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SHORT AND LONG TERM EFFECT OF GOODWILL IMPAIRMENT ANNOUNCEMENTS ON THE SHARE PRICES OF EUROPEAN BASED LISTED COMPANIES

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Abstract

This research investigates the effect of goodwill impairments on the share prices of European listed companies. The abnormal returns in the (-5,5), (-3,3), (-1,1) and (0,3) event period surrounding a goodwill impairment and the year prior to a goodwill impairment announcement are investigated. In the (-5,5) event period a positive cumulative abnormal return of 1.90% is found. A cumulative buy and hold abnormal return of -3.90% is found for the first nine months of the year prior to the goodwill impairment and a -0.30% cumulative buy and hold abnormal return is found for the total year prior to the goodwill impairment. An explanation for these results is that investors anticipate goodwill impairments and that therefore, the negative reaction to a goodwill impairment happens long before the announcement of the impairment. An pessimistic anticipation by investors might be the reason why the actual impairment announcement is received as positive news. The relative size of the impairment, the relative amount of goodwill in a company and the level of information asymmetry between a company and its investors are investigated on their influence on both the surprise effect and the level of anticipation. There is some proof that the positive reaction in the short term and the negative reaction in the long term are due to anticipating investors.

Keywords: Finance / Financial Economics / Financial Market / Announcements / Efficient Market Hypothesis, Event Studies / Information Acquisition / Intangible assets / Goodwill / Impairment / Goodwill impairment / European companies / Share price / Cumulative abnormal return / Buy and hold abnormal return / Information asymmetry / Investor anticipation / Sell-side analysts / Organisational complexity

JEL Classification: C33, D53, D82, D83, D84, G32, G14

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1. Introduction

Prevention is better than cure. A rule most people tend to or should live by. But do they actually do this in every case and is it always in the appropriate amount. Also is it always possible to prevent things from happening. This research is focussing on exactly those questions. More precisely on the surprise effects caused by a goodwill impairment announcement. Are investors actually surprised after such an announcement or are they able to prevent themselves from being surprised and do they anticipate the announcement. If so, what factors have influence on both the level of surprise and the level of anticipation?

Over the years multiple researchers have investigated the effects of both asset and goodwill impairments on share prices (see chapter 2 Literature Survey and Review). Multiple studies have been performed to see if there is a reoccurring effect on share prices when a company publishes impairments. Most of the studies do find such a result and describe the announcement of an impairment as valuable information for investors. This means that investors will incorporate this information in their share prices. This research will add to the research done in the past, more specifically the effect of goodwill impairments. However, it is important to understand the basics of impairment and goodwill before elaborating on why more research on the impact of goodwill impairment on share prices is necessary.

Impairment is an accounting method whereby, the book value of an asset is corrected based on the recoverable amount of the assets (Comiskey & Mulford, 2010). Assets that might need impairment can be fixed assets such as machinery or buildings, but can also be intangible assets such as goodwill (Hamberg & Beisland, 2014). Assets that are more susceptible to become impaired are the company's goodwill, accounts receivable, and long-term assets. Reason for this usually lies in detrimental changes in the market, sector or economy (Chareonsuk & Chansa-ngavej, 2008). Reasons to recognize impairment on goodwill specifically can be caused by a company paying too much for an acquired company or there might be a negative turn in the market or economy as a whole. Paying too much for an acquired company can be caused by, for instance, the expected synergies failing to realise over time (Chen, Shroff & Zhang, 2019).

Management will decide to recognize an impairment on an asset, when the value of the recoverable amount drops irreversibly below the book value of that asset. This is called fair

value accounting. The book value is defined as the value of the asset in the way it is accounted for on the balance sheet. The recoverable amount is either the asset's future value for the company or the amount it can be sold for, depending on which is higher, minus any transaction costs (Duangploy, Shelton & Omer, 2005). The necessity of an impairment normally arises when the decline in the recoverable amount of an asset is sudden and large (Comiskey & Mulford, 2010). Identifying impaired assets can happen in two ways, depending on whether the company is following the incurred loss model or the expected loss model (Camfferman, 2015).

Under the incurred loss model, goodwill is recognized as impaired, when expectations are that future positive value based on synergies will not be realized partly or entirely. Under the expected loss model, identifying impaired assets is a continuous process whereby the cash flow of an investment or asset is recalculated over time. Controlling for impaired assets is obligatory by regulation. Accounting regulations like the United States Generally Accepted Accounting Principles (US-GAAP) or International Financial Reporting Standards (IFRS) have specific rules for the way assets should be tested for impairment (Jerman & Manzin, 2008). Under IFRS an impairment test is obligatory whenever there are indications that the recoverable amount of assets irreversibly drops under the book value. However, companies are also required to test some of their assets for impairment on an annual basis, no matter if there are impairment signs or not (IAS 36 - IFRS). This means there is a mix of both the incurred loss model and the expected loss model. Since this research is focusing on companies situated in Europe we will be using IFRS as the applicable accounting rules.

When a goodwill impairment occurs this is information about the wellbeing of the company. This lies directly in the reasons that cause the expected value of goodwill to be too high. This information might be used by investors in the evaluation of their investments. When a company fails to perform the investors might sell off their shares. A decrease in demand for share prices and an increase in sales of share prices will cause the share price to drop. However, being honest about the financials of the company might also cause investors to gain more trust which might have a positive effect on the share prices. Also investors might be relieved after hearing the actual impairment in comparison to their expected impairment, which might also lead to a positive reaction. Most of the prior research on this effect does find a negative effect on share prices in the short term period around a goodwill impairment announcement.

There are also studies on the long term effect after the event. Most of them find a negative effect is the period after the event (Hirschey & Richardson (2002), Hirschey & Richardson (2003), Li, Shroff, Venkataraman & Zhang (2011)). However, Cheng, Peterson and Sherrill (2015) find a positive effect in the long run after the event. There is one study specifically looking into the year prior to the event and it finds a negative effect there as well (Hirschey & Richardson, 2003).

The announcement of the goodwill impairment is most likely to be at the filling date of an annual report (Hambur & Beisland, 2014). The reason for this lies in the fact that this is the most obvious way for companies to make impairments public. Also most of the impairments, when necessary, are performed once a fiscal year. This is most likely to happen when the financial situation of the last fiscal year is calculated for the annual report. This recognition of impairments at the annual report date is considered common practice by insiders of the IFRS Foundation[1]. Lastly the database used for this research shows that all of the impairments are annually and taken from the annual reports. In this research the focus will be on both the long term period before an impairment announcement and the short term period around the announcement. The reason for this lies in the fact that investors might know that an impairment is up-hand, in this case the investors should incorporate this expectation in the share prices before the announcement. This would mean that there might be an effect before the announcement and not in the short term period around the announcement. However, if the investors do not expect an impairment, the short term effect might show a reaction and the long term before an event might not show a reaction. This results in the following research question: *Are investors surprised by the announcement of an impairment on goodwill by European listed companies?*

This research adds to prior research for a couple of reasons. To begin with, this research will reopen the case of goodwill impairment effects on share prices. For the last five years there has not been performed any research on this topic. The last research used a sample size that ended in 2011. The sample period for this research starts in 2010 and ends in 2018. If there are differences in the outcomes of prior research compared to this one, than one of the reasons might be that different times have different answers. Secondly, this research will compare the long term effect before an event with the short term effect surrounding the event date. This will indicate if investors are anticipating an impairment on goodwill. Only Hirschey & Richardson

[1] IFRS Foundation March 2th 2018, *Goodwill and Impairment*, https://www.ifrs.org/-/media/feature/meetings/2018/march/cmac/ap4-goodwill-and-impairment.pdf

mention in their paper of 2003 that a negative abnormal return in the year prior to the impairment announcement might be caused by anticipation of investors. Further and more recent investigation on whether investors are anticipating goodwill impairments is needed. Thirdly, this research will look at how information asymmetry influences the level of surprise and anticipation by investors. Information asymmetry can decrease when companies are part of a non-complex organisational structure or when the size of a company is relatively large. Also analysts writing about companies can decrease the information asymmetry. These factors will be used as indicators on the level of information asymmetry. Factors increasing the information asymmetry might lead to a decreasing effect on the abnormal returns and vice versa. In the short term a lower level of information asymmetry might lead to a decrease in the abnormal returns and vice versa. If this is happening this is an indication that investors are in fact anticipating goodwill impairments and therefore, less surprised at the announcement.

The outcome of this research is that investors seem to react positively at the announcement of the actual goodwill impairment. This means there is a surprise effect and in a positive way. Also, in the year prior to the impairment announcement investors already anticipate on the impairment. This is indicated by negative abnormal returns in the first 9 months of the year before the impairment. The positive reaction at the announcement might be partly caused by a too pessimistic anticipation from the investors. Further, goodwill seems to have a negative effect on the anticipation level of investors. Companies with relatively large amounts of goodwill will face less negative abnormal returns in the year prior to the impairment announcement. Companies announcing smaller impairments will see a relatively small surprise effect. However, in the year prior to the announcement companies announcing large impairments will face less abnormal returns. This indicates that the level of impairment has a negative effect on the anticipation level of investors. There are some indications that companies with less information asymmetry have investors anticipate impairments more. This is mostly true for the number of sell-side analysts. Size seems to have an influence on the anticipation level but not on the surprise effect at the announcement. Companies who are part of a non-complex organisational structures will face smaller anticipation effects in the last months of the year prior to the impairment and a smaller surprise effect after the announcement.

Prior research on goodwill impairment effects are discussed in Chapter 2. In Chapter 3 the hypotheses are formulated after which Chapter 4 will describe the methodologies used to analyse the hypotheses. The data used is described in Chapter 5 and the Results Analysis can be found in Chapter 6 after which conclusions are drawn in Chapter 7.

2. Literature Survey and Review

This paper investigates the specific effect of goodwill impairments on the share prices. When it comes to this specific type of impairment there are a few mentionable prior studies. The first paper on this topic was published in 2002 and since then seven other have been published. They are all focusing on the value effects that are caused by goodwill impairments. However, there are some differences. For instance there are papers focusing on the short vs. long term effects of the goodwill impairment. Other papers look at the effect of impairments before and/or after major regulation changes, like the Statement of Financial Accounting Standards No. 142 (SFAS-142) regulation under United States Generally Accepted Accounting Principles (US-GAAP) and the IFRS No. 3 "Business Combinations" (IFRS 3) regulation under International Financial Reporting Standards (IFRS). Also there are differences in further investigation on the found effects, for instance differences in effects caused by company characteristics.

2.1 Prior research with focus on the short term effect of impairment on goodwill

Hirschey & Richardson (2002) were among the first to investigate the effect of goodwill impairment on share prices. Before them studies were performed on the effect of other impairments for instance on fixed assets (Elliot & Shaw (1988), Francis, Hanna & Vincent (1996), Bartov, Lindahl, & Ricks (1998)). Hirschey and Richardson use an event-study framework with which they analyse market-value effects. The event period consists of a three day period surrounding the moment a company publishes an impairment on goodwill. The authors state that, if investors perceive goodwill impairment announcements to be value determining information, than a significant share-price effect is anticipated to happen alongside this. In order to find events that can be used in the event-study, the authors identified impairment announcements between 1992-1996 from The Wall Street Journal Index on-line (WSJI). After selecting firms that are listed on either the New York Stock Exchange, the American Stock Exchange, or on NASDAQ they ended up with a sample of 80 goodwill impairment announcements. The authors use cumulative abnormal returns and mean adjusted abnormal returns to investigate share price effects. The results are that on average the effect on returns is negative and statistically significant. The effect lies depending on the calculation of the returns between -2.94% and -3.31%.

Li, Amel-Zadeh & Meeks (2010) look at the long term effect of an impairment on the market value of common shares. In order to do this they collected 174 firms which make up for a total of 930 firm years, in which impairment announcements occur. The firms are all listed at the London Stock Exchange and the announcements are all between 1997 and 2002. The authors of this paper use an ordinary least squares (OLS) regression. The dependent variable is the market value of common shares and different components of the financial statements like the book value of equity and goodwill are the independent variables of the OLS regression. If the impairment announcements are considered as value relevant information by the market, than the coefficient for goodwill impairments should show a significant negative effect. For the event period (-5,0) the negative effect is -4.4% and for the event period (-1,1) the negative effect is -1.9%.

Market value = $a+\beta 1$ x Book value of equity+$\beta 2$ x Goodwill acquired+$\beta 3$ x Total Goodwill+$\beta 4$ x Total amortisation+ $\beta 5$ x Earnings + $\beta 6$ x Accumulated amortisation of current year + $\beta 7$ x Impaired Goodwill + E

2.2 Prior research with focus on the long term effect of impairment on goodwill

Hirschey & Richardson (2003) wrote another paper on the effect of goodwill impairments. However, in this paper they also look at the pre- and post-announcement event periods of minus one year and plus one year. Also the results account for more different variables influencing the abnormal returns. Since most impairments are published in combination with other financial statements, factors like positive earnings, negative earnings or miscellaneous, are added. Also the firms are differentiated between (non)manufacturing and (non)industrial companies. All other factors stay pretty much the same. Again 80 goodwill impairment announcements are used for the period between 1992-1996. The cumulative abnormal returns are used to investigate the effect on the share prices. For the short term period an event period of 2 days is used (-1,0) which results in an effect of -3.3%. When the impairment announcement is accompanied by an announcement of positive earnings there is no negative effect, however, when the announcement is accompanied by an announcement of negative earnings the effect is more than double the normal effect, -6.86%.

Furthermore, the industrial firms seem to suffer a greater negative effect on share prices, -6.03%, compared to the other type of firms with negative effects ranging between -2.50% and -3.32%. The biggest new contribution of this paper is the research on the long term effect of impairment on goodwill. The authors find that both in the period (-250,-10) before the announcement as in the period (10,250) after the announcement there is a significant negative effect of respectively -38.81% and -8.98%. This might be an indication that there is an anticipation effect in the year prior to the impairment announcement.

2.3 Prior research on the effect of impairment on goodwill after a regulation change

Ghazaleh, Al-Hares & Haddad (2012) investigate the end of year market value of firms who made an impairment announcement, after the adoption of IFRS 3. One of the goals of IFRS 3 was to improve the accounting treatment for goodwill and provide users with more useful and value-relevant information regarding the underlying economic value of goodwill. The authors are interested to see if after this adoption goodwill impairments are perceived as reliable information by investors. They do so by using the accounting-based valuation method. The OLS regression they use takes a goodwill impairment loss as one of the independent variables and the market value as a dependent variable. Their data consists of 528 firm-year observations from UK listed firms and are spread over the period 2005-2006. They find that there is a significant negative association between reported goodwill impairment losses and market value. This suggests that investors perceive these impairments as a reliable signal for a decline in the value goodwill and therefore, the company. This information is incorporated in their firm valuation assessments.

Market value = $\alpha + \beta 1$ x Value of Equity + $\beta 2$ x Pre-tax profit + $\beta 3$ x Carrying value of Goodwill + $\beta 4$ Goodwill impairment Loss + E

Xu, Anandarajan & Curatola (2011) studied the effect of goodwill impairments after the SFAS 142 became effective (2002). SFAS 142 is a regulation under US-GAAP which made it obligatory for companies to perform impairment testing at every moment they expect goodwill to be impaired. This, instead of just reviewing the value of goodwill each year. Their sample consists

of 431 firm-year observations over the period 2003-2006. For the analysis the authors use a price model in which the price of the company is determined 3 months after the end of the fiscal year. Again the goodwill impairment is an independent variable within the model. The authors also use a returns model in which the cumulative dividend annual return, 3 months after the end of the fiscal year, is the dependent variable and the goodwill impairment is one of the independent variables. The authors find that goodwill impairment has a significant negative coefficient, which indicates that in general goodwill impairment conveys a value-decreasing signal and is incorporated into the share price. Interesting about the findings is that, when the sample is split up in a group of profitable firms and loss making firms the abnormal returns for profitable firms are negative, but returns for loss making firms are positive. Their explanation for this difference is that the goodwill impairment is interpreted as a strong negative signal when a firm is profitable, but less so for loss making firms.

Share price = α + β1 x Adjusted book value per share + β2 x adjusted earnings per share + β3 x Absolute amount of goodwill impairment charges per share + β4 x Absolute amount of restructuring charges + β4 x Absolute amount of asset write-down charges per share + E

Cum-dividend annual returns = α + β1 x Adjusted change in earnings per share / share price + β2 x Adjusted earnings per share + β3 x Absolute amount of Goodwill + β4 x Absolute amount of restructuring charges + β4 x Absolute amount of asset write down charges per share / share price + β5 Absolute amount of restructuring charges per share / share price + β6 x Absolute amount of asset write-down charges per share / share price + β7 x Change in net sales + β8 x Change in return on assets + β9 x Asset turnover + β10 x Market to book ratio + β1 x Age of long lived assets + β12 x Natural log of total assets at the end of fiscal year t + β13 x 1 digit SIC industry dummy variables + E

Cheng, Peterson and Sherrill (2015) examine the effect of goodwill impairments after the rule changes of SFAS 142 and find that investors continue to perceive goodwill impairments as negative news in the short term. However, contrary to prior research they also find that in the long term after the impairment announcement goodwill impairments are perceived as positive news by investors. The reasoning for this is the fact that the overall firm performance improves

significantly post event. The sample used for the analysis consists of 3209 firm-quarter observations between 2002 and 2011. The firms are all listed on the NYSE, AMEX or NASDAQ. The analysis used in the research is threefold and consists of an event study and a calendar time regression. The event study uses two-day cumulative abnormal returns (CARs) and buy and hold abnormal returns (BAHRs). The authors find a positive abnormal return after the announcement of 8.94% for the 6 month event period and 7.92% for the 12 month event period. The CAR for the (-1,1) event period is -1.38%.

2.4 Prior research on the difference between the effect of impairment on goodwill before and after a regulation change

Li, Shroff, Venkataraman & Zhang (2011) studied the difference in effect on share prices from an impairment on goodwill before and after the introduction of SFAS 142. Earlier research did not perform a comparison between prior and post regulation effects from goodwill impairments. The authors used a sample size of 1584 announcements of goodwill impairment losses between 1996 and 2006. For the analysis the authors used a panel-regression in which the abnormal return of a firm at the announcement date is the dependent variable. The independent variables consist of the unexpected impairment loss of a firm and the earnings surprise caused by the impairment announcement. The evidence shows that investors and financial analysts revise their expectations downward after the announcement of an impairment loss. The price impact of the impairment loss, while significant, is lower in the post-SFAS-142 period compared to the pre-SFAS-142 and transition period. Since the SFAS-142 tries to improve the rate at which impairment checks are performed this might have two effects. One, information on goodwill impairments becomes earlier available. Two, the size of the impairment might be lower because the impairment is found earlier instead of after years. Both might cause the effect of the impairment loss to be lower in the post-SFAS-142 period. This shows that availability of information and the size of the impairment might have an impact on abnormal returns.

$$\text{Abnormal Return} = a + a1 \times \text{Unexpected impairment loss} + a2 \times \text{Earnings surprise} + E$$

Bens, Heltzer & Segal (2011) look as Li, Shroff et al. (2011) did, at the difference of a goodwill impairment effect before and after the implementation of SFAS 142. The sample consists of 388 firm-years between 1996 and 2006 in which an impairment on goodwill was announced. For the analysis the authors used the short-window abnormal return as the dependent variable. Amongst others, the independent variables are the goodwill impairments gain and loss and the unexpected earnings announcements, excluding the goodwill impairments. Besides the event study the authors also perform a panel-regression in which firm characteristics are incorporated in the regression. The authors find that, on average goodwill impairments show a significant negative abnormal return in an event study analysis. However, in a panel-analyses they find that this negative reaction is smaller for firms with low information asymmetry. Information asymmetry is measured by the amount of analyst attention and institutional ownership. This might suggest that the market impounds information about a possible future goodwill impairment into the price prior to the public announcement by the company. For investors in companies with less information asymmetry it might be easier to anticipate a future goodwill impairment. Following the adoption of SFAS 142, the reaction caused by the goodwill impairment is weakened for the companies with high information asymmetry and does not strengthen for firms with low information asymmetry.

$$AR = a + a1 \times \text{Unexpected Earnings} + a2 \times \text{Unexpected goodwill write-off} + a3 \times \text{Unexpected goodwill write off Post or Pre SFAS 142} + a4 \times \text{Absolute value of loss} + a5 \times \text{Contemporaneously announced positive special charges} + E$$

Table 1: Prior research on the effect on value by impairments on goodwill

Authors	Research Question	Sample	Main Findings
Hirschey & Richardson (2002)	Are there negative share price effects tied to goodwill write- off announcements which suggest economic relevance?	80 goodwill impairment announcements. (1992-1996)	* Negative effect from goodwill impairment announcements is between 2.94% and 3.31%.
Hirschey & Richardson (2003)	Are goodwill impairments apt to represent important economic events for investors, or are they mere accounting adjustments?	80 goodwill impairment announcements. (1992-1996)	* Statistically significant negative abnormal returns tied to goodwill impairments announcements. * Effect around event date of -3.3%. * There is a one year pre-announcement effect of -38.81%. * There is a one year post announcement effect of -8.98%.
Li, Amel-Zadeh & Meeks (2010)	What is the value relevance of goodwill impairment and the information content of impairment announcements?	174 non-financial firms listed on the London Stock Exchange. (1997-2002)	* Goodwill impairment is negatively associated with market values. For the event period (-5,0) an effect of -4.4% and for the event period (-1,1) an effect of -1.9%. * Impairment announcements are associated with a significant decline in share returns.
Bens, Heltzer & Segal (2011)	What are the short term share price effects caused by the SFAS 142: *Goodwill and Other Intangible Assets*?	510 data points in which write-off of goodwill occurred. (1996-2006)	* On average, goodwill impairments induce a significant negative share market reaction in an event study analysis. * Firms with less information asymmetry face smaller goodwill impairment effects. * Following the adoption of SFAS 142, the reaction to the impairment is weakened for companies with more information asymmetry.

Li, Shroff, Venkataraman & Zhang (2011)	What is the reaction of market participants to the announcement of a goodwill impairment loss and the nature of the information conveyed by the loss?	1584 announcements of goodwill impairment losses. (1996-2006)	* Investors and financial analysts revise their expectations downward on the announcement of an impairment loss. * The price impact of the impairment loss, while significant, is lower in the post-SFAS-142 period relative to the pre-SFAS-142 and transition periods.
Xu, Anandarajan & Curatola (2011)	Are goodwill impairment charges value relevant?	After data selection the authors end up with 431 firm-year observations. (2003-2006)	* On average negative share price reactions are found. * Returns for profitable firms are negative, but returns for loss firms are positive.
AbuGhazaleh, Al-Hares & Haddad (2012)	Are goodwill impairment losses value relevant following the adoption of IFRS No. 3 *"Business Combinations"*?	A sample of 528 firm-year observations, drawn from the top 500 UK listed firms. (2005-2006)	* A significant negative association between reported goodwill impairment losses and market value is found. * The effect suggests that these impairments are perceived by investors as a reliable measure to incorporate the decline in the value of goodwill, in the firms' value.
Cheng, Peterson & Sherrill (2015)	What is the impact of goodwill impairment write-offs on share returns after the changes to the accounting rules that reclassified good-will from a wasting asset to a perpetual asset?	3209 firm-quarter observations are retrieved from U.S. based firms that are listed on the NYSE, AMEX, or NASDAQ. (2002-2011)	* A negative share price reaction to goodwill write-offs in the short term is found, -1.38%. * In the long term an economically significant positive effect on share prices is found, 7.92%-8.94%. This suggests that investors have changed their perceptions about goodwill impairment write-offs from a previous acquisition as a positive event in the long term.

3. Hypotheses formulation

In this chapter, the hypotheses are introduced. The hypotheses are based on prior research and economic theory. Where the first hypothesis is all about the short term effect, the second hypothesis will be looking at the long term effect. The effects found, are further investigated in the other hypotheses based on company characteristics.

H1: *Investors react negative to the announcement of an impairment on goodwill in the short term around an impairment announcement.*

Investors who are confronted with negative news from a company they invested in, have a tendency to sell the shares they own in that company. A goodwill impairment will result in lower profit or an increased loss since the impairment is a direct loss for the company. This means that the amount of dividend that can be paid out to the shareholders decreases. It also shows that management has been too optimistic when acquiring companies, since the expected value of goodwill has been estimated too high. All of this might cause investors to sell their shares to prevent losing money. This effect is shown by the following prior research: Hirschey & Richardson (2002) found that after the announcement of an impairment on goodwill there was a negative effect on share prices. In the papers of Li Amel-Zadeh & Meeks (2010) and Bens, Heltzer & Segal (2011) the same result is visible. Both find that around the event date there is a negative effect in the share prices. Li, Shroff, Venkataraman & Zhang (2011) find that both investors and financial analysts use the announcement of an impairment to revise their expectations. Xu, Anandarajan & Curatola (2010) show that there is a negative effect. However, it might be that the financial crisis of 2008-2009 has an influence on the results found in this research. Since a part of the sample period is directly after the financial crisis the recovering effect of that period might take away the negative effect altogether. Therefore, it is interesting to look at the announcement effect of goodwill impairments once more.

H2: *Investors show a negative sentiment towards companies with an upcoming impairment on goodwill in the long term period prior to the announcement.*

Investors are expected to check up on their investments to make sure that they don't lose money. It is very well possible that investors will start selling their shares before an impairment is announced. The investors might expect that management has been too optimistic when

buying other companies. They might expect that a company will have to make an impairment over time. Also the financial figures might show that expected synergies are not showing, making the value of goodwill over time become impaired. Important to add is that companies know that investors don't appreciate impairments, therefore they have a tendency to delay impairments. This will also increase the chances of investors making calculations themselves and therefore knowing that a future impairment is very likely. This tendency to delay impairments is restricted by the new regulations of IFRS 3 and SFAS-142 as is found in the research of Li, Shroff, Venkataraman & Zhang (2011) and Bens, Heltzer & Segal (2011). However, in practice the companies appear to have a hard time applying these regulations[2]. Bens, Heltzer & Segal also found that smaller companies were less able to apply the regulations. Therefore, the new regulation is not expected to completely take away anticipation by investors. The availability of more and more information also supports the assumption that a negative reaction to a goodwill impairment might happen in the period prior to the announcement instead of after the announcement. This theory is supported by the findings of Hirschey & Richardson (2002) who find a pre-announcement (-1 year) effect of -40% and Hirschey & Richardson (2003) who find a pre-announcement (-1 year) effect of -41.77%. Therefore, a negative abnormal return in the year prior to the event date is an indication of investors anticipating a goodwill impairment.

H3: *The effect of an impairment is smaller in the short term and larger in the long term, for companies with relatively large amounts of goodwill on their balance sheet.*

If investors are anticipating a goodwill impairment, than reacting on the amount of goodwill might be an indication for that. As stated before, goodwill is created by paying more for a target company than the book value of that company. When companies acquire a lot of companies this amount of goodwill might become relatively large. Companies paying a lot more for the target company compared to the book value of that target company will see the amount of goodwill become relatively large as well. Both cases increase the chances of goodwill impairments. In the first case, the chance of a goodwill impairment increases because with each target company acquired, the acquiring company runs the risk of overpaying for the company (Li, Shroff, Venkataraman & Zhang, 2011). In the second case, the company has acquired companies by paying a lot of goodwill or done a lot of research and development (R&D). This increases the chance that they over-paid for the company or the R&D doesn't generate the expected cash-flow.

[2] IFRS Foundation March 2th 2018, *Goodwill and Impairment*, https://www.ifrs.org/-/media/feature/meetings/2018/march/cmac/ap4-goodwill-and-impairment.pdf

It also increases the chance that they will not collect the synergy earnings that they expect to be generated by acquiring the company. It might very well be that investors will know this, since the amount of goodwill is presented at the balance sheet. This might result in investors being more cautious with companies that have relatively large amounts of goodwill on their balance sheet. Cautious meaning that they will do their own review of the goodwill to prevent being surprised with impairments. The result of this might be that companies with relatively large amounts of goodwill will see less outspoken effects on their share prices in the short run. In the year prior to the announcement there might be an anticipation effect. Reason for this being that the investors are aware of an increased chance of an impairment announcement.

H4: *The anticipation effect of an impairment is smaller for relatively small impairments and larger for larger impairments and the surprise effect is small for large impairments and small for small impairments.*

If investors are anticipating a goodwill impairment, than reacting on the size of the impairment might be an indication for that. The relative amount of an impairment might have an influence on the impairment effects in both the short and the long term. However, important to understand is that here there are two forces at work. One being the level of anticipation and the other being the size of the impairment. When an impairment is small the expected anticipation is small, since it is harder to anticipate a small impairment. When an impairment is large the expected anticipation is large. The reason for this can be that there need to be bigger more outspoken reasons for large impairments to be necessary compared to relatively small impairments (Xu, Anandarajan & Curatola, 2002). Following this line of reasoning in the short term period surrounding an impairment announcement the large impairment is expected to have a relatively small surprise effect because it was anticipated and the small impairment is expected to have relatively small surprise effect since it is only a small signal.

However, if investors don't anticipate a relatively large impairment the surprise effect of relatively larger impairments might be larger in the short run compared to relatively smaller impairments. Also the relatively smaller impairments are harder to anticipate, therefore those impairments might show both a smaller surprise effect in the short term and a smaller anticipation effect in the long run. Based on this the impairment size can be an indication of anticipating investors.

H5: *The effect of an impairment is smaller in the short term and larger in the long term for companies with less information asymmetry.*

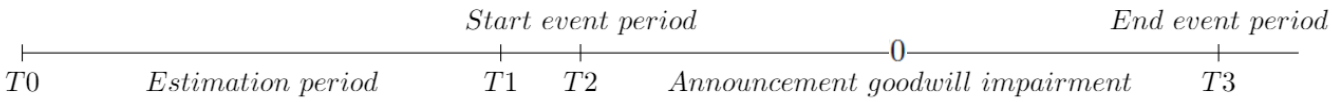
If investors are anticipating a goodwill impairment, than the level of information asymmetry influencing the abnormal returns might be an indication for that. As Bens, Heltzer & Segal (2011) showed, the amount of analysts writing about a company has a decreasing influence on the surprise effect of an impairment announcement. They expect that this is caused by anticipation in the period prior to the announcement. Therefore, this hypothesis tests not only whether companies that have larger information asymmetry face larger surprise effects, but also if they have smaller anticipation effects when announcing a goodwill impairment and vice versa. The reasoning behind this being that investors find it harder to anticipate when less information is available and tend to be more surprised when there is less information available. Prior research has already shown that investors are sensitive for information asymmetry (Affleck-Graves, Callahan & Chipalkatti, 2002). Information asymmetry can be caused by a couple of factors, one is that the company is smaller in size (Collins, Kothari & Rayburn, 1987 ; Freeman, 1987). Larger companies tend to have more attention and therefore less information asymmetry. Sell-side analysts might also have influence on the level of information asymmetry. If they publish information on the company regularly it can take down the level of information asymmetry. Companies that don't have a lot attention from sell-side analysts might find a larger surprise effect in the short term compared to companies that do have a lot of attention from sell-side analysts. (Bens, Heltzer & Segal, 2011). As another measurement of information asymmetry this research introduces the complexity of the company. Companies that have multiple companies within one organisation (holdings) are more difficult to keep track off, compared to a non-holding company.

4. Methodology

For the first two hypotheses an event study is used. The event study is on short term abnormal returns around the event dates and the long term abnormal returns before the event dates. How the abnormal returns are retrieved and how the event dates are selected and found is explained in this section. The second half of this chapter contains the methodology for the panel regressions and the corresponding dependent & independent variables. The abnormal returns are regressed to company characteristics and the relative impairment size in order to see if and how company characteristics and relative impairment size influence them. In the last section the robustness test of the panel regression is described.

4.1 Methodology for Hypothesis 1

4.1.1 Event Definition



The event timeline used in this thesis has five important start and/or end points, T0, T1 T2, 0 and T3. Point 0 in time is the moment a company announces an impairment on goodwill. The estimation periods starts at T0 and continues until T1. This period is used to calculate the normal return. Returns from the event period can be compared to this return to see if there is a difference. For the first hypothesis the estimation period is between -250 days and -50 days to the event (Hirschey & Richardson, 2001). The estimation period is much longer than the event date to make sure that there are no other factors influencing the normal return. When the normal return is calculated based on a short estimation period this makes it less reliable as a normal return.

The event window is the time between T2 and T3. The first hypothesis is focusing on the short term period around an announcement date and consists of four different event periods (-5,5), (-3,3), (-1,1) and (0,3) (Hirschey & Richardson, 2001; Li, Zadeh & Meeks, 2006; Li, Shroff, Venkataram & Zhang, 2011; Bens, Heltzer & Sagal, 2011). This means the T2 and T3 differ based

on the selected event period. The event periods used, investigate the period prior to the exact event date and post the event date. The reason for looking at the days prior to the event date is that information about the goodwill impairment might leak in the days before the announcement. If the information becomes available prematurely, than the investors will incorporate the information in the days before the official announcement of the goodwill impairment. The reason for looking at the days after the event date is that information about the goodwill impairment might need time to get completely incorporated in the share prices. It takes time before the information has reached all the investors and these investors have acted on it. Because of these two reasons the event period needs to be longer than just the day of the event period. By doing so the event periods resemble most of the effect of an impairment announcement.

The date of announcement, 0, is based on the filing date of the annual report. The filing date of the annual report is selected as the event date, since the impairments are most likely to be presented at that moment (Hamberg & Beisland, 2014). Prior research used the annual or quarterly reports as the moment of impairment announcement as well (Xu, Anandarajan, Curatola; AbuGhazaleh, Al-Hares, Haddad; Cheng, Peterson, Sherrill). IFRS, which is the regulation most likely applicable on the European companies used in the sample, doesn't force companies to present their goodwill impairments on any moment other than the annual report. And as already mentioned, insiders of the IFRS Foundation perceive the recognition of impairments at the annual report date to be common practice[3]. The databases of DataStream and Capital IQ show that in all of the impairment years of the sample, the impairments were performed once a year. They all were made public in the first quarter of the fiscal year following the fiscal year they referred to. This makes sense since the companies perform impairment tests on an annual basis unless there are reasons to perform it more than once a year. This makes the use of the filing date of annual reports a good method to find the announcement dates of impairments. It also enables the use of large amounts of companies and impairment years, since the impairments and their announcement date don't need to be handpicked. The number of event dates in this research is therefore, bigger compared to most prior research.

[3] IFRS Foundation March 2th 2018, *Goodwill and Impairment*, https://www.ifrs.org/-/media/feature/meetings/2018/march/cmac/ap4-goodwill-and-impairment.pdf

4.1.2 Cut-off points sample period

The sample period starts at the 1st January 2010 and ends at the 31th of December 2018. The reason to start in January 2010 lies in the fact that half way 2009 IFRS 3 ”Business Combinations” was implemented. The implementation of IFRS 3 ”Business Combinations” meant that companies had to start reviewing their goodwill each time it appeared to be impaired. Before IFRS 3 ”Business Combinations” companies only had to do this once every year. Also goodwill that had a limitless lifespan didn’t need to be amortized within 20 years. Before IFRS 3 ”Business Combinations” a limitless lifespan was not possible for goodwill. All goodwill on the balance sheet had to be amortized over time. After the implementation of IFRS 3 “Business Combinations”, companies could have larger amounts of goodwill on their balance sheet, because some of the goodwill didn’t get amortized. Since the relative amount of goodwill is one of the company characteristics used in the regressions, this difference in goodwill amount before and after the regulation change, might have an effect there. AbuGhazaleh, Al-Hares & Haddad (2012) proofed that there is a difference in the announcement effect before and after the implementation of IFRS 3 “Business Combinations”. Therefore, the sample starts from 2010 onwards, to prevent the data before the change in regulation to influencing the outcomes. As the endpoint the 31th of December 2018 is used, because until that year all the information needed is available.

4.1.3 (Ab)normal Return Measurement

Based on the semi strong form efficient market hypothesis, the investors are expected to incorporate all the information they have in the share prices. The share prices therefore, reflect all available information. Based on this the share price should efficiently adapt once the market is confronted with new information. If new information is considered as information with value impact, there should be a difference between the actual return compared to the normal return. If information is not considered as information with value impact the share prices shouldn’t show any effect. In order to find out if a goodwill impairment announcement is considered information with value impact the share prices should show a reaction once the information is made public.

In order to test the effect of the impairment announcements on the share prices of the companies, the returns of the companies need to be compared to a normal return. This can be done based on measuring the returns of shares around the event date and comparing them to the returns that are considered normal. The normal return can be found based on three different models: the mean adjusted model, the market adjusted model and the market model (MacKinlay 1997). The mean adjusted model uses the mean daily return on each individual firm's share over a predetermined estimation period as a benchmark. The market adjusted model uses the market's daily mean return over a predetermined estimation period as benchmark. Finally, the market model includes a risk adjustment component (beta) to estimate the returns. The betas are obtained in a regression analysis by assessing the individual daily return against the market's return over a predetermined estimation period.

In this research the market model and the mean adjusted model are used to come up with the normal returns. The Euro Stoxx 50 and the Euro Stoxx 600 are used to calculate the normal return based market model. Since all the companies are based in the EU the Euro Stoxx 50 with the 50 biggest companies in the EU is a good benchmark to calculate the normal returns. The Euro Stoxx 600 is also a good benchmark since it represents 600 different companies over 12 different countries. The Euro Stoxx 600 also contains smaller companies where the Euro Stoxx 50 only contains the biggest companies in the EU. The sample used for this research contains a lot of different and smaller companies spread over all the 12 countries used in the Euro Stoxx 600. Therefore, the normal return is calculated both on Euro Stoxx 50 and on the Euro Stoxx 600.

Since the actual return is calculated on a daily basis, the daily share price return (dividend excluded) of the individual firms need to be calculated. This is done based on the following formula:

$$\mathrm{R}_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

Where P is the share price of an individual company at a certain time. This formula was also used for the Euro Stoxx 50 and 600 in order to calculate the normal return.

$$R_{m,t} = \frac{P_{m,t} - P_{m,t-1}}{P_{m,t-1}}$$

Where P is the index price of the Euro Stoxx 50 or Euro Stoxx 600 at a certain moment in time. The abnormal return can be calculated as the difference between the actual return in the event period minus the normal return in the same event period:

$$AR_{i,t} = R_{i,t} - E[R_{i,t}]$$

Where $AR_{i,t}$ is the abnormal return of a company at a certain time and $E[R_{i,t}]$ is the expected return of a company at a certain time. $E[R_{i,t}]$ is calculated based on the mean of the individual firm share price returns in case of the mean adjusted model and the $E[R_{i,t}]$ is calculated based on either the Euro Stoxx 50 or Euro Stoxx 600 in case of the market model.

The formula for the $E[R_{i,t}]$ based on the mean adjusted model is:

$$E[R_{i,t}] = \frac{\sum_{i}^{t} R_{i,t}}{T}$$

Where the sum of the daily returns of the individual firm's estimation period is divided by the amount of days the estimation period is long.

The formula for the $E[R_{i,t}]$ based on the market model is

$$E[R_{i,t}] = \alpha_i + \beta_i R_{m,t} + \epsilon_{i,t}$$

Where:

$$(\text{i})\ \beta_i = \frac{Cov(R_i, R_m)}{Var(R_m)} \qquad (\text{ii})\ \alpha_i = R_i - \beta_i R_m$$

$$(\text{iv})\ Var(R_m) = \frac{1}{T_2 - T_1} \sum_{t=T_1}^{T_2} (R_{m,t} - R_m)^2$$

$$(\text{v}) \quad R_i = \frac{1}{T2-T1+1} \sum_{t=T_1}^{T_2} R_{i,t} \qquad (\text{vi}) \quad R_m = \frac{1}{T2-T1+1} \sum_{t=T_1}^{T_2} R_{m,t}$$

The analysis of the AR isn't performed for one company but for multiple companies. Therefore, next to the AR the Average Abnormal Return (AAR) is calculated. The AAR is the average of the abnormal returns for all the companies at a certain day in the event period. Since not only multiple companies but also multiple day event periods are used, the CAARs need to be calculated as well. The CAAR is the accumulation of each of the AARs depending on the amount of days in an event period. This leads to the following formulas:

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{i,t}$$

$$CAAR_t = \sum_{t=T_1}^{T_2}$$

4.1.4 Hypothesis Testing - H1

To test the first hypothesis, the CAARs of four different event periods are calculated. The first one is starting five days before the event date and ends five days after the event (-5,5). The next event period starts three days prior to the event and ends three days after the event (-3,3). In this shorter event period, the actual event date has more influence on the total CAAR compared to the (-5,5) period. The third period is even shorter, but still has an equal number of days before and after the actual event. This time an event period of one day before the event and one day after the event is taken into consideration (-1,1). Here the actual event date is even more important than the days surrounding it. The final event period for which the CAAR is calculated is the event date itself and three days after the event (0,3). Here the days before the event are not added, which are the days where the announcement wasn't made public yet. Meaning that in this event period the days after the event are considered only and the behaviour of investors after the event can be investigated.

In order to find out if investors are surprised by the announcement of an impairment on goodwill, the CAAR needs to be significantly different from a mean of zero around the event dates. To prove that the first hypothesis is correct, the share price returns should be significantly lower during the event period, compared to the estimation period. This would prove that investors react on the impairment by selling their shares, making prices drop. If this effect is visible around the event date it shows that the investors were not prepared for the impairment announcement. A T-test is used to see if the H_0 hypothesis holds or not:

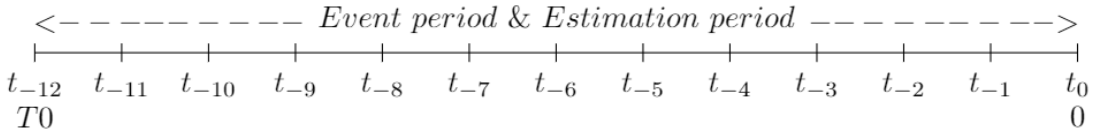
$$H_0\text{: } CAAR_{[-5,5/-3,3/-1,1/0,3]} = 0$$

$$H_1\text{: } CAAR_{[-5,5/-3,3/-1,1/0,3]} \neq 0$$

4.2 Methodology for Hypothesis 2

4.2.1 Event definition & (Ab)normal Return Measurement

The methodology of the second hypothesis is for a big proportion comparable to the first hypothesis. However, this hypothesis is calculating the long term period prior to the event date. This is the time that investors might use available information to anticipate on a goodwill impairment.



For the second hypothesis the estimation period is equal to the event period, meaning one year before the event date. Reason for this is that the hypothesis is tested with the buy and hold abnormal return (BHAR). The BHAR calculates the abnormal return by comparing the monthly return of an individual company with the monthly return of a benchmark. Here the benchmark is either the Euro Stoxx 50 or the Euro Stoxx 600. The return of the benchmark is compared one on one with the actual return of the companies (Hirschey & Richardson, 2003). This will result in a month by month comparison of the normal return and the actual return. Because of

this it is not necessary to calculate the normal return based on an estimation period as is done for the short term event period of hypothesis one. An estimation period before the event period is necessary in hypothesis one because there the event period is relatively short, meaning a direct comparison there could be influenced by a lot of other factors which are not considered.

The benchmark returns and the actual returns are calculated based on the daily returns in the year prior to the event. However, for this hypothesis the monthly returns are needed. The daily share price returns and daily benchmark returns are calculated the exact same way as under hypothesis one. The formula to calculate the monthly returns based on the daily returns is:

$$\text{Monthly return} = (\prod (1 + (R_{t-1} - R_t))) - 1$$

Meaning that one is multiplied by the return of the first day after which that number is multiplied by the return of the second day, etc. In the end one is subtracted, which results in the monthly return. This is done for each month and for both the benchmark return and the actual return. After this it is possible to make a comparison between the benchmark return and the company monthly returns. Reason for using the BHARs and not the CARs here is that BHARs employ geometric returns rather than arithmetic returns in calculating the overall return over the event period. Thus the BHAR can allow for compounding whereas the CAR does not. (Ritter 1991; Barber and Lyons 1997; Lyons et al. 1999). This makes the BHAR method in the long run more reliable than the CAR method. The BHAR is calculated as follows:

$$\text{BHAR}_{i,t} = \prod_{t=1}^{t} [1 + \text{R}_{i,t}] - \prod_{t=1}^{t} [1 + \text{BR}_{m,t}]$$

Where:

$\text{BHAR}_{i,t}$: the buy-and-hold abnormal return for $\text{R}_{m,i}$ in month t
$\text{R}_{i,t}$: the return of the individual firm in month t
$\text{BR}_{m,t}$: the return on the benchmark in month t

Because there are multiple firms the BHAR of the other firms had to be averaged in order to test the hypotheses for all the companies. This was done the same way as for the abnormal returns in hypothesis one. The average of the individual BHARs is calculated with the formula:

$$\text{ABHAR}_{i,t} = \frac{1}{N} \sum_{i=1}^{N} BHAR_{i,t}$$

Finally, to see what the cumulative return of the entire year prior to the announcement would be, the Cumulative Buy and Hold Abnormal Return is calculated. Cumulative Buy and Hold Abnormal Return is not a common used word but this is the best way to cover that what is stands for. It basically is the same as the ABHAR but in this case the return used is not of one month but of two to twelve months. The CBHAR is used for the regressions in hypotheses three to five.

$$\text{CBHAR}_{i,1,12} = \sum_{i=1}^{12} ABHAR_{i,t}$$

4.2.2 Hypothesis Testing - H2

In order to find out if investors are foreseeing an impairment on goodwill the ABHAR and the CBHAR need to show a significant result in the year before the announcement. To prove that hypothesis two is right the share price returns of the firms announcing an impairment need to be significantly lower during the event period, compared to the benchmark returns. This would prove that investors anticipate on the impairment by selling their shares, making share prices drop. A T-test is used to see if the ABHAR and CBHAR are significantly different from zero:

$$H_0: \text{ABHAR}_{i,t} = 0$$

$$H_1: \text{ABHAR}_{i,t} \neq 0$$

and

$$H_0: \text{CBHAR}_{i,t=(-12,0)} = 0$$

$$H_1: \text{CBHAR}_{i,t=(-12,0)} \neq 0$$

4.3 Methodology for Hypotheses 3-5

4.3.1 Hypothesis Testing - Hypotheses 3-5

The formula to test the hypotheses 3-5 are using either the CAAR(-5,5) or the CBHAR(-12,0) as the dependent variables for respectively the short period and long period. This means that initially the full period abnormal returns are used to investigate the relation between the variables and the abnormal returns. This is because these event periods capture all the reaction from the investors. For the short term period this means both the premature reaction due to leaked information as the lagged reaction due to the time needed for information to reach all the investors. Another reason to start with the CAAR(-5,5) lies in the fact that there might be a stronger relationship between the dependent variables and the independent variables. Also, since most prior research do not investigate the (-5,5) period this might add to the prior findings. In section 6.3.2 other period abnormal returns are used like the CAAR(-1,1) which is often used as a dependent variable in prior research. In the last three hypotheses of this research the abnormal returns of the first two hypotheses are investigated based on relative impairment size and company characteristics. To see if there is a difference in the abnormal returns based on differences in impairments and companies. Four differences between companies are investigated, the relative amount of goodwill, the size (total amount of assets), the total amount of sell-side analysts and the organisational complexity of the companies. These characteristics and the relative impairment size are the independent variables in the panel regressions. The CAARs and CBHARs are the dependent variables. The reason to use the CAAR and not the MeanCAAR is because the CAAR is calculated based on the market model which is more reliable than the Mean Adjusted model. The CBHAR is used instead of the ABHAR because it takes multiple months into account instead of just one month. Therefore, the outcome of the regression will be explanatory for multiple months instead of just one month.

The variables used in the panel regression for the third hypothesis are made based on the assumption that companies with relatively large amounts of goodwill might cause investors to be more cautious for impairments. The variables are build up by the amount of goodwill compared to the total amount of assets. These values are compared with each other by dividing the total amount of goodwill by the total amount of assets. Based on this it was possible to make three variables, one being the total Goodwill sample, two and three being either companies with relatively large amounts of goodwill and companies with relatively small amounts of goodwill.

The GoodS variable is the first quartile of the sample being the companies with relatively small amounts of goodwill and GoodL the fourth quartile being the companies with the relative large amounts of goodwill. Based on this three variables are made **Goodwill, GoodS, and GoodL**. The Goodwill variable is representing the actual values of goodwill/total assets. The GoodS and GoodL are dummy variables being either one if they apply for a company or zero if they don't. Under data selection this variable is investigated on an industry level to see if there are major differences. If this is the case than the analysis will take this differences in account by using industry fixed effects.

Other variables that were used in the panel regression are based on the relative size of the impairments. These variables are used for the fourth hypothesis. The variables are build up by the value of the impairment divided by the total amount of assets. The fourth hypothesis is based on the assumption that companies with relatively large impairments might see larger anticipation effects in their share prices because the impairments are easier to anticipate. Because of this three variables are made, one being the total Impairment sample, two and three being either companies with relatively large impairments and companies with relatively small impairments. The ImpairS variable is the first quartile, being the companies with relatively small impairments and the ImpairL is the fourth quartile, being the companies with relatively large impairments. Based on this three variables are made **Impairment, ImpairS, and ImpairL**. The Impairment variable is representing the actual values of the impairments/total assets. The ImpairS and ImpairL are dummy variables being either one if they apply for a company or zero if they don't. Under data selection this variable is investigated on an industry level to see if there are major differences. If this is the case than the analysis will take this differences in account by using industry fixed effects.

The seventh variable was created based on the size of the companies. The size of the company is based on the natural logarithm of the total amount of assets on the balance sheet. The rationale behind this variable is that investors investing in large companies face less information asymmetries since it is more likely that information is available. This means information asymmetries might be higher for companies which are smaller in size and lower for companies which are larger in size.

The eighth variable is created based on the structure of companies. Investors that invest in companies with a lot of companies within the organisation (complex organisational structure) like holdings might face more information asymmetries because the company is less transparent. Important to mention here is that this variable is purely based on the length of the organisational structure a companies is positioned in, meaning that the amount of divisions, product lines or any other differentiated aspect of a company are not taken into the equation. The companies are divided into two groups of companies with the first half being the companies with a relatively small amount of companies within the organisational structure and the second half being the companies with a relatively large amount of companies within the organisational structure. Based on this the dummy variable **Organisational complexity** is made. The variable is one for companies that are considered to be part of a non-complex organisational structure. The effect found is therefore true for these type of companies. Since the variable is a dummy variable this means the inverse effect is true if the variable is 0, meaning for companies that are part of a complex organisational structure.

The ninth variable was created based on the information available about a company. The availability of information will make it easier for investors to collect information about the well-being of the company, whether goodwill is likely to be impaired or not, etc. A way to collect that information is by using sell-side analysts' rapports. These analysts collect and distribute important information about companies, hereby decreasing the information asymmetry. When a lot of analysts are focusing on a company, it will be easier for investors to collect a lot of information. Meaning companies with a lot of attention from analysts might see less of a surprise reaction in the short term and a larger anticipation effect in the long run.

4.4 Robustness tests

The regressions are tested both for multicollinearity and heteroscedasticity. The test used for the multicollinearity is the variable inflation factor (VIF). If the VIF shows a value higher than 10 for one of the variables used in the regression this might indicate multicollinearity. This would mean variables are correlated and therefore influence each other's coefficients and significance. In order to make sure the regressions don't suffer from heteroscedasticity, the White test is used to test the regressions.

The regressions of the hypotheses 3-5 are based on the (-5,5) short term period and the 12 month long term period. The outcomes of the coefficients in the regressions are therefore, based on the data from these periods. However, in order to see if the results are consistent over time it is necessary to compare the results with regressions that use different time periods. For the short term period these are the already calculated CAARs and MeanCAARs for the periods (-3,3), (-1,1) and (0,3). For the long term period the different time periods are selected based on the behaviour of the monthly ABHARs. In chapter 6 it is shown that the CBHAR becomes more and more negative for the months 1-9. In the months 10-12 the ABHARs are positive and because of this the CBHAR becomes less negative. Therefore, the year prior to the event date is divided in two periods, the 1-9 months and the 10-12 months. The regressions will be rerun for these months as is done for the 12 month period. For both the short term period and the long term period the results of the new regressions will be compared to the initial regressions. Based on this conclusions can be draw on whether the results are consistent or different time periods have different results.

5. Data selection

5.1 Impairments, Company characteristics & Filing dates

To end up with impairment announcement dates, first the companies are selected. Using Capital IQ all the companies being listed in a developed European country are collected. The listed companies are spread over all the market types except for the financial market. Most other papers deselected the financial market, so for comparability this is done in this sample as well. This results in a total of 6055 listed companies. For each of these companies the impairments, goodwill, total assets, number of sell-side analysts and organisation complexity details are collected.

Only companies with impairments in the year 2010 up until 2018 are used in the sample therefore, the companies without an impairment in that time period are taken out. This results in a sample size of 829. The impairment, goodwill and total assets variables show some large outliers. To make the dataset more normalized, truncation is used. This is done by calculating the medians and the standard deviations. Based on this any company with outliers larger than the median plus three times the standard deviation is taken out of the sample. After this the variables of the companies look more or less normalized, Figures 2-3. The total amount of companies after the truncation is 643.

Figure 1: Histograms of Total Assets, Goodwill / Total Assets and Impairment / Total Assets before deselecting

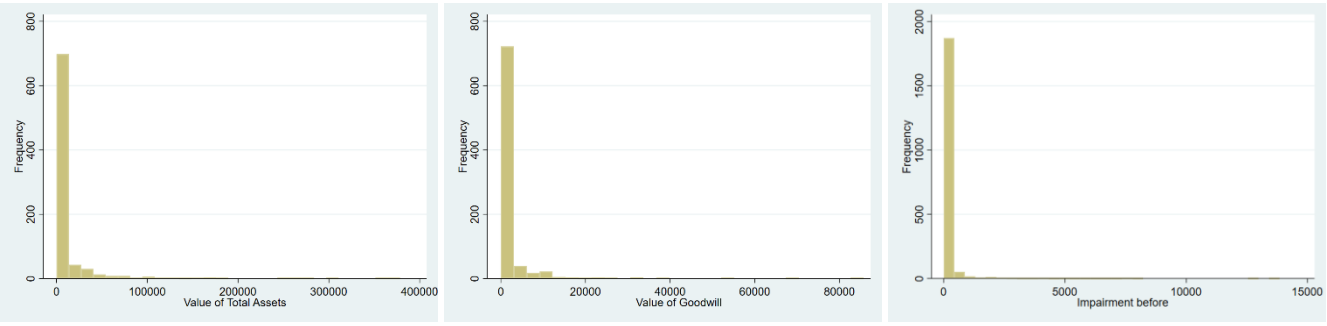
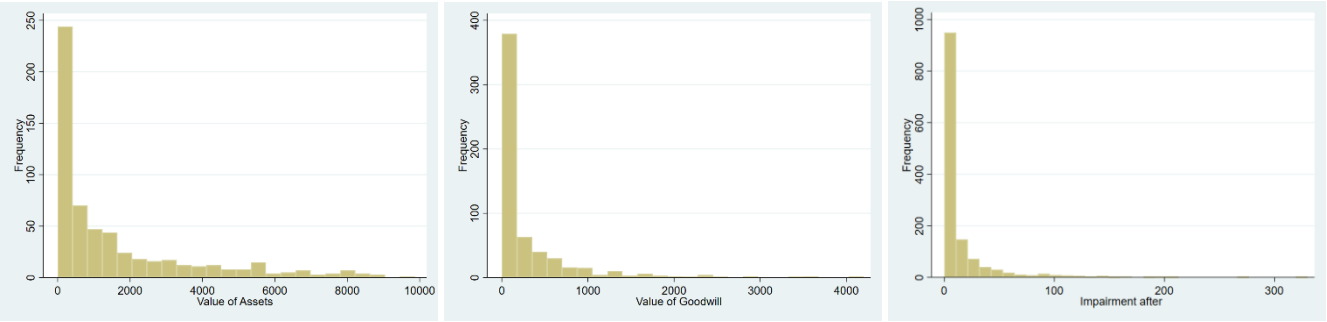


Figure 2: Histograms of Total Assets, Goodwill / Total Assets and Impairment / Total Assets after deselecting



As stated before, the impairments are all yearly. Based on this information and the information that by far the most of the impairments are announced in the annual report, the filling date of the annual report is selected as the announcement date. The filing dates could not be collected from Capital IQ and had to be collected from Compustat. Companies that had no available filing dates for all of their impairments were taken out of the sample. Then the impairment years could be combined with the filing dates of that year, resulting in 567 companies. Since some of the companies have more than one impairment in the time period 2010-2018 the total amount of observations during the years 2010-2018 based on the 567 companies is 1215.

As stated in the methodology the variables goodwill and impairment are investigated on an industry level. In order to see if there are major differences in impairments and goodwill per type of industry the sample is divided into six types of industries: Customer services, Information & Communication, Health Care, Industrials, Materials and Real Estate. The results can be found in Table 2. These industry classifications are based on the Capital IQ database. For the Customer services industry the average impairment is €8.8 thousand. For the Information & Communication industry the average is €16.6. For the Health Care industry the average is €16.5 thousand. For the Industrials industry the average is €16.6 thousand. For the Materials industry the average is €12.0. Lastly the average for the Real Estate industry is €12.1 thousand. Considering the fact that the average of the total sample is €14.5 thousand these averages are relatively comparable to the total sample. Only the average impairment of the Customer services industry is a bit on the lower side.

The same is done for the amount of Goodwill. For the Customer services the average amount of goodwill is €302 thousand. For the Information & Technology industry the average is €301 thousand. For the Health Care industry the average amount of goodwill is €277 thousand. For the Industrials industry the average is €369 thousand. For the Materials industry the average is €390 thousand and for the Real Estate industry the average is €405 thousand. Considering the fact that the average of the total sample is €369 thousand these averages are also relatively comparable to the total sample. Considering the fact that there are no major differences among the industries when it comes to impairments and goodwill, the differences between industries will not be further investigated in this research.

The last two variables were collected from Thomson Reuters. The first of those is the Organisational complexity variable. This variable was created by looking at the organisational structure of the companies used. The companies that have a lot of different companies within their organisational structure, for example holdings, are considered less transparent compared to companies with a more simple organisational structure. The larger the organizational complexity the smaller the transparency. This variable is purely based on a mother company with a certain amount of daughter companies, meaning that the amount of divisions, product lines or any other differentiated aspect of a company are not taken into the equation. Companies that have no mother or daughter companies are considered not complex. Companies that have mother or daughter companies are considered complex. The second of the last two variables is based on the amount of sell-side analysts that are reporting information about the companies. The data is summarised in Table 2. An overview of the data selection and truncation can be found in Table 3.

5.2 Return data

The daily share prices of the selected companies and the Euro Stoxx 50 and Euro Stoxx 600 were taken from DataStream. An event study tool from the Erasmus University Data Team was used to retrieve the daily prices of both the company stocks and the benchmarks Euro Stoxx 50 and Euro Stoxx 600. The tool calculated the mean adjusted abnormal returns based on the estimation period and the returns in the event window. It also calculated the market model based abnormal returns. For this it used the alphas and betas of the Euro Stoxx 50 or Euro Stoxx 600 benchmark.

Table 2: Descriptive data statistics

Company characteristics	Amount	Bottom of range (x1000)	Top of range (x1000)
Companies	567		
Observation years	1215		
Impairments	1215	€ 2	€ 330.000
Small impairments	332	€ 2	€ 1.060
Large impairments	332	€ 13.100	€ 330.000
Goodwill	1215	€ 696	€ 5.172.000
Small amounts of goodwill	332	€ 696	€ 23.466
Large amounts of goodwill	332	€ 328.841	€ 5.172.000
Size	1215	€ 4.484	€ 31.153.888
Number of sell-side analysts	1215	0	29
No organisational complexity	958		
Organisational complexity	371		

Industry type	Amount	Impairment average (x1000)	Goodwill average (x1000)
Customer services	247	€ 8.8	€305
Information & Communication	386	€16.6	€301
Health care	77	€16.5	€277
Industrials	377	€16.6	€369
Materials	116	€12.0	€390
Real estate	12	€12.1	€405
Sample	1215	€14.5	€331

The total amount of companies used in this research is 567. For some of the companies there are multiple observation years leading to a total of 1215 observation years. The impairment and goodwill ranges are shown both for the total and for the first and fourth quartile. The impairments, goodwill amounts and size amounts are all in €. The range of analysts per company vary from zero to 29. Furthermore there are 958 companies that are qualified as non-complex organisation and 371 as complex organisations.

Further the impairment and goodwill variables are split to see if there are major differences among the 6 industry types: Customer services, Information & Communication, Health care, Industrials, Materials and Real estate. Based on the comparison with the total sample there are no major differences. Only the impairment average of customer services is a bit on the lower side.

Table 3: Data selection

Filtering argument	Amount before	Amount after
Companies from Capital IQ without financial market companies	7003	6055
Companies with impairments between 2010 and 2018	6055	829
Companies without outliers in their impairments, goodwill and total assets	829	634
Companies with available filing dates	634	567

This table gives a short summary of how the data sample was filtered from total amount of European listed companies to companies used in the sample.

6. Results and Analysis

6.1 Event Study

6.1.1 Hypothesis 1

Investors react negative to the announcement of an impairment on goodwill in the short term around an impairment announcement.

Table 4 depicts the CAARs for the four event periods (-5,5), (-3,3), (-1,1) and (0,3). The estimation results of the market model are contrasted with those from the alternate mean adjusted model. For all the estimates the t-Statistics and the significance levels are given at a 0.10, 0.05 or a 0.01 level. Overall, it can be concluded that both the mean adjusted model and the market model adjusted based on the Euro Stoxx 50 and Euro Stoxx 600 show estimates that are comparable. The estimates are also all significant at a 0.01 level.

The results of the CAARs suggest that in the short term there is a small positive effect that is significant at a 0.01 level. This effect can be found throughout all the three methods used. For the (-1,1) period the effect is 0.60%. and it appears that the positive effect is getting bigger when the event period is getting bigger. However, the effect is not growing with the same ratio as the growth of the amount of days. This means that some days the return effect is larger or smaller than other days. In order to say anything about the day to day effect the AARs need to be investigated. This results in Table 5 and Figure 4.

Figure 4 shows that for each day the AAR is positive most of which are significant at a minimum level of 0.10 level. However, it is not possible to say anything about the way the AARs behave over the course of the event. They seem to follow a more or less comparable pattern but not a particular pattern. This makes it hard to draw certain conclusions about the positive effect that is found based on the CAARs. If there was a negative effect at day 1 or day -1 that was completely offset by other days than the AARs would have revealed that in the graph, but this is clearly not the case. The line more or less goes along the 0.2% line.

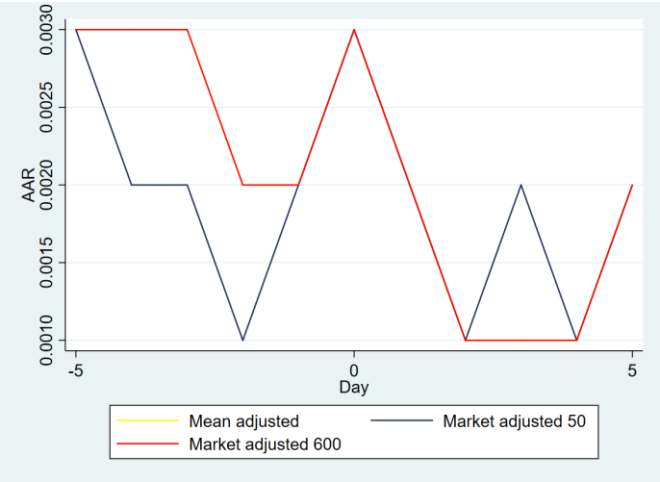
Table 4: CAARs over the (-5,5), (-3,3), (-1,1) and (0,3) event periods for goodwill impairments (N=1215)

Event date Goodwill	Market model adjusted CAAR	Mean-adjusted CAAR
Panel A: Goodwill announcement effect Market adjusted Euro Stoxx 50 & Mean adjusted CAAR		
Event period (-5,5)	1.90%	2.10%
t-Statistic	(6.30)[c]	(6.90)[c]
Event period (-3,3)	1.20%	1.30%
t-Statistic	(4.80)[c]	(5.05)[c]
Event period (-1,1)	0.60%	0.60%
t-Statistic	(3.25)[c]	(3.50)[c]
Event period (0,3)	0.70%	0.70%
t-Statistic	(3.95)[c]	(3.80)[c]
Panel B: Goodwill announcement effect Market adjusted Euro Stoxx 600		
Event period (-5,5)	2.00%	
t-Statistic	(6.55)[c]	
Event period (-3,3)	1.20%	
t-Statistic	(4.80)[c]	
Event period (-1,1)	0.60%	
t-Statistic	(3.40)[c]	
Event period (0,3)	0.70%	
t-Statistic	(3.85)[c]	

Mean-adjusted, market model CAARs (Euro Stoxx 50 & 600) and *t*-Statistics are shown for the (-5,5), (-3,3), (-1,1) and (0,3) event periods. This was done in order to be sure the results of the comparable indexes are robust. The analysis suggests a 1.90-2.10% positive return for the (-5,5) window, a 1.20-1.20% positive return for the (-3,3) window, a 0.60% positive return for the (-1,1) window and a 0.70% positive return for the (0,3) window. The t-Statistic of the estimates is shown in the parenthesis under the estimate. All the results are significant on a 0.01 significance level.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

Figure 3: Graph of daily AARs for the event period (-5,5) based on the Market model, Euro Stoxx 50 & 600 and the Mean Adjusted model.



This is a graphic representation of Table 5, which are the daily AARs for the event period (-5,5) based on the Market model, Euro Stoxx 50 & 600 and the Mean adjusted model. The Mean adjusted AARs follow the Market model Euro Stoxx 50 AARs until day 2, after which it follows the Market model Euro Stoxx 600 AARs.

Fact is, however, that on a three day period a return of 0.60% is found that is significant at a 0.01 level. Most of the prior research uses a three day period therefore, these will be used to compare the results. Hirschey & Richardson (2002, 2003) found three day abnormal returns of -3.52% and -2.83%. The magnitude of the effects found in Hirschey & Richarson's researches are bigger compared to the smaller and positive effect found in this research. Li, Amel-Zadeh & Meeks (2010) found a three day CAR of -1.90% and Li, Shroff, Venkataraman & Zhang found a three day CAR of -1.69% which are also negative and bigger in magnitude compared to the positive and smaller effect found in this research.

Table 5: AARs over the (-5,5) event periods for firms announcing goodwill impairments, (N=1215)

Event date	Mean-adjusted AAR	Market adjusted Stoxx 50 AAR	Market adjusted Stoxx 600 AAR
Panel A: Market adjusted Euro Stoxx 50 & 600 & Mean adjusted AAR			
Day (-5)	0.30%	0.30%	0.30%
t-Statistic	(3.80)[c]	(3.35)[c]	(3735)[c]
Day (-4)	0.30%	0.20%	0.30%
t-Statistic	(2.80)[c]	(2.25)[b]	(2.50)[b]
Day (-3)	0.30%	0.20%	0.30%
t-Statistic	(2.15)[b]	(1.95)[a]	(1.95)[a]
Day (-2)	0.20%	0.10%	0.20%
t-Statistic	(1.30)	(1.10)	(1.25)
Day (-1)	0.20%	0.20%	0.20%
t-Statistic	(2.00)[b]	(1.45)[c]	(1.55)
Day (0)	0.30%	0.30%	0.30%
t-Statistic	(1.95)[a]	(1.9)[a]	(2.05)[b]
Day (1)	0.20%	0.20%	0.20%
t-Statistic	(2.7)[c]	(2.95)[c]	(2.95)[c]
Day (2)	0.10%	0.10%	0.10%
t-Statistic	(1.85)[a]	(1.9)[a]	(1.7)[b]
Day (3)	0.20%	0.20%	0.10%
t-Statistic	(1.65)	(1.8)[a]	(1.6)
Day (4)	0.10%	0.10%	0.10%
t-Statistic	(1.85)[a]	(1.25)	(1.55)
Day (5)	0.20%	0.20%	0.20%
t-Statistic	(1.90)[a]	(1.80)[a]	(1.95)[a]

Market-adjusted, mean-adjusted AARs and *t*-Statistics are shown for the days (-5,5) event-period. This was done in order to see how the ARs behave at each certain day. The analysis suggests that the positive return varies between 0.10-0.30% for the days in the (-5,5) window. 25 of the 33 days are at least significant at a 0.10 level.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

This leads to two conclusions: The magnitude of the effects found in prior research are bigger and the effects in prior research have different signs compared to this research. This means that based on these results the first hypothesis is rejected and the results found in prior research are contradicted.

There might be a couple of reasons why this is happening. At the start of the sample period the economy was still recovering from the financial crisis of 2008 and 2009. This might have two effects for the results of this research. The first effect is that investors were sceptical in general. They might have priced in a more pessimistic view on the impairment of goodwill. After the companies published the actual goodwill impairments this might have been more positive than expected, causing a positive reaction of relieve. Contributing to this is the fact that companies can publish the actual impairment in the annual report which might be in less disastrous times compared to the first month of that year. This is especially the case when the economy is recovering which is the second effect. On the 26th of 2012 Mario Draghi held a speech in which he comforted the financial market with the promise that the European Union would do 'Whatever it takes' to preserve the Euro. After this there was a long and steady recovery for most of the European stocks markets, which might be the second effect influencing the results of this research. Since this period of recovery is in the middle of the sample period, the positive effect might cause the negative effect of goodwill impairments to disappear. This positive effect was not there in the sample periods of prior research.

A different reason that might cause the effect of goodwill impairment to be no longer negative lies in the availability of information. If investors have more and more information at their disposal, this might result in a reduction of the surprise effect after an impairment announcement. Investor might have anticipated an impairment long before it was announced, which can reduce the surprise effect at the event. It is therefore interesting to look at abnormal returns in the time prior to the announcements.

6.1.2 Hypothesis 2

Investors show a negative sentiment towards companies with an upcoming impairment on goodwill in the long term period prior to the announcement.

Table 6 depicts the ABHARs and CBHARs in the year prior to the announcement of a goodwill impairment. For each month the t-Statistics and the significance level are provided as well. Only in three out of the 24 cases the estimates are not significant at a level of 0.10 or lower. Overall, it is clear that the abnormal return at the first month of the year is positive, than it is negative for a consecutive 8 months, after this it becomes positive again. In the last month the abnormal return is also relatively large in magnitude compared to the other months. The monthly ABHARs show returns that vary between 1.80% and minus 0.70%. The CBHARs start with a positive return after the first month of 0.60% and reach a level of minus 3.90% in the ninth month. The 12 month CBHAR prior to the event period is -0.30% (Table 6 & Figure 5).

For the months 10-12 the positive ABHAR might indicate that there is no longer a negative anticipation but a positive anticipation close to the announcement. In section 6.1.1 the conclusion is that in the short term the abnormal returns are positive. One of the possible explanations for the positive abnormal returns in the short term is that the investors are positively surprised with the actual impairments. In section 6.1.1 it is also mentioned that the economy in Europe is recovering from the financial crisis for a part of the sample period. Because of this recovery impairments on goodwill might be less severe than investors anticipated in the year prior to the event. In the last months before the announcement of an impairment investors might anticipate that the situation is not as bad as they initially anticipated. The third quarter results might be a good signalling point that the financial situation of a company is not as bad as expected. The third quarter results are usually published in the 9th month of a fiscal year, which is exactly the point the ABHARs start to become positive.

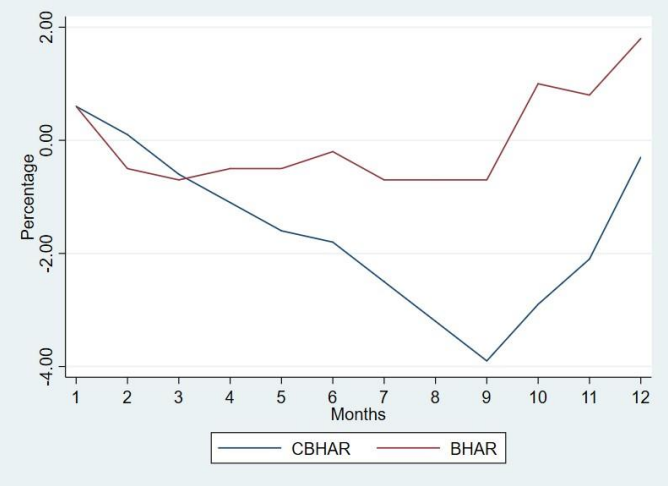
Table 6: ABHARs & CBHARs over the one year pre-announcement period for firms announcing goodwill impairments (N=1215)

Months prior to event	ABHAR	CBHAR
Panel A: Goodwill announcement effect year prior to the event		
Month 1	0.60%	0.60%
t-Statistic	(2.30)[b]	(2.30)[b]
Month 2	-0.50%	0.10%
t-Statistic	(-1.85)[a]	(0.44)
Month 3	-0.70%	-0.60%
t-Statistic	(-2.05)[b]	(-1.00)
Month 4	-0.50%	-1.10%
t-Statistic	(-1.90)[a]	(-1.76)[b]
Month 5	-0.50%	-1.60 %
t-Statistic	(-1.80)[a]	(-2.40)[b]
Month 6	-0.20%	-1.80 %
t-Statistic	(-0.55)	(-2.39)[b]
Month 7	-0.70%	-2.50 %
t-Statistic	(-2.50)[b]	(3.17)[c]
Month 8	-0.70%	-3.20 %
t-Statistic	(-2.30)[b]	(-3.62)[c]
Month 9	-0.70%	-3.90 %
t-Statistic	(-2.20)[b]	(-4.12)[c]
Month 10	1.00%	-2.90 %
t-Statistic	(3.25)[c]	(-2.87)[b]
Month 11	0.80%	-2.10 %
t-Statistic	(2.95)[c]	(-2.00)[b]
Month 12	1.80%	-0.30 %
t-Statistic	(4.90)[c]	(-0.25)

The ABHARs and CBHARs are shown for each month in the year prior to the event. The ABHARs are calculated by comparing the company returns to a benchmark. The benchmark used is the Euro Stoxx 600 since this has the largest number of companies and covers companies through all the countries used in the sample of this research. For both the ABHARs and the CBHARs the *t*-Statistics are given. The ABAHRs show significance at the three levels for almost all the months except for month six. The CBHARs show to be significant as well. Except for the months two, three and twelve. The monthly ABHARs show returns that vary between 1.8% and minus 0.70%. The CBHARs start with a positive return after the first month of 0.60% and reach a level of minus 3.90% in the ninth month.

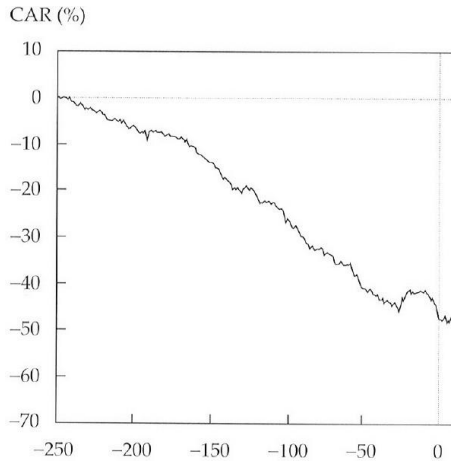
a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

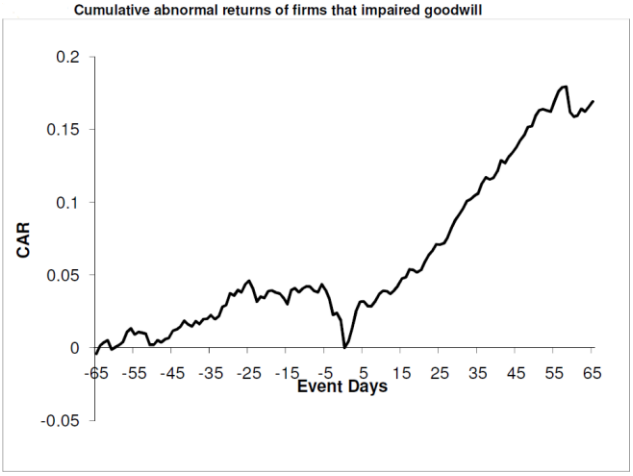
Figure 4: Graph of the monthly ABHAR and the monthly accumulation of the ABHAR based on this research



There are two prior researches that contribute with their findings to this hypothesis, Hirschey & Richardson (2003) and Li, Amel-Zadeh & Meeks (2010). As Figure 6 shows, Hirschey & Richardson (2003) found negative abnormal returns in the period prior to the event date. They calculated the (-250,0) cumulative daily abnormal return before the event. Their cumulative abnormal return starts at zero or slightly positive and then becomes more and more negative until it reaches a cumulative abnormal return of -41.77%. In the last month the cumulative abnormal return shows a less negative abnormal return. This means that the daily abnormal return itself was positive in the last month. Li, Amel-Zadeh & Meeks (2010) looked at the cumulative daily abnormal returns in the 65 days prior to the event (Figure 6).

Figure 5: Graph of the CARs (-250,0) based on Hirschey & Richardson (2003) & Graph of the CARs (-65,65) based on Li, Amel-Zadeh & Meeks (2010)





Their cumulative abnormal returns start slightly negative and become increasingly more positive in the days approaching the event, meaning the abnormal returns in these days are positive. Only at the event date the cumulative daily returns show a drop in the abnormal returns.

When combining the two results of these two papers, the results of this research are comparable. First, the cumulative monthly abnormal returns in this research show a constant drop in the months two until nine. Second, in the last three months the abnormal returns are positive making the cumulative returns become less negative. These two effects are mostly comparable to the cumulative abnormal returns of Hirschey & Richardson (2003). The effect of the positive abnormal returns in the two months is one on one comparable to the results of Li, Amel-Zadeh & Meeks (2010).

When it comes to the magnitude of the abnormal returns, Hirschey & Richardson (2003) find large negative abnormal returns. The results of this research are not that large. However, the sample size of Hirschey & Richardson (2003) is only 80 whereas this research uses 1215 events. Hirschey & Richardson (2003) handpicked their events making the large and more pronounced impairment announcements more likely to end up in their sample. This might have resulted in more outspoken effects on the abnormal returns. This statement is backed up by the fact that the research of Cheng, Peterson & Sherril (2015) which uses 3209 events show monthly abnormal returns of 0.31% until 2.06% which are in magnitude (not in sign) comparable to the monthly abnormal returns found in this research. This shows that when the sample size is larger the magnitude of the effect is smaller.

The conclusion that can be drawn from these results is that in the period prior to the announcement of a goodwill impairment, the investors show a negative sentiment towards the companies. This means the second hypothesis holds. Whether this is because they anticipate on the announcement of a goodwill impairment is not a conclusion that can be drawn directly from these results. However, Hirschey & Richardson (2003) also seek the rational of the increasingly negative cumulative abnormal returns in the anticipation by investors on a goodwill announcement.

Summary

To conclude, these results show a positive significant abnormal return in the short run, for all the event periods used. This contradicts the results found in prior research and might be proof that the surprise effect based on a goodwill announcement is no longer in existence due to the sample period used in this research or due to the availability of more and more information. As was found in prior research in the long term period before a goodwill announcement there are significant negative abnormal returns. These might be caused by investors anticipating the goodwill announcements.

6.2 Panel regression

6.2.1 Hypothesis 3

The effect of an impairment is smaller in the short term and larger in the long term, for companies with relatively large amounts of goodwill on their balance sheet.

In the third hypothesis the effect of impairments on goodwill is investigated on a goodwill level. The amounts of goodwill vary between companies and this difference might be visible in the effect of a goodwill impairment announcement. In order to test this a panel regression is run for the short and long term abnormal returns. In section 6.2 the CAAR is always the CAAR(-5,5), the MeanCAAR is always the MeanCAAR(-5,5) and the CBHAR is always the 12 month CBHAR. First, the relative amount of goodwill is regressed against the short term announcement effect. The CAAR(-5,5) and MeanCAAR(-5,5) that were calculated in the first two hypotheses are used as the dependent variables and the relative amount of goodwill is used as an independent variable. Multiple regressions are run with a varying amount of independent variables in order to see how the coefficients and significance levels of the variables alter when other variables are added.

Tables 7 & 8 show the results of the regressions. The expected signs represent the expected way the variables influence the CAAR or MeanCAAR based on the hypothesis formulated in chapter four. For the Goodwill variable it is expected that the coefficient will have a negative influence on the CAAR and MeanCAAR. The reason for this is that the increase in goodwill might make investors expect the chance of an impairment on goodwill to be higher. The surprise effect will be lower due to this. In line with this reasoning the GoodS variable, the companies with

relatively small amounts of goodwill, are expected to have a positive sign. For the variable GoodL, companies with a relatively large amount of goodwill, the expected sign is therefore negative.

The results of the coefficient are presented in columns 1b-1e. Regression 1b is solely focusing on the effect of goodwill on the CAAR and MeanCAAR. In regression 1c the Size factor is added. In regression 1d the Number of sell-side analysts is added and in regression 1e the Organisational complexity is added. Table 7 & 8 show that the variables of Goodwill, GoodS and GoodL are not significant in any of the regressions. This means that, based on these results, in the short term the variables Goodwill, GoodS and GoodL have no significant influence on the level of the abnormal returns.

Second, the relative amount of goodwill is regressed against the long term announcement effect. CBHAR of the year prior to the announcement is used as the independent variable and the relative amount of goodwill is used as a dependent variable. Again multiple regressions are run with a varying amount of dependent variables.

The results of the coefficient are presented in columns 1b-1e of Table 9. Regression 1b is solely focusing on the effect of goodwill on the CBHAR. In regression 1c the Size factor is added. In regression 1d the Number of sell-side analysts is added and in regression 1e the Organisational complexity is added. As Table 9 shows the variables GoodS and GoodL have no significant influence on the dependent variable. However, the total amount of Goodwill does have a significant effect. After adding more variables the GoodS and GoodL don't show any significance but Goodwill stays significant.

The expected sign based on the formulation of hypothesis three is positive because an increase in goodwill might lead to an increase in abnormal returns. This would indicate that investors are anticipating a goodwill impairment based on the amount of goodwill with the effect of an increased abnormal return in the year prior to the event period. However, as the coefficient shows the sign is negative and therefore, based on this dataset, an increase in goodwill leads to a decrease in abnormal return. This means that if investors anticipate on goodwill impairments, than using the amount of goodwill makes them anticipate impairments less.

However, there could be another explanation why the level of goodwill lowers the abnormal return in the year prior to the event period and shows no effect in the short term. As stated

before the amount of goodwill can grow because of acquisitions or large R&D projects. In light of the fact that the economy was for a large part of the sample in a recovering state, the growing amount of goodwill might be considered as the way back to growth for companies. Therefore, it are the companies with large amounts of goodwill that are perceived as normal companies instead of overly risky companies. This might be the reason why the investors show no abnormal returns for companies with relatively large amount of goodwill.

Hypothesis 3 has to be rejected based on this dataset. The amount of goodwill has a negative effect on abnormal return in the long run prior to the event date. The effect of goodwill on the short run is insignificant and therefore, it is not possible to say that goodwill makes the abnormal return in the short term smaller. Based on these results goodwill is not a good indication that investors are anticipating a goodwill impairment and because of this are less surprised by the announcement.

6.2.2 Hypothesis 4

The anticipation effect of an impairment is smaller for relatively small impairments and larger for larger impairments and the surprise effect is small for large impairments and small for small impairments.

In the fourth hypothesis the influence of the relative amount of impairment on the abnormal returns is investigated. The impairment size varies between companies and years and this might have an impact on the effect of a goodwill impairment announcement. If investors anticipate based on impairment size, than the large impairments are expected to be met with large anticipation and little surprise effects. The small impairments are expected to see small effects throughout the event periods.

First, the relative size of the impairments is regressed against the short term announcement effect, the CAAR(-5,5) and MeanCAAR(-5,5). As is done to test hypothesis three. Tables 7 & 8 show the results of the regressions. For the Impairment variable it is expected that there is no influence or a small influence on the CAAR and MeanCAAR. The reason for this is that relatively large impairments are anticipated by investors and small impairments only will have a relatively small impact. In line with this reasoning the ImpairS variable, the companies with relatively small goodwill impairments, are expected to have a negative sign. For the variable

ImpairL, companies with a relatively large goodwill impairment, the expected sign is positive with a small coefficient.

As Tables 7 & 8 show the variables, Impairment, ImpairS and ImpairL, aren't significant throughout all of the regressions. Also the coefficients are relatively small. This means that, based on these results, in the short term the variables Impairment, ImpairS and ImpairL have no significant influence on the level of abnormal returns. This is in line with the hypothesis indicating that the impairments are anticipated by the investors in the year prior to the announcement and that therefore, there is no effect at the announcement.

The relative impairment variable is also regressed against the long term announcement effect. The CBHAR of the year prior to the announcement is used as the dependent variable and the impairment variable is used as an independent variable. Multiple regressions are run with a varying amount of dependent variables to see how the coefficient react when other variables are added.

Table 9 shows the results of the regressions. For Impairment it is expected that the coefficient has a positive influence on the CBHAR. Reason for this is that the higher the impairment the more it might have been expected by investors, which will increase the abnormal return in the year prior to the announcement. In line with this reasoning the ImpairS variable, the companies with relatively small impairments, are expected to have a negative sign. For the variable ImpairL, companies with a relatively large impairment, the expected sign is positive.

The results of the coefficient are presented in columns 1a & 1c-1e. As the t-Statistics of the variables Impairment and ImpairS show there is no significant influence on the dependent variable. After adding more variables the variables stay insignificant. However the variable ImpairL is significant throughout regression 1c-1e. This contradicts the expectation that large impairments face large abnormal returns in the year prior to the event period.

Based on these results it can be concluded that the size of an impairment appears to have a negative influence on the abnormal return in the long run throughout the regressions. The conclusion for hypothesis four is that it only holds in the short term period and not in the year prior to the event. The amount of impairment is based on these results not an indication that investors are anticipating goodwill impairments.

6.2.3 Hypothesis 5

The effect of an impairment is smaller in the short term and larger in the long term for companies with less information asymmetry.

In the fifth hypothesis the influence of information asymmetry on the abnormal returns is investigated. The information asymmetry is based on three variable, one is the Size, two is the Number of sell-side analysts and three is the Organisational complexity. All were regressed against the short term announcement effect, the CAAR(-5,5) and MeanCAAR(-5,5).

In line with the hypothesis the Number of sell-side analysts variable is expected to have a negative influence on the CAAR and MeanCAAR and for the Organisational complexity the sign is expected to have a negative influence as well. For the sake of completeness, the Organisational complexity is a dummy variable with the value 1 therefore, representing the companies that are non-complex. Therefore, the interpretation of the variable is the effect of being a non-complex company on the abnormal return. For the Size variable the sign is expected to be negative.

Tables 7 & 8 show the results of the regressions. The coefficients of the variables are presented in columns 1c-1e. As the table shows none of the coefficients are significant throughout all of the regressions. Also the coefficients are relatively small. This means that, based on these results, in the short term the variables have no significant influence on the level of abnormal returns.

Although Bens, Heltzer and Segal (2011) used a different way to calculate firm complexity (market share) they also find that firm complexity is not significantly effecting abnormal returns. Since both their and this measurement of firm complexity show no significant impact, this might indicate that there is no relationship. For the size variable and the amount of sell-side analysts insignificance is unexpected. The reason for the insignificance might be the fact that the three variables take significance away from each other. However, table 10 shows that the regressions don't appear to suffer from multicollinearity. Also Tables 7 & 8 show that in regression 1c the Size variable is also not significant and in regression 1d the variables Size and Number of Sell-side analysts also show no significance.

Table 7: Panel regression on the individual variable effects on the CAAR of the period (-5,5)

Variable	Expected sign	1a	1b	1c	1d	1e
Constant		0.019	0.012	0.011	0.013	0.015
t-Statistic		(5.18)[c]	(1.35)	(1.22)	(1.40)	(1.58)
Impairment	+	-0.002		-0.005	-0.006	-0.006
t-Statistic		(-0.20)		(-0.73)	(-0.87)	(-0.87)
ImpairS	–	0.001		0.001	0.001	0.001
t-Statistic		(0.16)		(0.15)	(0.10)	(0.10)
ImpairL	+	0.002	0.001	0.001	0.001	
t-Statistic		(0.32)	(0.13)	(0.15)	(0.16)	
Goodwill	–		0.043	0.045	0.044	0.046
t-Statistic			(1.05)	(1.07)	(1.05)	(1.04)
GoodS	+		-0.003	-0.002	-0.003	-0.003
t-Statistic			(-0.30)	(-0.27)	(-0.30)	(-0.32)
GoodL	–		-0.001	-0.001	-0.000	0.001
t-Statistic			(-0.07)	(-0.09)	(-0.03)	(-0.07)
Size	–			-0.000	-0.000	0.000
t-Statistic				(-0.29)	(0.39)	(0.10)
Number of sell-side analyst	–				-0.000	-0.000
t-Statistic					(-0.87)	(-0.95)
Organisational complexity	–					-0.003
t-Statistic						(-0.34)
Sample size		1215	1215	1215	1215	1215
R^2		0.0001	0.0051	0.0053	0.0059	0.0059
Adjusted R^2		-0.0024	0.0026	-0.000	-0.0000	-0.0015

This table presents the panel regression where the independent variables Impairment, ImpairS, ImpairL, Goodwill, GoodS, GoodL, Size, Number of sell-side analysts and Organisational complexity are regressed against the dependent variable CAAR(-5,5). The expected signs represent the expected influence of the variables on the dependent variable.

1a CAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + E.

1b CAAR(-5,5) = $a0 + a1$ x Goodwill + $a2$ x GoodS + $a3$ x GoodL + E.

1c CAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + E.

1d CAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a8$ x Number of sell-side analysts + E.

1e CAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a9$ x Number of sell-side analysts + $a10$ x Organisational complexity + E.

For each of the regressions the coefficients and the *t*-Statistics of the independent variables are given. The table shows that only the constant is significant throughout the five regressions. The variables show no significance. On the bottom of the table the number of observations, the R-squared and the adjusted R-squared are given for each of the regressions. According to White's test the regressions suffer from heteroscedasticity. Therefore, the regression is performed using robust standard errors.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

Table 8: Panel regression on the individual variable effects on the MeanCAAR of the event period (-5,5)

Variable	Expected sign	1a	1b	1c	1d	1e
Constant		0.020	0.014	0.013	0.0014	0.015
t-Statistic		(5.34)[c]	(1.61)	(1.36)	(1.51)	(1.61)
Impairment	+	-0.003		-0.006	-0.007	-0.007
t-Statistic		(-0.39)		(-0.83)	(-0.72)	(-0.94)
ImpairS	–	0.002		0.002	0.002	0.002
t-Statistic		(0.28)		(0.28)	(0.24)	(0.24)
ImpairL	+	0.003	0.001	0.002	0.002	
t-Statistic		(0.39)	(0.21)	(0.22)	(0.22)	
Goodwill	+		0.039	0.041	0.041	0.041
t-Statistic			(0.93)	(0.97)	(0.96)	(0.93)
GoodS	–		-0.003	-0.002	-0.003	-0.003
t-Statistic			(-0.29)	(-0.26)	(-0.28)	(-0.29)
GoodL	+		-0.001	-0.001	-0.001	-0.001
t-Statistic			(-0.08)	(-0.12)	(-0.06)	(-0.08)
Size	–			0.000	0.001	0.000
t-Statistic				(0.01)	(0.36)	(0.36)
Number of Sell-side analyst	–				-0.000	-0.000
t-Statistic					(-0.74)	(-0.70)
Organisational complexity	–					-0.001
t-Statistic						(-0.14)
Sample size		1215	1215	1215	1215	1215
R^2		0.0002	0.0040	0.0043	0.0046	0.0046
Adjusted R^2		-0.0023	0.0015	-0.0015	-0.002	-0.002

This table presents the panel regressions where the independent variables Impairment, ImpairS, ImpairL, Good- will, GoodS, GoodL, Size, Number of sell-side analysts and Organisational complexity are regressed against the independent variable MeanCAAR(-5,5). The expected signs represent the expected influence of the variables on the dependent variable.

1a MeanCAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + E.

1b MeanCAAR(-5,5) = $a0 + a1$ x Goodwill + $a2$ x GoodS + $a3$ x GoodL + E.

1c MeanCAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + E.

1d MeanCAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a8$ x Number of sell-side analysts + E.

1e MeanCAAR(-5,5) = $a0 + a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a9$ x Number of sell-side analysts + $a10$ x Organisational complexity + E.

For each of the regressions the coefficients and the *t*-Statistics of the independent variables are given. The table shows that only the constant is significant throughout the five regressions. The variables show no significance. On the bottom of the table the number of observations, the R-squared and the adjusted R-aquared are given for each of the regressions. According to White's test the regressions suffer from heteroscedasticity. Therefore, the regressions are performed using robust standard errors.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

Table 9: Panel regression on the individual variable effects on the CBHAR(-12,0) before the announcement of an impairment

Variable	Expected sign	1a	1b	1c	1d	1e
Constant		0.026	0.077	0.076	0.016	0.020
t-Statistic		(1.70)[a]	(2.67)[b]	(2.39)[b]	(1.01)	(0.56)
Impairment	+	-0.030		-0.006	0.016	0.016
t-Statistic		(-0.73)		(-0.15)	(0.37)	(0.38)
ImpairS	–	-0.003		0.001	0.008	0.009
t-Statistic		(-0.13)		(0.34)	(0.31)	(0.32)
ImpairL	+	-0.068		-0.067	-0.069	-0.070
t-Statistic		(-2.51)		(-2.46)[b]	(-2.57)[c]	(-2.59)[c]
Goodwill	+		-0.361	-0.314	-0.293	-0.316
t-Statistic			(-2.57)[c]	(-2.18)[b]	(-2.05)[a]	(-2.18)[b]
GoodS	–		-0.037	-0.037	-0.031	-0.030
t-Statistic			(-1.13)	(-1.13)	(-0.97)	(-0.92)
GoodL	+		0.055	0.050	0.035	0.039
t-Statistic			(1.27)	(1.09)	(0.75)	(0.84)
Size	+			0.000	-0.000	-0.000
t-Statistic				(1.53)	(-0.18)	(-0.20)
Number of sell-side analysts	+				0.009	0.008
t-Statistic					(4.58)[c]	(4.32)[c]
Organisational complexity	+					0.026
t-Statistic						(1.02)
Sample size		1215	1215	1215	1215	1215
R2		0.0070	0.0079	0.0151	0.0319	0.0328
Adjusted R^2		0.0045	0.0054	0.0094	0.0255	0.0256

This table presents the panel regression where the independent variables Impairment, ImpairS, ImpairL, Goodwill, GoodS, GoodL, Size, Number of sell-side analysts and Organisational complexity are regressed against the dependent variable CHBAR(-5,5). The expected signs represent the expected influence of the variables on the dependent variable.

1a CBHAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + *E.*

1b CBHAR = $a0$ + $a1$ x Goodwill + $a2$ x GoodS + $a3$ x GoodL + *E.*

1c CBHAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + *E.*

1d CBHAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a8$ x Number of sell-side analysts + *E.*

1e CBHAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a9$ x Number of sell-side analysts + $a10$ x Organisational complexity + *E.*

For each of the regressions the coefficients and the *t*-Statistics of the independent variables are given. On the bottom of the table the number of observations, the R-squared and the Adjusted R-squared are given for each of the regressions. According to White's test the 1b regressions suffers from heteroscedasticity. Therefore, this regression is performed using robust standard errors.

For each of the regression the coefficients and the *t*-Statistics are given.

On the bottom of the table the number of observations is given and the R-squared for each of the regressions.

a Statistically significant at the 0.10 level (one-tailed test)

b Statistically significant at the 0.05 level (one-tailed test)

c Statistically significant at the 0.01 level (one-tailed test)

The variables are also regressed against the long term announcement effect. The CBHAR of the year prior to the announcement is used as the dependent variable and the variables Size, Number of sell-side analysts and Organisational complexity are used as independent variables. Table 9 shows the results of the regressions. The Number of sell-side analysts variable is expected to have a positive coefficient. For the Organisational complexity the sign is expected to be positive. For the sake of completeness, the Organisational complexity is a dummy variable with the value 1 therefore, representing the companies that are non-complex. For the Size variable the sign is expected to be positive as well.

The results of the coefficient estimates are presented in columns 1c-1e. In the 1c regression Size is added and the results show that the coefficient is significant at a 0.01 level. However, the coefficient is no longer significant in regression 1d when the Number of sell-side analysts is added and in regression 1e when Organisational complexity is added. The variable Number of sell-side analysts is significant at a 0.01 level and has a positive coefficient in both the 1d and 1e regressions. The last variable is the Organisational complexity variable. This variable is based on these results not significant.

As described in the methodology the Size, Number of sell-side analysts and Organisational complexity are used as measurements for the information asymmetry. An increase in size means a decrease in information asymmetry, an increase in the number of sell-side analyst means a decrease in information asymmetry and being a non-complex organisation means there is a decrease in information asymmetry. As Table 9 shows the relation between Size and CBHAR is significant in regression 1c, however after adding more variables the coefficient is no longer significant. This might indicate that although the multicollinearity level is low (Table 10), there is still effect taken away from the Size variable by the variables Number of sell-side analysts and Organisational complexity. If the other two information asymmetry indicators are taken out of the regression the conclusion is that there does appear to be a relation between Size and abnormal returns in the long run. This agrees with the hypothesis that company size is effecting anticipation in the long run because of lower information asymmetry.

The Number of sell-side analysts variable is positive which is in line with hypothesis six. When the number of sell-side analysts increase there is more information available and the investors are more able to anticipate an impairment. This is in line with the findings of Bens, Heltzer & Segal (2011). The Organisational complexity variable is not significant based on these results meaning there is no direct relation between the complexity of an organisation and the CBHAR.

Based on these results it can be concluded that the hypothesis partly holds in the long term. The Number of sell-side analysts variable shows that the availability of information increases the abnormal in the year prior to the impairment announcement. Also the Size variable has a positive effect on the abnormal return in the year prior to the impairment announcement, when it is regressed without other factors of information assymetrie. Both are indications that there is anticipation by the investors because of the increased abnormal returns. In the short term there is, based on these results, no proof that the variables Size, Number of sell-side analysts and Organisational complexity influence the abnormal returns.

6.3 Robustness of panel regressions

6.3.1 White's test and VIF test

All the panel regressions are tested for heteroscedasticity by the White test and for multicollinearity by the VIF test. For the CAAR of the event period (-5,5) the VIF ranges from 1.02-2.36. For the MeanCAAR of the event period (-5,5) the VIF ranges from 1.02-2.36. For the CBHAR the VIF ranges from 1.01-2.32. This means that for all of the panel regressions the VIF never goes above 10. Since the rule is that a variable with a VIF higher than 10 might indicate multicollinearity it is safe to say that not one of the regressions suffers from multicollinearity.

For the CAAR of the event period (-5,5) the probability of the regressions suffering from heteroscedasticity ranges from 0.9964-0.115. For the MeanCAAR of the event period (-5,5) the probability of the regressions suffering from heteroscedasticity ranges from 0.9949-0.1311. Based on this the conclusion must be that the CAAR and MeanCAAR for the (-5,5) period suffer from heteroscedasticity. For that reason the regressions are rerun and this time with robust standard errors. After this, for the CAAR of the event period (-5,5) the probability of the regressions suffering from heteroscedasticity ranges from 0.996-0.115. For the MeanCAAR of the event period (-5,5) the probability of the regressions suffering from heteroscedasticity ranges from 0.9949-0.1311. For the CBHAR the probability of heteroscedasticity ranges from 0.005-0.051 for the first and last three regressions, these regressions don't suffer from heteroscedasticity. For the second regression the probability of heteroscedasticity is 0.887 therefore, this regression does suffer from heteroscedasticity. The second regression is therefore, rerun with robust standard errors.

Table 10: Outcomes of the multicollinearity and heteroscedasticity check for the penal regressions

Regression	Test Type	Low end	High end
Panel A: Short term regressions CAAR & MeanCAAR			
CAAR (-5,5)	VIF	1.12	4.86
CAAR (-5,5)	White's test	0.300	0.717
MeanCAAR (-5,5)	VIF	1.05	4.86
MeanCAAR (-5,5)	White's test	0.331	0.717
Panel B: Long term regression			
CBHAR			
CBHAR	VIF	1.05	4.86
CBHAR	White's test	0.005	0.887

This table presents the outcomes of the VIF and White's test. The VIF test shows that none of the regressions have variables with VIF levels above 10. This means that the regressions do not suffer from multicollinearity. However, the White test shows that most of the regressions suffer from heteroscedasticity meaning they had to be rerun with robust standard errors.

6.3.2 Robustness of variables

To test the robustness of the panel regressions for the hypotheses 3-5 a robustness test is performed. The regressions are rerun, but this time with different event periods. For the CAAR and MeanCAAR the periods (-3,3), (-1,1) and (0,3) are used. For the CBHAR the periods (-12,-3) and (-3,0) are used. Table 11 and 12 give the results for the CAAR and MeanCAAR. A few interesting things can be taken away from this. In the short term event period there are two significant changes noticeable. The first change is in the variable for small impairments. Where in the (-5,5) period this variable was far from significant this changes when the event period becomes smaller. For the (-1,1) period the variable is significant at a 0.05 level. This is the case for both the regressions using the CAAR and the MeanCAAR as the dependent variable. Also where in the (-5,5) period the variable was positively related to the dependent variable, in the (-3,3), (-1,1) and (-0,3) the variable is negatively related to the dependent variable. This is in line with hypothesis four, relatively smaller impairments have a relatively lower surprise effect in the short term event period. However, this is still not enough proof in order to hold hypothesis four.

The second change is the Organisation complexity variable. Where in the (-5,5) period the organisational complexity has no significant relation with the dependent variable, in the period (0,3) it does. The variable is negatively related to the dependent variable at a significance level of 0.05. In the (-3,3) period the variable is almost significant at a 0.10 level but the t-Statistics shows that the relation with the CAAR & MeanCAAR is a lot stronger compared to the relation in the (-5,5) period. What is interesting, however, is that the Organisation complexity is negatively related to the CAAR and MeanCAAR in the (0,3) period. This does agree with hypothesis five which states that companies with non-complex organisations will see smaller surprise effects in the short run because impairments are easier anticipated by investors. Hypothesis five already partly holds in the long run but now based on the (0,3) period the hypothesis also partly holds in the short term. The fact that this effect is visible in the (0,3) period and not in other periods might be a coincidence. However, the t-Statistics show that in other periods the relation between the Organisation complexity variable and the CAAR and MeanCAAR is also stronger compared to the (-5,5) period.

The results of the robustness test on the CBHAR is given in Table 13. The first thing that can be said is that there is a clear difference between the (-12,0), (-12,-3) periods and the (-3,0) period. The (-12,0) and (-12,-3) period have more or less the same results. The large impairments variable is still negatively related to the dependent variable and is still significant. This goes for the Goodwill variable as well. The Number of sell-side analysts variable is still positively related to the CBHARs and is still significant. These similarities are not applicable for the (-3,0) period. In the (-3,0) period the ImpairL variable and the Goodwill variable are no longer significant. The Number of sell-side analysts variable remains its significant positive relation with the CBHAR although the significance level goes from 0.01 to 0.10. Lastly the Organisation complexity variable becomes significant in the (-3,0) period and has a negative relationship, meaning investors anticipate goodwill impairments less in this period.

The reason a robustness test is employed on the CBHAR panel regression lies in the fact that Table 6 shows that the ABHARs for the months 10-12 are positive where the ABHARs for the months 2-9 are negative. Variables might give an insight in why the ABHARs are negative in the first months of the year and later become positive. However, the variables Goodwill and ImpairL lose their significance in the period (-3,0) which means that Goodwill is no longer a reason for

investors to anticipate goodwill impairments less and large impairments are no longer a reason for investors the anticipation goodwill impairments less. The Number of sell-side analysts is also less significant and lastly the Organisational complexity variable is negative and significant. The negative Organisational complexity variable means an increase in complexity and therefore, information asymmetry now decreases the abnormal return. This is not in line with hypothesis five based on which an increase in information asymmetry is expected to increase the anticipation effect.

Based on this it is hard to draw conclusions on why the ABHARs are positive in the last month and if the variables have an effect on this. The answer to this phenomenon might be that closer to the event date the investors start behaving like at the event date. Because that is what the variables indicate. Goodwill and Impairment size have no influence on abnormal returns, the same goes for the short term period. The Organisational complexity makes the abnormal return go down which is what happens at the short term event period (0,-3). Another explanation might be that due to the decrease in data points for the months (-3,0) the variables are no longer significant or less significant. This would explain why the variables Goodwill and ImpairL are no longer significant and why the Number of sell-side analysts is less significant. However, this does not explain why the Organisation complexity variable does become significant.

Table 11: Robustness test of the panel regressions results for the CAAR(-5,5), using the periods (-3,3), (-1,1) and (0,3).

Variable	CAAR(-5,5)	CAAR(-3,3)	CAAR (-1,1)	CAAR (0,3)
Constant	0.015	0.013	0.007	0.011
t-Statistic	(1.58)	(1.69)[a]	(1.42)	(2.29)[b]
Impairment	-0.006	-0.004	-0.004	-0.002
t-Statistic	(-0.87)	(-0.64)	(-1.52)	(-0.38)
ImpairS	0.001	-0.003	-0.009	-0.005
t-Statistic	(0.10)	(-0.53)	(-2.27)[b]	(-1.24)
ImpairL	0.001	-0.004	-0.003	0.003
t-Statistic	(0.16)	(-0.66)	(-0.89)	(0.83)
Goodwill	0.046	0.032	0.006	0.010
t-Statistic	(1.04)	(0.92)	(0.34)	(0.44)
GoodS	-0.003	-0.005	0.001	-0.001
t-Statistic	(-0.32)	(-0.73)	(0.19)	(-0.27)
GoodL	-0.001	-0.001	0.005	0.003
t-Statistic	(-0.07)	(-0.05)	(0.77)	(0.48)
Size	0.000	-0.000	-0.000	0.000
t-Statistic	(0.10)	(-0.24)	(-0.36)	(0.23)
Number of sell-side analysts	-0.000	0.000	0.000	-0.000
t-Statistic	(-0.77)	(0.59)	(1.56)	(-0.64)
Organisational complexity	-0.003	-0.008	-0.004	-0.008
t-Statistic	(-0.34)	(-1.44)	(-1.16)	(-2.09)b
Sample size	1215	1215	1215	1215
R^2	0.0059	0.0072	0.0109	0.0097
Adjusted R^2	-0.0015	-0.0002	0.0035	0.0023

This table presents the panel regression for the CAAR(-5,5) but also the exact same regression for the periods (-3,3), (-1,1) and (0,3).

CAAR = $\alpha 0$ + $\alpha 1$ x Impairment + $\alpha 2$ x ImpairS + $\alpha 3$ x ImpairL + $\alpha 4$ x Goodwill + $\alpha 5$ x GoodS + $\alpha 6$ x GoodL + $\alpha 7$ x Size + $\alpha 9$ x Number of sell-side analysts + $\alpha 10$ x Organisational complexity + *E*.

For each of the regression the coefficients and the *t*-Statistics are given. On the bottom of the table the number of observations, the R-squared and the adjusted R-squared are given for each of the regressions.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

Table 12: Robustness test of the panel regression results for the MeanCAAR(-5,5), using the periods (-3,3), (-1,1) and (0,3).

Variable	MeanCAAR(-5,5)	MeanCAAR(-3,3)	MeanCAAR (-1,1)	MeanCAAR (0,3)
Constant	0.015	0.014	0.007	0.011
t-Statistic	(1.61)	(1.85)[a]	(1.48)	(2.34)[b]
Impairment	-0.007	-0.006	-0.004	-0.002
t-Statistic	(-0.94)	(-0.87)	(-1.47)	(-0.49)
ImpairS	0.002	-0.003	-0.009	-0.005
t-Statistic	(0.24)	(-0.56)	(-2.31)[b]	(-1.26)
ImpairL	0.002	-0.004	-0.003	0.002
t-Statistic	(0.22)	(-0.67)	(-0.91)	(0.60)
Goodwill	0.041	0.031	0.008	0.012
t-Statistic	(0.93)	(0.88)	(0.40)	(0.52)
GoodS	-0.003	-0.007	0.000	-0.001
t-Statistic	(-0.29)	(-0.96)	(0.01)	(-0.32)
GoodL	-0.001	-0.001	0.003	0.002
t-Statistic	(-0.08)	(-0.09)	(0.52)	(0.26)
Size	0.000	-0.000	-0.000	0.000
t-Statistic	(0.36)	(-0.09)	(-0.57)	(0.01)
Number of sell-side analysts	-0.000	0.000	0.000	-0.000
t-Statistic	(-0.70)	(0.53)	(1.46)	(-0.83)
Organisational complexity	-0.001	-0.008	-0.003	-0.008
t-Statistic	(-0.14)	(-1.31)	(-1.00)	(-2.01)[b]
Sample size	1215	1215	1215	1215
R^2	0.0046	0.0071	0.0099	0.0089
Adjusted- R^2	-0.0028	-0.0003	0.0025	0.0015

This table presents the panel regression for the MeanCAAR(-5,5) but also the exact same regression for the periods (-3,3), (-1,1) and (0,3).

MeanCAAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a9$ x Number of sell-side analysts + $a10$ x Organisational complexity + E.

For each of the regression the coefficients and the *t*-Statistics are given. On the bottom of the table the number of observations, the R-squared and the adjusted R-squared are given for each of the regressions.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

Table 13: Robustness test of the panel regression results for the CBHAR(-12,0), using the periods (-12,-3) and (-3,0).

Variable	CBHAR(-12,0)	CBHAR(-12,-3)	CBHAR (-3,0)
Constant	0.020	0.002	0.018
t-Statistic	(0.56)	(0.06)	(1.14)
Impairment	0.016	0.034	-0.018
t-Statistic	(0.38)	(0.71)	(-0.93)
ImpairS	0.009	-0.000	0.009
t-Statistic	(0.32)	(-0.02)	(0.75)
ImpairL	-0.070	-0.062	-0.008
t-Statistic	(-2.59)[c]	(-2.74)[c]	(-0.67)
Goodwill	-0.361	-0.271	-0.044
t-Statistic	(-2.18)[b]	(-2.21)[b]	(-0.68)
GoodS	-0.030	-0.021	-0.009
t-Statistic	(-0.92)	(-0.73)	(-0.61)
GoodL	0.039	0.030	0.009
t-Statistic	(0.84)	(0.84)	(0.43)
Size	-0.000	-0.000	0.000
t-Statistic	(-0.20)	(-0.89)	(0.69)
Number of sell-side analysts	0.008	0.007	0.002
t-Statistic	(4.32)[c]	(4.80)[c]	(1.76)[a]
Organisational complexity	0.026	-0.002	-0.028
t-Statistic	(1.02)	(-0.11)	(2.49)[b]
Sample size	1215	1215	1215
R^2	0.0328	0.0272	0.0146
Adjusted R^2	0.0256	0.0199	0.0072

This table presents the panel regression for the CBHAR(-12,0) but also the exact same regression for the periods (-12,-3) and (-3,0).

CBHAR = $a0$ + $a1$ x Impairment + $a2$ x ImpairS + $a3$ x ImpairL + $a4$ x Goodwill + $a5$ x GoodS + $a6$ x GoodL + $a7$ x Size + $a9$ x Number of sell-side analysts + $a10$ x Organisational complexity + *E*.

For each of the regression the coefficients and the *t*-Statistics are given. On the bottom of the table the number of observations, the R-squared and the adjusted R-squared are given for each of the regressions.

a Statistically significant at the 0.10 level (one-tailed test)
b Statistically significant at the 0.05 level (one-tailed test)
c Statistically significant at the 0.01 level (one-tailed test)

7. Conclusion

In this research the effects of goodwill impairment announcements on the share prices are investigated. Therefore, the research question is: *Are investors surprised by the announcement of an impairment on goodwill by European listed companies?* In order to answer this question five hypotheses are tested. Under hypothesis one it is tested whether investors react negative to an impairment announcement in the short term. The results are that investors actually react positive (0.6%) to the announcement of impairments. This means the hypothesis doesn't hold which is not in line with prior research. Most prior research found negative reactions to the announcement of a goodwill impairment in the short term. Reasons for the positive reaction in this research might be caused by the sample period used. Part of the sample period is influenced by the recovery from the financial crisis which might cause investors to react positive because impairments weren't as bad as initially anticipated. Whether there are signs of investors anticipating goodwill impairments at all is tested in the second hypothesis.

The results are that investors do indeed show a negative sentiment towards companies announcing a goodwill impairments in the year prior to the announcement. The abnormal returns are negative (-3.9%) in the second to ninth month of the year prior to the impairment announcement. After this the abnormal returns become positive again. The cumulative abnormal returns of the total year is slightly negative (-0.3%). This is in line with prior research. However, the effect is in magnitude less pronounced compared to prior research. The second hypothesis holds and the most likely explanation for it is that investors anticipate a goodwill impairment. In order to investigate this the hypotheses three-five are tested. If investors do anticipate a goodwill impairment, than the relative amount of goodwill on a company's balance sheet might have an influence on abnormal returns. Also the impairment size might make investors anticipate impairments more and because of this surprise them less. Lastly the amount of information asymmetry between a company and an investor might have influence on the level of anticipation and surprise.

The third hypothesis tests whether the relative amount of goodwill is an indication for investors to expect a goodwill impairment. The results show that in the short term investors are not less surprised by an impairment when goodwill is relatively large. This is true for all the short term event periods. In the year prior to the impairment announcement investors are not anticipating a goodwill impairment more when the relative amount of goodwill of a company is high. It appears

to be the other way around. Companies with relatively large amounts of goodwill have investors anticipate less on goodwill impairments. The reason for this might lie in the fact that adding goodwill is in this sample period perceived as normal by investors. This, because of the fact that the sample period consist for a large part of recovery years of the economy after the financial crisis.

The fourth hypothesis tests whether the relative size of impairments is an indication for investors to expect a goodwill impairment. In the short term the impairment size seems to have an impact on the abnormal returns. Smaller impairments face smaller surprise effects based on the (-1,1) period. In other periods the impairments variables are not significantly related to the abnormal returns. In the year prior to the goodwill impairment companies with relatively large impairments face less anticipation from investors. This is no longer true for the last three months of the year prior to the impairment announcement. Based on this the hypothesis only holds in the short term event period of (-1,1) and has to be rejected for all the other event periods.

The fifth hypothesis tests whether information asymmetry has an effect on how investors anticipate goodwill impairments or are surprised by them. The information asymmetry is measured by three factors. One is the size of a company, bigger size means less information asymmetry. Two is the organisational complexity, companies which are part of a complex organisational structure create more information asymmetry. Three is the number of sell-side analysts, more sell-side analysts means less information asymmetry. The results in the short term are that none of the factors have a significant influence on the abnormal returns except for the Organisational complexity variable. In the (0,3) short term event period companies which are part of a less complex organisational structure have a smaller surprise effect in the short term. Which might indicate that the impairment was anticipated. In the long term the number of sell-side analysts make investors anticipate goodwill impairments more which is in line with the hypothesis. The factor size is significantly related to the abnormal return in the long term, when the other two factors are not add to the regression. The conclusion is that the fifth hypothesis partly holds. The number of sell-side analysts and size increase the anticipation in the long term and the organisational complexity decreases the abnormal return in the short term.

Based on the hypotheses the research question can be answered. The overall conclusion is that in the short term period investors seem to be relieved when goodwill impairments are made public. Which means they are surprised in a positive way. They do anticipate goodwill impairments which results in negative abnormal returns in the year prior to the impairment announcement. It is

possible that because of this, the reaction at the announcement is positive because the anticipation has been too pessimistic. The relative amount of goodwill and the relative size of impairments don't provide proof that investors anticipate a goodwill impairment. However, the information asymmetry based on the number of sell-side analysts, size and organisational complexity provides proof that there is a level of anticipation by investors and a decreased surprise effect.

It would be interesting to see if these results change when the sample period is not overshadowed by the recovery from the financial crisis of 2008-2009. In that case the negative surprise effects in the short term might return. Also the information asymmetry could be further investigated using more factors influencing the information asymmetry. This might generate stronger proof that less information asymmetry will make investors anticipate impairments more and make them less surprised at the moment of announcement.

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