equals 5.9 billion SEK. Hence, the average firm in the sample could be described as a firm in the middle cap segment. The sample therefore includes firms with goodwill impairment losses across all three market segments¹⁴.

Both the median and the average MTB values exceed 1.0, indicating that most of the sample firms are valued above the book value of equity. Based on the median and average MTB value and assuming only one cash generating unit for each firm, there ought to be less impairment losses as the recoverable amount measured as the fair value exceeds the carrying amount for more than 50 % of the firms in the sample. The mean and median MOM indicates, however, that most firms have had a negative trend in the share prior to the goodwill impairment loss. Based on MOM it is therefore not surprising that goodwill has been impaired.

¹⁴ OMXS categorizes firms as either small cap, middle cap or large cap.

The descriptive statistics in table 4 also provide some insight into the distributions of the regression variables. The variables CAR, GWIL, Δ ROE, MTB and MOM are right skewed as the mean exceeds the median for each variable. The variables LTG, BETA and SIZE are however fairly normal distributed as the mean and the median corresponds to one another. Noteworthy in the descriptive statistics is also the unlikely negative minimum value of BETA and the wide range of Δ ROE and LTG. These values are most likely a result of too simplistic variable calculations.

Table 4. Descriptive statistics of the goodwill impairment loss sample.

Variable	N	Mean	Median	Std. Dev.	Min	Max
CAR	188	-0.0143967	-0.0079	0.072694	-0.4595067	0.1499487
GWIL	188	0.0331671	0.0039	0.0745316	1.09E-06	0.4859436
Δ ROE	188	-0.0759482	-0.02373	0.2686445	-1.50675	1.01205
LTG	188	0.0375415	0.0365	0.0225974	9.00E-08	0.0921814
BETA	188	0.8034564	0.7997	0.3769224	-0.6317304	1.797587
SIZE	188	15.42512	15.6407	2.192666	9.81411	19.7274
MTB	188	1.963428	1.6008	1.608151	-3.992529	11.91175
MOM	188	-0.0219291	-0.00135	0.2410479	-0.7426575	0.639152

Notes: The descriptive statistics for BETA, Δ ROE and LTG are reported ex-ante winsorizing.

6.5 Discussion of econometric issues

The descriptive statistics indicate some dispersion among the regression variables. This could be a potential issue for the multivariate OLS regression as the fifth assumption of the Gauss-Markov theorem states that the variance in the error term must be constant (Wooldridge, 2014). If the assumption does not hold, heteroskedacity is present, meaning that OLS no longer is the best linear unbiased estimator, thus leading to incorrect regression coefficients and t-test statistics (Wooldridge, 2014). The issue of heteroskedacity can however be solved with robust standard errors (Wooldridge, 2014). The presence of heteroskedacity is examined with a White test for each multivariate OLS regression. The White tests

suggest that heteroskedasticity is present in both multivariate OLS regressions (see appendix 1). The two multivariate OLS regressions are therefore carried out with robust standard errors.

The third assumption of the Gauss-Markov theorem assumes no perfect collinearity among the independent variables in the multivariate OLS regression (Wooldridge, 2014). However, two or more independent variables could still be highly correlated with one another and thus make it difficult to determine which independent variable actually cause an effect on the dependent variable. The issue is referred to as multicollinearity, and to establish when multicollinearity is a problem is not completely straightforward. However, less correlation among the independent variables is always preferable (Wooldridge, 2014). To gauge multicollinearity, this study employs a variance inflated factor test (VIF-test) on the independent variables in each multivariate OLS regression. A rule of thumb is that multicollinearity exists when the VIF-test exceeds the value of 10 (Wooldridge, 2014). The outcome of the VIF-tests (see appendix 2) indicates that multicollinearity is not an issue in any of the regressions.

OLS estimates are to great extent susceptible to outliers, and especially when the sample is small. Outliers can drive the regression coefficients and distort the statistical significance (Wooldridge, 2014). However, to classify an observation as an outlier is both difficult and associated with subjectivity. In order to overcome the issue of outliers, two separate procedures are employed. First, the independent variables GWIL and SIZE are operationalized to reduce dispersion, and thus the extent of outliers. Second, variables such as Δ ROE and LTG are approximations, calculated with data from databases that could be prone to errors, thus increasing the likelihood of outliers. Moreover, the descriptive statistics of the regression variable BETA show a negative minimum value which is highly unlikely as equities usually tend to be positively correlated with the overall market. Hence, these three variables are winsorized to the 2.50 and 97.50 percentiles in the multivariate OLS regressions to reduce potential error, and thus potential outliers from distorting the OLS estimates. The dependent variable, CAR, and the main independent variable, GWIL, are however not winsorized as they are derived based on solid theory or on primary information from firms' financial reports.

The main independent variable GWIL is right skewed with most observations centered around zero on the x-axis and with fewer observations stretching out the right. There is however no indication of incorrect values in the GWIL variable and a fairly large impairment loss in relation to total assets should not automatically be classified as an outlier as a result of the skewness in the distribution. On the contrary, the very smallest GWIL observations are the ones that should be eliminated from an economic perspective, as it is unlikely that an insignificant impairment loss could have a significant effect on CAR. In the study of Zang (2008), goodwill impairment losses are scaled by share price and the very smallest observations are removed. However, the sample size in this study prohibits a similar approach.

7. RESULTS

7.1 The value relevance hypothesis

The results of the value relevance regression (table 5) indicate a slightly negative association of -0.09 between CAR and GWIL. The sign of GWIL is negative, as expected, but the coefficient is not statistically significant at any conventional level. Hence, the results provide no support for the value relevance hypothesis (*H1*). Goodwill impairment losses are therefore on average non-value relevant for investors on the Swedish equity market. Consequently, the result also suggests that most investors on the Swedish equity market find the goodwill asset to be non-value relevant.

Two of the control variables are statistically significant, BETA at the 10% level and MTB at the 1% level. The remaining control variables are however not statistically significant. The R-squared of the value relevance regression indicates that 13.36% of the variance in CAR is explained by the regression variables. Hence, a majority of the variance in CAR is explained by factors outside the model.

Table 5. The value relevance regression (equation 13).

Variable	Coefficient	P-value	T statistics
GWIL	-0.0927856	0.472	-0.72
Δ ROE	-0.020934	0.567	-0.57
LTG	0.0122911	0.955	0.06
BETA	-0.043027*	0.091	-1.70
SIZE	0.0068524	0.110	1.61
MTB	0.0083971***	0.002	3.22
MOM	0.0372921	0.182	1.34
Intercept	-0.09998*	0.084	-1.74
n		188	
R ²		0.1336	
F value		2.39**	

Notes: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. Robust standard errors are used for the value relevance regression. Δ ROE, LTG and BETA are winsorized to the 2.50 and 97.50 percentiles.

7.2 The leverage hypothesis

The leverage regression (table 6) results in a slightly positive GWIL coefficient of 0.003. The coefficient is, however, not statistically significant at any conventional level, and investors therefore consider goodwill impairment losses in firms with low financial leverage as non-value relevant.

The interaction term (FLEV x GWIL) coefficient, measuring the difference in average market reaction caused by a goodwill impairment loss for the two financial leverage groups, is negative as expected. The interaction term coefficient of -0.945 is also statistically significant at the 1% level. From an economic perspective, it is also worth noting the magnitude of the interaction term coefficient. Ceteris paribus, in firms with high financial leverage, a goodwill impairment loss in relation to total assets (GWIL) of one percentage point causes on average a 0.945 percentage point more negative CAR compared to a GWIL of equal size in firms with low financial leverage. The interaction term coefficient must therefore be considered economically significant.

As the interaction term coefficient is negative and statistically significant, and the GWIL coefficient (the low leverage group) is close to zero and not statistically significant, the result supports the leverage hypothesis (*H2*) at the 1% significance level. Hence, investors on the Swedish equity market react more negatively to goodwill impairment losses in firms with high financial leverage compared to goodwill impairment losses in firms with low financial leverage.

A similar result is also found when two separate multivariate OLS regressions are carried out, one for each leverage group (see appendix 3). The results indicate that goodwill impairment losses are non-value relevant for investors in firms with low financial leverage. On the contrary, goodwill impairment losses are value relevant for investors in firms with high financial leverage. To conclude, financial leverage impacts the value relevance of goodwill impairment losses, and consequently investors only find the goodwill asset valuable in firms with high financial leverage.

A part from the interaction term, the control variable MTB is statistically significant at the 5% level. The other control variables are however not statistically significant. The R-squared of the leverage regression indicates that the regression variables explain 27.11% of the variance in CAR. Hence, a majority of the variance in CAR is explained by factors outside the model.

Table 6. The leverage regression (equation 14).

Variable	Coefficient	P-value	T statistics
FLEV x GWIL	-0.9452515***	0.006	-2.73
GWIL	0.0035836	0.970	0.04
Δ ROE	-0.0404847	0.283	-1.08
LTG	-0.1020476	0.627	-0.49
BETA	-0.0374534	0.104	-1.63
SIZE	0.0048003	0.223	1.22
MTB	0.0085712**	0.013	2.51
MOM	0.014448	0.480	0.71
FLEV	0.0087285	0.381	0.88
Intercept	-0.0693742	0.179	-1.35
n		188	
R2		0.2711	
F value		2.18**	

Notes: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. Robust standard errors are used for the leverage regression. Δ ROE, LTG and BETA are winsorized to the 2.50 and 97.50 percentiles.

7.2.1 Robustness test

A robustness test is carried out to test the results of the leverage hypothesis (H2) further and to verify the underlying debt covenant theory of the hypothesis. Information on debt covenants is collected for each of the 188 goodwill impairment loss observations. 50 of the 188 goodwill impairment loss observations are recognized in firms with debt covenants at the year-end of the goodwill impairment loss (see appendix 4). These 50 goodwill impairment losses constitute a subsample that is used for the robustness test.

The robustness test regression (table 7) results in a GWIL coefficient of -0.42 that is statistically significant at the 10% level. The magnitude of the GWIL coefficient can also be considered economically significant as a goodwill impairment loss in relation to total assets of one percentage point on average causes a negative CAR of 0.42 percentage point. Investors on the Swedish equity market therefore find goodwill impairment losses value relevant in firms with debt covenants. The result of the

robustness test therefore confirms that debt covenants play a crucial part in determining value relevance.

Among the other regression variables, LTG and MOM are statistically significant at the 5% level, while the other control variables are not statistically significant. The R-squared of 43.75% indicates that the regression variables explain almost half of the variance in CAR.

Table 7. The robustness test regression (equation 13).

Variable	Coefficient	P-value	T statistics
GWIL	-0.4272611*	0.075	-1.83
Δ ROE	-0.0529101	0.222	-1.24
LTG	1.174768**	0.027	2.29
BETA	-0.0348518	0.477	-0.72
SIZE	-0.000254	0.975	-0.03
MTB	0.0050325	0.470	0.73
MOM	0.1637679**	0.011	2.66
Intercept	-0.038279	0.760	-0.31
n		50	
R2		0.4375	
F value		4.67***	

Notes: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. Δ ROE, LTG and BETA are winsorized to the 2.50 and 97.50 percentiles.

8. DISCUSSION OF THE RESULTS

The result of the value relevance regression suggests that goodwill impairment losses are non-value relevant for investors on the Swedish equity market. The result therefore opposes the value relevance hypothesis (H1) and the results of a majority of prior value relevance studies (e.g. AbuGhazaleh et al., 2012, Lapointe-Antunes et al., 2009, Li et al., 2011, Xu et al., 2011 and Zang, 2008) that find a statistically significant negative association between goodwill impairment losses and the market reaction of the earnings announcement or share price. The result of the value

relevance regression must therefore be described as somewhat surprising. Prior research can however provide some explanation to the result.

Laghi et al., (2013) find that investors of most equity markets in Europe consider goodwill impairment losses non-value relevant. The Swedish equity market could therefore be a market in which investors consider goodwill impairment losses to be non-value relevant, as indicated by the result of the value relevance regression.

Another reason explaining why value relevance is not found could be that this study examines non-zero goodwill impairment losses. The results therefore exclude the possible signaling value of the zero-goodwill impairments that could affect value relevance as suggested by Laghi et al., (2013). Hence, the results of this study could differ from the findings of studies such as AbuGhazaleh et al., (2012) and Zang (2008) that include zero-goodwill impairment losses and also find that goodwill impairment losses are value relevant.

Hamberg et al., (2011) also suggest that the results of studies that examine goodwill impairment losses surrounding the implementation of the impairment method can be affected by transitional effects. The goodwill impairment loss observations of this study are based on a time period that is far longer than any of the time periods used in the prior value relevance studies. The result of the value relevance regression should therefore be less affected by potential transitional effects compared to the results of prior value relevance studies. If transitional effects would enhance the value relevance of goodwill impairment, they could explain why the result of the value relevance regression differs to the results of the prior value relevance studies.

The results of the financial leverage regression suggest that the market reaction of investors becomes more negative with financial leverage. Moreover, the results of the two separate OLS regressions for the leverage hypothesis (see appendix 3) suggest that goodwill impairment losses only are value relevant for investors of firms with high financial leverage. The results are therefore in agreement with the leverage hypothesis (H2) and with the results of Zang (2008), who also finds that the market reaction of goodwill impairment losses becomes more negative with leverage. Zang (2008) has three leverage groups compared to the two leverage

groups of this study. The pattern of the results is however similar, because Zang (2008) also finds that goodwill impairment losses are considered non-value relevant by investors of the firms with the lowest leverage.

Zang (2008) assumes that debt covenants explain why investors react more negative to goodwill impairment losses in firms with higher financial leverage. The robustness test of this study confirms that debt covenants are of interest for investors. However, one cannot exclude the alternative theory presented in the leverage hypothesis from also explaining why the market reaction of investors is more negative in firms with high financial leverage.

The multivariate OLS regressions of this study are inspired by the multivariate OLS regression of Zang (2008). Hence, as similar hypothesis are examined with similar regression estimators, a comparison of the regression results should provide some insight into the credibility of the multivariate OLS regressions used in this study.

Overall, the multivariate OLS regressions of this study manage to produce results similar to those of Zang (2008). The only exception is the result of the value relevance regression that is not statistically significant at any conventional level. However, as already stated, there are numerous reasons why the result of the value relevance regression could differ from the results of Zang (2008). The multivariate OLS regressions therefore seem robust on a general level.

A majority of the control variables are not statistically significant in both the value relevance regression and the leverage regression. However, this is not surprising because most of the control variables in the regressions of Zang (2008) are also not statistically significant. The control variable that differs considerably between the multivariate OLS regressions of this study and the multivariate OLS regressions of Zang (2008) is however the control for the unexpected earnings announcements. The control for unexpected earnings announcements in the study of Zang (2008) is both statistically significant and highly economically significant. Conversely, ΔROE , the control for unexpected earnings announcements in this study, is not statistically significant and less economically significant. The control variable ΔROE is therefore

not performing as intended, and the multivariate OLS regressions must therefore suffer from some omitted-variable bias. Intuitively, the assumptions behind the Δ ROE variable are too simplistic.

The R-squared of the two multivariate OLS regressions in this study is considerably higher than the R-squared in the multivariate OLS regressions of Zang (2008). Hence, the independent variables in this study explain a larger portion of the variance in CAR compared to the independent variables in the study of Zang (2008). The difference in explanatory power could perhaps be a result of Zang (2008) including zero-goodwill impairment losses.

9. CONCLUSIONS

This study contributes to research on the value relevance of goodwill impairments with results from the Swedish equity market. The results suggest that most investors on the Swedish equity market find goodwill impairment losses to be non-value relevant. However, in highly leveraged firms, investors find goodwill impairment losses to be value relevant because the association between the goodwill impairment loss and the market reaction of the earnings announcement is negative and statistically significant at the 1% level. A similar but less statistically significant result also applies to investors of firms with debt covenants¹⁵. The results therefore suggest that investors on the Swedish equity market only are concerned about goodwill impairment losses in firms with either high financial leverage or debt covenants. Hence, the main contribution of this study is that the value relevance of goodwill impairment losses depends on financial leverage.

The results can also be interpreted to the background of the goodwill asset. The goodwill asset can only be considered value relevant if the association between the goodwill impairment loss and the market reaction of the earnings announcement is statistically significant and negative. Hence, the goodwill asset is only considered to be value relevant in firms with high financial leverage, debt covenants, or both.

¹⁵ Debt covenants are assumed to be positively correlated with financial leverage.

IASB replaced the amortization method with the impairment method to make the financial information of the goodwill asset useful (IASB, 2004). The results of this study suggest, however, that the financial information of the impairment method is non-value relevant for most investors on the Swedish equity market. Hence, similarly to the prior amortization method, the overall usefulness of the impairment method can be questioned. The results, however, provide some support for the impairment method in firms with high financial leverage or debt covenants.

9.1 Future research

Most prior value relevance studies examine goodwill impairment shortly after the introduction of the impairment method and find value relevance. This study contributes with surprising results stating that goodwill impairment losses are non-value relevant for investors on the Swedish equity market. Similar results are also presented by (Laghi et al., 2013), but for different equity markets in Europe. Both this study and Laghi et al., (2013) use time periods that stretch beyond the transition phase. More studies examining value relevance of goodwill impairment in the later years would therefore be beneficial to see if the value relevance of goodwill impairment has changed. Moreover, the study of Laghi et al., (2013) indicate that it can have a vital importance if one includes or excludes zero goodwill impairments. This could also be an area to examine further as this study excludes the potential signaling value of zero goodwill impairments.

Apart from the overall results on value relevance, this study suggests that financial leverage impacts the value relevance of goodwill impairment losses. Therefore, it would be beneficial to further explore the area of value relevance of goodwill impairment losses with focus on leverage. The results of this study are similar to the findings of Zang (2008). Both studies also adopt a similar multivariate OLS regression. It could therefore be interesting to verify the results by using a regression estimator based on the Ohlson valuation framework. Moreover, the results of this study suggest that debt covenants play an important role in determining the value relevance of goodwill impairment losses. However, the study contributes also with an additional theory that together with the debt covenant theory could explain why the market reaction becomes more negative with leverage. It would be interesting to test the two theories against each other and examine to

what extent they explain how leverage impacts the value relevance of goodwill impairment losses.

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Accounting standard setting regulations

IASB Conceptual framework

IFRS 3 Business combinations

IFRS 8 Operating segments

IAS 36 Impairments

SFAS 142 Goodwill and other intangible assets

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APPENDICES

Appendix 1

OLS requires that the variance in the error term is constant. If the variance in the error term is not constant, heteroskedacity is present. The existence of heteroskedasticity can be examined with a White test. The null hypothesis of the White test states that homoscedasticity (constant variance in the error term) exists while the alternative hypothesis states that heteroskedacity exists (Wooldridge, 2014). Three White tests are carried out for the value relevance regression, the leverage regression and the robustness test regression and the null hypothesis is rejected if $p < 0.01$.

Table 8. The White heteroskedasticity test for the value relevance regression

Source	Chi2	df	p
Heteroskedasticity	134.66	35	0.0000
Skewness	30.17	7	0.0001
Kurtosis	2.19	1	0.1386
Total	167.03	43	0.0000

Notes: The null hypothesis is rejected at the 1% significance level and thus, heteroskedacity exists.

Table 9. The White heteroskedasticity test for the leverage regression

Source	Chi2	df	p
Heteroskedasticity	124.33	50	0.0000
Skewness	22.27	9	0.0081
Kurtosis	5.61	1	0.0178
Total	152.21	60	0.0000

Notes: The null hypothesis is rejected at the 1% significance level and thus, heteroskedacity exists.

Table 10. The White heteroskedasticity test for the robustness regression

Source	Chi2	df	p
Heteroskedasticity	42.22	35	0.1872
Skewness	13.65	7	0.0577
Kurtosis	6.84	1	0.0089
Total	62.71	43	0.0264

Notes: The null hypothesis cannot be rejected at any significance level and thus, homoscedasticity exists.

Appendix 2

The VIF-score measures to what extent the variance in the regression coefficients is affected by correlation among the independent variables. A lower VIF-score is always preferable, and one rule of thumb is that the VIF-score should not exceed 10 (Wooldridge, 2014). The VIF-scores are low for all regressions indicating that multicollinearity is no issue in any of the regressions.

Table 11. VIF-test for the independent variables in the value relevance regression

Variable	VIF	1/VIF
GWIL	2.01	0.498340
Δ ROE	1.71	0.583220
LTG	1.22	0.821514
Beta	1.62	0.616246
SIZE	1.82	0.550353
MTB	1.03	0.969232
MOM	1.18	0.848388
Mean VIF	1.51	

Table 12. VIF-test for the independent variables in the leverage regression

Variable	VIF	1/VIF
FLEV x GWIL	1.45	0.688304
GWIL	2.05	0.488946
Δ ROE	1.75	0.572742
LTG	1.10	0.912616
Beta	1.78	0.562974
SIZE	2.10	0.476201
MOM	1.26	0.793365
MTB	1.20	0.836229
FLEV	1.41	0.711389
Mean VIF	1.56	

Table 13. VIF-test for the independent variables in the robustness regression

Variable	VIF	1/VIF
GWIL	2.03	0.493536
Δ ROE	1.59	0.630485
LTG	1.16	0.858910
Beta	1.47	0.678144
SIZE	1.72	0.581338
MOM	1.71	0.585487
MTB	1.37	0.729331
Mean VIF	1.58	

In addition to the VIF-test, multicollinearity is also examined with a Pearson's correlation matrix. The Pearson's correlation matrix finds no strong correlation between any of the independent variables. Hence, multicollinearity is no issue for the value relevance and the leverage regressions.

Table 14. Pearson's correlation matrix for the regression variables

	CAR	GWIL	ROE	LTG	BETA	SIZE	MTB	MOM	FLEV	FLEVxGWIL
CAR	1									
GWIL	-0.15	1								
ROE	0.0788	-0.621	1							
LTG	0.0363	0.0232	0.0109	1						
BETA	-0.063	-0.175	0.1164	-0.063	1					
SIZE	0.1786	-0.443	0.3397	-0.043	0.5779	1				
MTB	0.2443	-0.089	0.0251	0.1398	0.1663	0.266	1			
MOM	0.2304	-0.181	0.2537	0.0402	-0.088	0.191	0.2532	1		
FLEV	-0.091	-0.189	0.023	-0.228	0.2837	0.075	0.0823	-0.099	1	
FLEVxGWIL	-0.44	0.3619	-0.354	-0.112	-0.013	-0.27	-0.085	-0.294	0.284	1

Appendix 3

Two separate OLS regressions are carried out to verify the results of the leverage regression. The goodwill impairment loss sample is divided into two subsamples based on financial leverage. The median debt equity ratio of 1.52 is used as a cut-off point to separate the two leverage groups. The group with low financial leverage consists of firms with a debt equity ratio less than 1.52 and the group with high financial leverage consists of firms with a debt equity ratio above 1.52.

The results of the two OLS regressions indicate that goodwill impairment losses in firms with low financial leverage are non-value relevant, while goodwill impairment losses cause a negative market reaction and are value relevant at the 5% significance level in firms with high financial leverage. The results are therefore in line with the results of the leverage regression.

Table 15. Alternative leverage regression (equation 13).

Variable	Low financial leverage			High financial leverage		
	Coefficient	P-value	T statistics	Coefficient	P-value	T statistics
GWIL	-0.03071	0.687	-0.40	-0.8355647**	0.040	-2.09
ΔROE	--0.02956	0.298	-1.05	-0.0291459	0.709	-0.37
LTG	0.01437	0.956	0.06	-0.4527288	0.179	-1.36
BETA	0.005989	0.781	0.28	-0.0753048**	0.040	-2.08
SIZE	-0.00147	0.659	-0.44	0.0093202	0.165	1.40
MTB	0.009352	0.677	0.42	0.0097306**	0.036	2.13
MOM	0.007254	0.103	1.65	0.0283953	0.436	0.78
Intercept	-0.00434	0.925	-0.09	-0.0882698	0.321	-1.00
N	94			94		
Median DE	0.89			2.33		
R ²	0.0535			0.3589		
F value	0.69			3.07***		

Notes: *** significant at the 1% level, ** significant at the 5% level and * significant at the 10% level. Robust standard errors are used for the high financial leverage regression. ROE, LTG and BETA are winsorized to the 2.50 and 97.50 percentiles.

Appendix 4

Table 16. The sample firms with reported goodwill impairment losses for years 2005-2013

AB SKF	GUNNEBO AB*	PROACT IT GROUP AB
ABB LTD	HEMTEX AB*	PROFFICE AB
ACANDO AB	HOLMEN AB	RATOS AB
ADDNODE GROUP AB	IAR SYSTEMS	REDERI AB TRANS*
AF AB	ICA GRUPPEN AB	RNB RETAIL*
ALFA LAVAL AB	INDUTRADE AB	SAAB AB
ANOTO GROUP AB	INTELLECTA AB	SANDVIK AB
ASPIRO AB	INTRUM JUSTITIA AB*	SECURITAS AB
ATLAS COPCO AB	INVESTMENT AB LATOUR*	SEMCON AB
ATRIUM LJUNGBERG AB*	INVESTMENT AB KINNEVIK	SKANDINAVISKA ENSK
AVANZA BANK	KLOVERN AB*	SKANSKA AB
Bilia	LINDAB INTER*	SSAB SVENSKT STAL AB
BILLERUDKORSNAS PUBL	LUNDIN PETROLEUM AB	STOCKWIK FORVALT
BIOTAGE AB	MIDSONA	STUDSVIK AB
BLACK EARTH*	MODERN TIMES GRP MTG*	SWECO AB*
BONG LJUNGDAHL AB*	MSC KONSULT AB	SWEDBANK AB
BURE EQUITY AB	MULTIQ INTL AB	SVENSKA CELLULOZA AB
CYBERCOM*	NCC AB	SYSTEMAIR AB*
DIGITAL VISION AB	NOKIA CORP*	TELE2 AB*
DUROC AB	NORDNET SECURITIES	TELIASONERA AB*
ELANDERS AB	OEM-INTERNATIONAL AB	TIETO OYJ
ENIRO AB*	ORTIVUS AB	TRADEDOUBLER AB*
FEELGOOD SVENSKA AB	PARTNERTECH AB	TRELLEBORG AB*
G5 ENTERTAINMENT	PEAB AB*	VENUE RETAIL GROUP
GETINGE AB	POOLIA AB	VOLVO AB
GLOBAL HEALTH PART*	PREVAS AB	

Notes: The firms marked with an asterisk have had debt covenants for at least one quarter over the nine-year period when impairment of goodwill was recognized.