UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

The Value Relevance of Goodwill Impairments on European Stock Markets

An Event Study of European Stock Markets' Short-Term Behavior to Released Information Regarding Goodwill Impairments

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Abstract

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Title: The Value Relevance of Goodwill Impairments on European Stock Markets – An Event Study of European Stock Markets' Short-Term Behavior to Released Information Regarding Goodwill Impairments

Background and Discussion: In 2002 the EU decided to force all European listed companies to adopt the standards issued by the IASB for their consolidated financial statements. As a result of the IFRS implementation, amortization of goodwill is no longer permitted. Instead, goodwill must be tested for yearly impairment. The purpose with impairment testing is to successively impair the goodwill amount when realizing its synergy effects. However, there is much criticism against the possibility for professionals to interpret the IFRS framework to their own advantage. Investors previously saw goodwill amortizations as an irrelevant consequence of past investments, but many previous studies claim that nowadays, investors incorporate goodwill impairments in their firm valuation assessments.

Purpose and Research Question: The purpose is to provide a broader picture of the markets' reaction to goodwill impairments. The research question is: do investors find goodwill impairments value relevant? If yes, does the size of the impairment generate different market reactions?

Methodology: To be able to test whether the share prices react to the announcement of goodwill impairments, the thesis uses an event study approach. In short, the study detects reactions in share prices when the market receives information from the year-end reports containing goodwill impairments. Since much more information in addition to the potential goodwill impairments is released, the study also, with a regression analysis, takes earnings, growth, liquidity and capitalization measures into account, as well as macroeconomic impact.

Results and Conclusions: The study provides evidence that there is a statistically significant reaction in share price returns surrounding the announcement of a goodwill impairment, although at $\alpha=0.10$ level. More specifically, the mean of CAR (-0.16%) is significantly lower than zero. The result also demonstrates that goodwill impairment ratio is the best explanatory variable for changes in CAR, provided through a regression analysis. The regression coefficient of -0.0136639 indicates that if a firms' impairment rate increases by 1 unit, all else being equal, CAR decreases by 0.0136639. One could argue that the economic effect is very low, but there still is a significant correlation (at $\alpha=0.05$ level) between the variables. The study also verifies that the size of the goodwill impairment in relation to total goodwill generates different market reactions: the group with a low goodwill impairment ratio had a negative coefficient of -0.324, while in comparison the group with a higher goodwill impairment ratio had a negative coefficient of -0.017. The study concludes that markets do react to information about goodwill impairments and therefore investors do find goodwill impairments value relevant. Further, smaller impairments tend to generate more negative short-term reactions.

Keywords: Goodwill, Goodwill Impairment, IAS 36, Value Relevance, Event Study, Cumulative Abnormal Return, Stock Market Reaction

Abbreviations

CAR	Cumulative Abnormal Return
EMH	Efficient-Market Hypothesis
EBIT	Earnings Before Interest and Taxes
ESMA	European Securities and Markets Authority
EU	European Union
FAR	Föreningen Auktoriserade Revisorer
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards

Definitions

Heterogeneity	The opposite of homogeneity, which is applied to a distribution or a data sample, which indicates that it has been drawn from the same underlying population (Moles and Terry, 1997).
Multicollinearity	A statistical phenomenon where two or more predictor variables in a multivariate regression model are highly correlated (Clapham and Nicholson, 2009).
Value relevance	A statistical association between share values and accounting information (Hellström, 2005).

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1. Introduction

1.1 Background

In 2002 the European Union (EU) decided to force all European listed companies to adopt the standards issued by the International Accounting Standards Board (IASB) for their consolidated financial statements, as from 2005. The purpose with this implementation was to make it easier for investors to compare companies all over Europe with a harmonized financial reporting (Marton et al., 2013), this as a result of EUs fundamental idea of free movement of capital. IASB intends to develop principles-based accounting standards instead of rule-based. A principles-based framework gives relatively little guidance about how to use the principles in a certain situation. Instead, the companies themselves must make their own professional assessments and interpretations. The standards are based on the principles mentioned in the *IFRS Conceptual Framework for Financial Reporting* where the fundamental qualitative characteristics are *relevance* and *faithful representation* (Marton et al., 2013).

One of the new standards implemented was *IFRS 3 Business Combinations*. This standard explains how to valuate assets during acquisitions. The standard makes a major difference for, e.g., Swedish listed companies since the earlier framework handled value changes in goodwill completely different (Hamberg et al., 2011). As a result of the IFRS implementation, amortization of goodwill was no longer permitted. Instead, goodwill had to be tested for yearly impairment, i.e. an impairment-only approach. Previously, the impairments (if necessary) were made in addition to the amortization. Nowadays, an impairment test should be made if there is an indication that an asset has lost in value, according to *IAS 36 Impairment of Assets*. While doing impairment testing, companies estimate future cash flows allocated to the specific asset with a discount rate. If the result from the estimation confirms a lower value than the reported, impairment is mandatory.

The IFRS regulations require detailed disclosures regarding impairment testing of goodwill. Often this information is inadequate, e.g. Gauffin and Thörnsten (2010) refer to the basis for decision-making regarding impairments of goodwill in several cases being absent from the Swedish listed companies' financial statements. Furthermore, they argue that the lack of information regarding certain assumptions, e.g. discount rates, makes it impossible for the user to compare companies that are reporting under the same regulations, in this case IFRS. The problem with inadequate disclosures is not unique for Sweden, but also all around Europe. ESMA (2013) have conducted a study on goodwill accounting based on financial information taken from the 2011 annual reports of 235 European companies from 23 different countries. The report states that it is certain that an improvement of information is needed to help investors assess companies' assumptions, e.g. when making their cash flow calculations in conjunction to the impairment testing.

1.2 Problem Discussion

Goodwill accounting has been the subject of much debate during recent years. The debate has focused on the difficulties with goodwill accounting, often regarding the lack of information in the disclosures (e.g. ESMA, 2013; Gauffin and Thörnsten, 2010) or value relevance (e.g. Laghi et al., 2013; Frii, 2013; AbuGhazaleh et al., 2012; Hamberg et al., 2011; Liberatore and Mazzi, 2010). Since the IFRS is a principles-based framework, it gives the possibility to the

professionals, who know their business activities best, to present fair financial information without having precise rules. However, this opens up the possibility of presenting embellished financial statements and increases the ambiguity and subjectivity in financial reporting (Wines et al., 2007). The purpose with impairment testing is to successively impair the goodwill amount when realizing its synergy effects, but in practice this is not always the case (Hoogervorst, 2012); companies might be reluctant to conduct goodwill impairments due to the negative signaling effect assignable to a bad investment decision. It is unclear whether it is the signaling effect or the actual size of the impairment that enforces market reactions. Laghi et al. (2013) show that investors are more careful when low impairment losses are recognized, which could indicate that the size of the impairment actually makes a difference. The problem with the study though is that it does not examine the short-term effects surrounding the actual announcement. Hamberg et al. (2011) also question whether the transparency in financial reporting has increased, or decreased, since the implementation of IFRS. As a result of the principles-based framework, the comparability between companies could suffer if similar transactions are assessed in different ways. This is, according to Gauffin and Thörnsten (2010), a major concern since the basis for decision-making will become deficient.

To summarize the discussion above, it is obvious that there is much criticism against the possibility for professionals to interpret the IFRS framework to their own advantage, leading, for example, to reduced relevance, reliability and comparability of financial statements. This complicates the users' ability to absorb the information from these reports, which contrasts with the purpose of a *faithful representation* in the *IASB Conceptual Framework for Financial Reporting*. Furthermore, Hamberg et al. (2011) presented in their study that investors previously saw goodwill amortizations as an irrelevant consequence of past investments, but that the result of the goodwill amortization abolishment was higher valuation of companies with a great amount of goodwill. The conclusion drawn from this is that goodwill is in fact value relevant. To further strengthen the thesis of value relevance, Liberatore and Mazzi (2010) conducted an event study that indicated that goodwill impairment announcements have a negative effect on share prices, though this was not statistically significant. This indicates, according to another study (AbuGhazaleh et al., 2012), that investors incorporate goodwill impairments in their company valuation assessments, and are seen as reliable measures for declines in goodwill value.

The potential insufficiency with both Liberatore and Mazzi (2010) and AbuGhazaleh et al. (2012) is that the studies were conducted shortly after the IFRS implementation, i.e. 2005-2007 and 2005-2006 respectively. Furthermore, AbuGhazaleh et al. (2012) were limited to firms listed on United Kingdom stock markets. In our thesis, using an event study, we study the short-term market reaction to goodwill impairments on a broader sample of companies, both geographically and by using a longer time period. Since Liberatore and Mazzi (2010) focused their study on mid and long-term market reactions to the impairment event, we aim to bring more current findings regarding the short-term market reaction to goodwill accounting choices. Also, when conducting a more recent study, we ensure that the possible factor of deficient knowledge about the accounting standards, a factor that perhaps existed when the studies mentioned were conducted, is not anything we have to take into account.

The problem we face is that there is a lack of recent knowledge about the relation between goodwill impairment announcements and short-term stock market reaction. By solving this problem, professionals will be able to understand if investors today find goodwill impairments value relevant, i.e. to which extent investors can absorb the given information in

the financial statements. Investors, on the other hand, can use this information in their basis for decision-making, which, if the given information about goodwill impairments is correct, will lead to a more optimal resource allocation on stock markets. Furthermore, there is a lack of knowledge about whether the potential market reaction only occurs because of negative signaling effects or if reactions differ depending on the size of the impairment loss.

1.3 Purpose

Based on the identified problem above, we find our purpose as follows: to provide a broader picture of the markets' reaction to goodwill impairments.

1.3.1 Research Questions

- Do investors find goodwill impairments value relevant?
    - If yes, does the size of the impairment generate different market reactions?

1.4 Research Design and Limitations

The following section briefly explains how the thesis was conducted and which limitations that were made. For more detailed information, please see chapter 3.

To be able to test whether the share prices react to the announcement of goodwill impairments, we have conducted an event study, which will be explained further in the methodology chapter. In short, we have studied reactions in share prices when the market receives information from the year-end reports containing goodwill impairments. Since much more information in addition to the potential goodwill impairments is released, we need to take growth and liquidity measures into account, as well as the macroeconomic impact. The reason why we focus on year-end reports is due to the data collection procedure: the database we use in order to collect financial data does not provide complete financial data from quarterly reports. Therefore, we focus on the year-end reports where the actual announcement dates are easy to collect.

The study is limited to firms listed on stock markets within the EU. This is due to the thesis focusing on goodwill impairments according to IAS 36 and IFRS 3, and the EU countries provide us with a harmonized sample of companies that are reporting in accordance to the IFRS framework. We are well aware about the fact that more countries are reporting according to IFRS but often with local modifications. Companies with no reported goodwill was also excluded since the purpose is to examine market reactions associated with the event of an impairment of goodwill. As a result of this, we have collected an even larger sample than, e.g., Liberatore and Mazzi (2010) and AbuGhazaleh et al. (2012) since we are including more years and companies originating in more countries in our sample. Thus, we are able to generalize and achieve a higher validity. Through this we examine if the findings from other studies are valid during a longer and more recent time period. The period chosen is all the years with complete financial statements after the IFRS implementation except the transition year 2005, i.e. 2006-2012. In order to manage the large amount of information released in connection with the year-end reports that might cause a market reaction, the abnormal return was controlled for, e.g., liquidity position, measures of return, growth measures and macroeconomic impact. In this process, a plurality of variables used in previous studies were

deselected, e.g. we saw no reason to use multiple measures of return as control variables. In the methodology chapter we further justify why we chose our specific variables. Furthermore, it was also not our intention to detect differences in goodwill accounting between industries and across country borders, since we aimed to investigate the value relevance regarding goodwill impairments in general.

1.5 Contribution

The subjectivity in the framework makes it harder to assess the companies financially as well as achieve the qualitative characteristic *faithful representation.* As mentioned before, there have been earlier studies on different stock markets, which have shown that there is an association between the announcement of goodwill impairments and share price returns. We want to contribute to the research in financial reporting with new information regarding market reactions to goodwill impairments, and we hope our findings are relevant for standard setters, investors and accounting professionals. The aim of the contribution is to determine whether the behavior of the stock market could be a reason for companies' reluctance to impair goodwill. Our study differs from previous studies by offering a larger and broader sample of firms, as well as up-to-date empirical results to validate if the previous findings are applicable as of today. Furthermore, the study contributes with a combination of two different strands when conducting a study investigating the value relevance of goodwill impairments (see 2.3 and the introduction to chapter 3). Because of this, we can see which effect the size of an impairment has on short-term market reaction, findings that previous studies have not contributed with.

1.6 Outline

INTRODUCTION	A short background to the subject, a discussion of the existing problem, research question, research design/limitations and our contribution to the subject have been presented.
FRAME OF REFERENCE	IASB, IFRS, relevant theory and previous studies are described. The chapter ends with construction of three hypotheses.
METHODOLOGY	Research design, data collection, variables and models for answering our hypotheses are presented.
EMPIRICAL FINDINGS AND ANALYSIS	Sample/variable overview and the empirical results of the three hypotheses are presented and analyzed.
CONCLUSIONS AND FURTHER RESEARCH	The conclusions, followed by a discussion and suggested further research are presented.

2. Frame of Reference

This section of the thesis will begin with a concise background of the implementation of the IFRS and the standards concerned. By giving this brief review, we provide a deeper understanding regarding both the standards and previous studies. In addition, the potential benefits of a higher degree of transparency and comparability will be discussed. The standards that will be covered in this thesis, IAS 36 and IFRS 3, will be discussed briefly in order to help the reader understand why companies must make goodwill impairments and give a further introduction to the problem scenario.

The standard setting section will be followed by the efficient-market hypothesis, which is an important component for our thesis. After that, previous studies that have dealt with similar research as ours will be summarized. From these three parts, we will develop our hypotheses that form the basis for methodology, empirical findings and analysis.

2.1 Standard Setting

2.1.1 The Adoption of the New Accounting Standards

In 2005 IFRS, a new framework that affected the formation of consolidated financial statements, became mandatory for all listed companies within the EU. Before the implementation most European companies used domestic accounting standards. The different standards within the EU affected the comparability and the transparency between companies. The purpose with the new framework was to harmonize the accounting standards and give investors better information in their decision-making. Similar accounting standards are fundamental to the global capital markets if the aim is to achieve better comparability and transparency (Marton et al., 2013).

To make IFRS possible to adopt in the European countries, the standards had to be principle-based instead of rule-based in order to take the national accounting traditions into consideration. A principle-based framework makes it possible for a company to use professional judgments and interpretations in order to conduct more accurate accounting (Marton et al., 2013). The affordances of the principles-based framework have often been used for the wrong purpose, for example, to consciously interpret the standards subjectivity and, e.g., achieve income smoothing or “big bath” accounting (Jordan and Clarke, 2011). Jordan and Clarke (2011) conducted a study where they discussed how goodwill impairments are a common tool associated with big bath accounting. Income smoothing is another course of events in which goodwill impairments are used as a tool; Byrnes et al. (1998) claim that companies often have incentives not to spread the costs over a long time, and instead it is better to take all costs at one time, or in a short period, and that way produce more stable earnings. These types of events hamper the purpose of transparency and comparability, something that further strengthens the problem area regarding goodwill impairments and hopefully gives a valuable background for the reader.

2.1.2 IAS 36 Impairment of Assets

IAS 36 describes the procedure of how companies should evaluate their assets. This particular standard ensures that assets are not overvalued. The value of the asset should not

be higher than the recoverable amount, which is the higher of fair value minus selling costs and value in use. The companies are required to do impairment tests if there is any indication that the asset has lost value. There are exceptions regarding goodwill and other intangible assets with indefinite economic lives, which must be tested for yearly impairments. An impairment loss is recognized in the income statement when the recoverable amount of an asset is less than the asset's carrying value (FAR, 2013).

To define an asset's fair value minus selling costs, an active market is used for the same type of assets. According to IAS 36, the estimation of fair value minus selling costs is the price that can be charged in a binding transaction. If there is no active market, it is hard to measure an asset's fair value. Value in use is the alternative when estimating an asset's recoverable amount and is the discounted future cash flows that an asset is expected to generate (FAR, 2013).

2.1.3 IFRS 3 Business Combinations

IFRS 3 establishes principles and requirements regarding recognition and measurement of identifiable assets and goodwill acquired. The standard also provides guidance on the disclosures required to enable financial statement users to evaluate the financial effects of the business combination (FAR, 2013). IFRS 3 replaced IAS 22 when it was issued in March 2004 (Deloitte, 2014). The major difference between the two standards was that the goodwill acquired in the business combination should not be amortized over its economic lifetime; instead goodwill, as well as other intangible assets with indefinite economic lives, should be tested for yearly impairments (Marton et al., 2013). According to the IFRS restatement firms, with a significant amount of goodwill, IFRS 3 was considered as the most important change accompanied with the implementation (Hamberg et al., 2011). As a result of the impairment-only approach, IFRS 3 contains strict requirements for the acquirer to identify and measure all the identifiable assets and liabilities (Marton et al., 2013).

2.2 The Efficient-Market Hypothesis

The primary role of capital markets is to allocate ownership of the economy's capital stock. A market, in which prices provide accurate signals for investors to allocate their capital, is efficient if investors can assume that the prices always "fully reflect" all available information (Fama, 1970). In a free market economy with perfect competition, prices are determined by supply and demand. However, economists argue that the supply and demand model is not completely operational in marketplaces. This is due to regular violations of the following assumptions (Schroeder et al., 2011):

1. The participants have access to all available and necessary information and are assumed to have perfect knowledge about it.
2. All goods and services on the market are completely mobile and can therefore be easily shifted within the market.
3. Infinite buyers and sellers exist, which implies that one alone cannot influence supply and demand.
4. No barriers of entry and exit exist. There are also no restrictions placed on supply, demand, or prices of goods and services.

However, the best example of the supply and demand model can be seen in the securities market, and in particular the stock exchange market. This is because of the provided distribution system that tends to be relatively efficient and also due to its supply of easily found information. Sources that can be used to collect information (Schroeder et al., 2011) are, e.g., published financial statements, quarterly earnings reports, reports of changes in management by news media, contract awarding announcements and information given to shareholders at annual meetings.

The efficient-market hypothesis (EMH) is a refined model of the supply and demand model applicable for the securities market. The EMH assumes that the purchasers' knowledge of relevant information about a certain product determines its price. Therefore, the companies' share prices accurately reflect their fair value after including information about the companies' earnings, business prospects and other relevant information. That said, the hypothesis indicates that one cannot consistently beat the market by using already known information (Schroeder et al., 2011). The EMH defines *all available information* in three different ways (according to how much information is used when determining security prices): *weak form, semi-strong form* and *strong form*.

Weak form states that an investor cannot make excess returns only with knowledge of past share prices for their decision basis. According to the weak form, stock markets incorporate all information about past prices when determining the current price. Therefore, historical trends provide no additional information to an investor and all financial information given to the market is not necessary for the estimation of future share prices (Schroeder et al., 2011).

Semi-strong form assumes that all publicly available information is important when determining share prices. In other words, an investor cannot make excess returns by using this information because it has already been considered when determining the current share prices. The semi-strong form implies that note disclosures are as relevant as the balance sheet and the income statement (Schroeder et al., 2011).

Strong form is the form where all available information, public as well as insider information, has been taken into account when determining share prices. The implication is that the marketplace will consider all available information, when it becomes available and even with insider information one cannot make excess returns. The strong form implies that accounting information is as valuable as any other type of information (Schroeder et al., 2011).

The EMH is a prerequisite in the development of our measures of return and therefore vital for us; the information regarding a goodwill impairment would not affect the share price if a strong efficiency existed. If weak efficiency exists, or to some extent semi-strong efficiency, there would probably be changes in stock valuation. Earlier studies (e.g. Claesson, 1987) also show that other effects, i.e. so-called anomalies, also affect the stock returns. One anomaly is the *weekday effect*; another is the *year-end effect*. The meaning of these effects is that the stock returns differ from expected returns on specific days, or dates. For example, the stock returns have traditionally been higher in January and July due to the year-end effect (Claesson, 1987). However, Claesson (1987) also points out that it is hard to know if the expected higher return is worth the risk of planning a transaction to a specific day or date.

2.3 Previous Studies

Over the years there have been several studies regarding goodwill impairments and financial market reactions. The methodology of the studies can be divided into two different strands: the information content approach (event study) and the association approach (regression analysis). The information content approach examines the relation between the announcement of an impairment and equity market reactions, while the association approach examines the association between impairment amount and returns calculated over a longer time interval (Alciatore et al., 1998). Studies from both strands provide evidence that goodwill impairments convey meaningful information to investors about the future profitability of firms. We will in this section shortly give an account of those that we find most important for our thesis to help us contextualize the problems regarding the value relevance of goodwill impairments.

Hirschey and Richardson (2003) conducted an event study on the American market between the years 1992 and 1996. At that time, goodwill impairments were conducted in addition to amortizations, and due to this, the reactions were presumably stronger than to goodwill impairments. They were able to find statistically negative abnormal returns tied to goodwill impairment announcements. In this study they focused on the share price behavior both before and after the announcement. From an accounting perspective they related negative and statistically significant share price effects tied to goodwill impairments, a signal of a loss in future earning capability. They found a strong relationship between goodwill impairments and abnormal returns. The immediate announcement effects to goodwill impairments were in the sample of the study typically negative, i.e. 3-3.5% of the company's stock value. Hirschey and Richardson (2003) found on some occasions negative valuation effects before the announcement events, which indicates that investors partially anticipate goodwill impairments. However, in most cases they found that the negative valuation effects occurred after the announcement, which suggests that investors underreact to goodwill impairment announcements. The possible causes are a lack of investor focus and insufficient appreciation of the importance of goodwill impairments.

Liberatore and Mazzi (2010) have conducted a similar study to Hirschey and Richardson (2003). They wanted to verify how the financial markets react to goodwill impairments following the implementation in 2005 of IAS 36. They took note of the goodwill impairment announcements and related them to the share prices and their volatility, in the hope of finding an explanation for the great sensation caused by the impairments of goodwill. They conducted an event study and the sample used consisted of companies in the Standard & Poor's Europe 350 index (S&P 350)[1] over a period of three years. In their study they used the financial statements from the fourth quarter since impairments testing is usually made in that period of time. The difficulty with using annual reports was, according to Liberatore and Mazzi (2010), that the documents contain much more information, some that is already known or at least expected from the market, and other information is completely new. Depending on this, it is hard to isolate the reaction to goodwill impairments. By collecting the announcement dates, they made it possible to know the exact date on which the market received the information. In order to get more accurate conclusions, they studied adjusted share prices and how they reacted to the announcements. The prices were adjusted to rule out such as payments of dividends, stock-splitting operations and equity operations. To further

[1] An equity index drawn from 17 major European markets, covering approximately 70% of the region's market capitalization. http://us.spindices.com/indices/equity/sp-europe-350 (Accessible 2014-02-13)

isolate the possible influence of goodwill impairments, they adjusted the share price reaction with the S&P 350 index and that way adjusted for macro-economic trends. Their conclusions were that the market shows sensitivity to goodwill impairments. In other words, there is a correlation, but in their study they could not statistically ensure the reaction of share prices. What Liberatore and Mazzi (2010) were able to establish regarding share price reactions was that the share prices decrease up to 150 days and then reabsorb. This depends on overreactions from the market operators regarding the loss in goodwill value at first, and in a later stage they interpret the information in a more nuanced way.

AbuGhazaleh et al. (2012) use a regression model to help them assess the value relevance of goodwill impairment losses following the implementation of IFRS 3. In other words, they use the association approach. The accounting-based valuation model used for the regression analysis in the study was originally proposed by Ohlson (1995) and later refined by Lapointe-Antunes et al. (2009). They draw a sample of 528 firm-year observations from the 500 largest firms listed in the UK by Financial Times at 30 March 2007, sorted by market capitalization. The time period is 2005-2006 and the results imply that there is a significant negative correlation between market value and reported goodwill impairment losses. This verifies, according to AbuGhazaleh et al. (2012), that investors see goodwill impairments as an indication of a decline in the companies' future earnings capacity, which therefore provides evidence that goodwill impairments are value relevant. The documented findings in the study provide academics and standard setters with early evidence that managers choose to use their impairment discretion to reliably convey their private information on the firms' future cash-flows (AbuGhazaleh et al., 2012). Thus, the limited number of yearly financial statement data makes it difficult to decide whether the conclusions of the study will persist over time.

Laghi et al. (2013) also adopt the association approach and practically continue where AbuGhazaleh et al. (2012) finished. With a broader sample, including listed firms from different countries (France, Germany, Italy, Portugal, Spain and United Kingdom), sectors, years (2008-2011) and more, they provide a more comprehensive picture. They also add an extra variable to explain country-specific differences. Consistent with prior studies, they found statistically significant evidence that there is a correlation between goodwill impairment losses and stock market reaction, which, as said before, indicates that goodwill value decline is incorporated in firm valuation assessments. Their results also show that the market, especially in France, is more sensitive to this information than the other countries. Despite that harmonized accounting standards have existed since 2005, this indicates that country-specific factors have a significant influence on market operators' investment decisions. Furthermore, the study was able to show that investors in general are more careful when low goodwill impairment losses are recognized. They show that a higher level of significance and explanatory power is observed for companies whose goodwill impairment ratio is lower than or equal to 5%.

In order to provide a broader background to our research question, i.e. the value relevance in connection with the goodwill impairment, we choose to highlight a study by Duff & Phelps (2013). They conducted a study named *2013 European Goodwill Impairment Study,* which was based on interviews of 150 CFOs and Finance Directors of publicly listed European companies. They investigated the practitioners' experiences in applying the IAS 36 goodwill impairment test in the 2012 financial statements. An interesting aspect to take into consideration was the results from the interviews: it appeared that 51% of the interviewees argued that the event of goodwill impairments actually affected the share price. What also emerges is that the reactions were both positive and negative. Duff & Phelps (2013) believes

that there are two reasonable explanations for the reactions: an explanation to the positive outcome is that the share price impact of a goodwill impairment announcement is hard to predict, and will depend on what information is out in the market. Investors generally already know about the troubles a company is facing, e.g. the situation with a significant increase in goodwill impairments during 2011. This may, according to Duff & Phelps (2013), be driven in part by the sovereign debt crisis that affected many European companies, a crisis that investors was mildly aware of. The study discovered quite a few cases in which, after a substantial impairment, the share price rose. Perhaps investors expected a larger impairment or saw the impairment as positive news because it shows that management recognized actual problems and tried to resolve them. An explanation to the negative outcome could be that the reporting of an impairment generally comes after the market has anticipated it, and seeing the loss in the financial statements provides confirmation of just how badly the acquisition has gone. It is only when the market is surprised by the amount that the share price moves significantly, often negatively.

According to the above-mentioned studies, we can conclude that the financial markets do react to goodwill impairments and investors do seem to include goodwill valuation in their decision basis for investments (Hirschey and Richardson, 2003; Liberatore and Mazzi, 2010; AbuGhazaleh et al., 2012; Laghi et al., 2013) In three of four studies (all but Liberatore and Mazzi, 2010) the value relevance of goodwill impairments could be statistically ensured. However, Hirschey and Richardson (2003) conducted their study when both amortization and impairment were applied in the United States, and therefore it may be hard to find the study completely relevant today, though the study contributes with an approach to how our event study was designed. The last presented study by Duff & Phelps (2013) is of importance since the study contributes with qualitative elements and reasonable explanations for certain events in connection with goodwill impairments on European markets during recent years.

2.4 Hypotheses

H1 relates to our main research question. If we can ensure that investors find goodwill impairments value relevant, we will continue with the second hypothesis, H2, which will be tested in order to answer our sub-question: whether the size of the impairment generates different market reactions.

If we take the efficient-market hypothesis into account, it emphasizes that if the efficiency is weak or, to some extent, semi-strong, there should be a visible reaction when announcing new accounting information. Based on previous studies using the information content approach (Liberatore and Mazzi, 2010; Hirschey and Richardson, 2003), one can confirm that markets have historically reacted to releases of information about goodwill impairments. We expect the same outcome and out of this, we hypothesize the following:

H1: The announcement of a goodwill impairment has a negative effect on share price returns.

In order to ensure the potential negative reaction in share price returns, we perform a mean-comparison test, which will be explained in section 3.3.3. However, the mean-comparison test does not take any other factors than the share price return, followed by the announcement date, into account. To isolate the goodwill impairment factor from other information present in year-end reports we must control for factors like earnings, capitalization and other

performance measures, this in order to more accurately derive what impact goodwill impairments has on share price returns. To do this, one must run a regression model. Other studies investigating the correlation between goodwill impairments and market value (AbuGhazaleh et al., 2012; Laghi et al., 2013) have been able to ensure the correlation statistically. What differs our study from theirs is that we look at the short-term reaction and therefore use other measures and variables (see section 3.3.4 for the regression model), but the main point is the same: to investigate how markets react to goodwill impairments. By combining the results from the mean-comparison test and the regression analysis we will be able to decide whether we can strengthen *H1* or not.

Under the assumption that *H1* is true, we have developed a second hypothesis to answer our sub-question: whether the size of the impairment generates different market reactions. The hypothesis is answered by using the same regression analysis as in *H1*. Laghi et al. (2013) claim that investors in general are more careful when low goodwill impairment losses are recognized, more specifically when the goodwill impairment ratio is lower than or equal to 5%. This negative correlation was ensured statistically. However, Laghi et al. (2013) investigated the long-term effects and we investigate if the market reactions are stronger to low goodwill impairments in short-term. Duff & Phelps (2013) also state that they have seen several cases where the share price rose after a substantial impairment, which underpins the statement that there are stronger negative reactions to low goodwill impairments even further. Based on this we hypothesize the following:

H2: Goodwill impairment ratios under, or equal to, 5% tend to affect the share price returns to a higher degree than goodwill impairment ratios over 5%.

3. Methodology

This section of the thesis contains a presentation of our methodology. As mentioned in section 1.4, an event study is used, influenced by MacKinlay's (1997) methodology for event studies. We measure the impact of a goodwill impairment announcement on the share price returns. Also, we run a regression model to be able to measure which influence the impairment size has on share price returns. Out of this, one could argue that we use a combination of the information content approach and association approach when investigating the value relevance of goodwill impairments (see section 2.3). This chapter further presents our research design and explains how we collected our data, followed by a discussion about the credibility of the methods applied to this research and what the possible shortcomings could be. Lastly, event studies and which models that were used in the study are explained in detail.

3.1 Research Design

In our thesis we use a quantitative rather than a qualitative method. The quantitative method is applicable since the data of interest is presented in the official annual reports. Potential value relevance is easy to identify when comparing share price reactions within an event to the information released from financial statements. To be able to fulfill our purpose, it is more effective to discuss value relevance based on market reactions to financial information instead of, e.g., interviews, due to the time aspect and the large amount of data needed for accurate conclusions. We use a deductive approach on our quantitative study since the base of our methodology and the hypotheses are derived from theories and previous research within our research area.

When writing a thesis, it is important to take the starting point from one single scientific perspective that permeates the work. There are two distinct research philosophies: positivistic and hermeneutic. The positivistic view assumes distinct objectivity and the purpose with theories is to generate hypotheses. The fundamental attitude that knowledge is achieved by collecting observations and then forming the basis of regularities is typical of the positivistic view of science (Bryman and Bell, 2005). The positivistic view of science is corresponding well with the approach of this study.

3.1.1 Data Collection

In order to assess the behavior of the companies regarding goodwill impairments, we examine financial information from 2006-2012. The reason why we decided to use these years is to get the most recently issued financial statements since the IFRS implementation in 2005. We decided to exclude the transition year 2005 in order to avoid the transitional effects that, e.g., Hamberg et al. (2011) illustrated. With that amount of data, from a long time period we received a great basis in order to answer and discuss our research questions. The reason why we chose to examine all European stock markets is to give the research as high credibility as possible, and also due to the fact that these firms use the same accounting framework. By looking at all listed European companies, it is easier to discern and detect significant goodwill impairments that are valuable for our thesis. In other words, it is possible to collect a large and broad sample of observations given the large geographical area.

To find the necessary data in order to conduct our research, Datastream was used. This is a well-known and commonly used database regarding financial data collection. The variables collected were *Net Sales*, *Total Debt % Common Equity*, *EBIT*, *Goodwill Impairments*, *Goodwill/Cost In Excess Of Assets Purchased (Net)*, *Accounting Standards Followed*, *EBT Announce Date*, *Price* and *Price Index*. In order to avoid receiving several values from the same company, we only included the primary equity listing for each company. Companies with no reported goodwill impairments during our time period were excluded since the purpose is to examine the value relevance of goodwill impairments. It is worth noting that the share prices are closing prices, adjusted for subsequent capital actions, which rule out some financial movements that might impair an equity trend, such as payment of dividends. The price indexes were collected for all but four EU countries, since there were no available price indexes in Datastream for those countries. However, there were only four firms in Estonia that had to be excluded because of this. The index is country-specific and reflects the macroeconomic impact of the domestic market. To harmonize our sample further, we collect all financial data in the currency Euro.

By collecting the *Accounting Standards Followed* variable, we were able to ensure that the companies in our sample reported under IFRS, in order to eliminate the possibility of regulation differences between the firms. With the *Net Sales* we could calculate the growth in sales, which is always an important factor associated with the companies' performance and changes in that variable could possibly affect the share price. The *EBT Announce Date* were collected in order to determine the actual dates when the market received the year-end report with information regarding goodwill impairments, which is most often released together with the year-end report.

3.1.2 Regression Variables

Cumulative Abnormal Return (CAR) serves as our dependent variable and is used to measure changes in share price returns. The derivation of CAR will be described in section 3.3.1 and onwards. By detecting changes in CAR, we are able to identify the value relevance in the context of an event and in this case, it is associated with the release of the year-end report. By taking country-specific indexes connected to the announcement dates, we automatically take market trends, e.g. the aftermath of the financial crisis and anomalies such as year-end effects (as described in section 2.2) into account.

Goodwill Impairments / Goodwill (Net) Before Impairments (GWIGW) is our main independent variable. By dividing these two variables, we are able to determine whether the ratio of goodwill impairments correlates with CAR. Hamberg et al. (2011) scaled goodwill impairments to total assets in order to capture the fact that the level of goodwill can vary over time. Since we use total assets as a control variable for firm size, goodwill net is used as denominator. As a result of this, we can provide a relative number of the goodwill impairment size.

Earnings Before Interest and Tax (EBIT) is used in order to explain how the actual business activities are performing; a company's economic performance might play an important role in its choice to perform impairments (Churyk, 2005). EBIT contributes with an absolute number, positive or negative, for the business performance in conjunction with the valuation of a company. Other studies, e.g. AbuGhazaleh et al. (2012), used pre-tax profit (PTP) at the end of the year in which the goodwill impairment loss is recognized. The difference between EBIT and PTP is that the latter one takes financial income and expenses into account, but since we use leverage as a control variable, the companies' liquidity position is taken into consideration.

Net Sales Growth (NSG) controls for growth opportunities. Other similar variables have been used in order to measure these opportunities. For example, Yermack (1996) uses capital expenditures over sales in order to control for growth opportunities and La Porta (1996) actually used NSG as a variable regarding analysts' expectations of stock returns. In his study NSG represents an important part of the calculations in expected and actual portfolio stock returns.

Leverage (LEV) is used as a control variable and in order to explain the liquidity position of the company. The liquidity aspect is an important part during the valuation of a company associated with the development of decision support before investments. Leverage is measured at the end of the most recent fiscal year and is calculated as long-term debt over the market value of common equity. Using leverage as a control variable is important since it does affect the stock's risk and expected return (Ball et al., 1993).

Natural Logarithm of Total Assets (lnTA) as a variable controls for firm size and we account for size by controlling for each company's assets, measured in thousands of Euros. Using total assets as a control variable in connection with regressions is commonly used. The reason for transforming the variable into a logarithmic variable is to "pull in" large positive values and to prevent outliers from being excluded. Also, the distribution of the new variable becomes more symmetric (Little, 2004). See Appendix 3 for distribution graph comparisons.

The reason why we choose the variables above is to take count of information in excess of the goodwill impairments. Key figures that measure growth and performance overall could, as well as information regarding goodwill impairments, be value relevant for investors. By doing regression analyses, we are able to measure which variables that affect CAR in the most significant way. In the next step we sort out whether goodwill impairments have any impact on the potential market reactions, namely, if the information is value relevant and explains abnormal returns. Associated with the process of selecting relevant variables, a number of variables used in the previous studies (presented in section 2.3) are not included. We see, for example, no reason to use both EBIT and Return on Equity as control variables. Both variables control and measure the company's business performance and would probably give us the same answers.

3.1.3 Data Analysis Procedure

After all the data were collected and the variables were chosen, descriptive statistics were obtained by using STATA. Then, the relationships between all the variables were examined with the help of Pearson's correlation coefficient, which provides a standardized measure of the linear relationship between the variables. The correlation coefficient provides information

about both the direction and the strength of a relationship (Newbold et al., 2010). The outcome from this test will be shown in the empirical findings. If a strong correlation between the variables occurs, either positive or negative, it will be difficult to identify if the independent variable affects the dependent variable.

The final part of the data processing was to construct a multiple regression analysis. Regressions are used to determine the relationship between the dependent variable (CAR) and the independent variable (GWIGW). Since the data is spread over seven years, with firms having one to seven observations each, the format of the data is unbalanced panel data. When running the regression, it is important to know whether to run fixed or random effects regression. In a fixed effects model it is assumed that unobserved heterogeneity is either constant across the units at every time period, or constant over time for every cross-sectional unit. In the random effects model, on the other hand, one assumes that unobserved heterogeneity is uncorrelated with the included variables (Black et al., 2012). To decide between those, we perform a Hausman Test. The null hypothesis of the test is that the preferred regression model is random effects, which is tested against the alternative hypothesis to prefer a fixed effects regression model. In short, it tests whether the unique errors are correlated with the regressors or not. If the null hypothesis is true, they do not correlate (Greene, 2008).

3.2 Methodology Discussion

An alternative method for this thesis would have been a more qualitative approach, potentially including interviews with professionals on valuing companies, as well as professional investors. By using a qualitative method we could have collected personal thoughts and interpretations of actual investors, which partially might have explained how practitioners perceive and react to accounting information, something that would have been valuable information in order to provide underpinned conclusions. But since our sample incorporates more than a thousand companies with reported goodwill listed at European stock markets, a large amount of interviews would have been required not to limit the generalizability. The benefit of using a quantitative approach though is the actual possibility to generalize. We have the ability to process extreme amounts of information and are able to generalize in a way that hardly would have been possible with a qualitative approach.

The benefits of collecting data from year-end reports using Datastream are that it is easy to get access to, and it opens up the possibility to compare a great number of companies. Since the financial information is collected from Datastream, our data is secondary. The benefit of using secondary data is that since we are not the ones originally collecting the numbers, and others can do the exact same study using the exact same data. This gives our study a higher degree of credibility and reliability in contrast to using primary data. In order to ensure that the financial data collected from Datastream were correct, we performed a manual check. We compared the information from Datastream with the firms' own financial information for about 10% of the firms in the firm sample (see section 4.1), this in order to ensure that the dates and financial data were correct. We achieved a positive outcome out of the manual check, i.e. the financial data provided by Datastream were correct in comparison with the companies' annual reports.

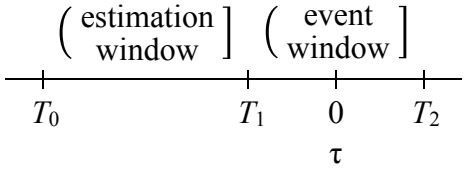
However, despite Datastream being a well-known source for gathering data, the database still has its deficiencies. There were problems finding complete financial data regarding, e.g.,

announcement dates and goodwill impairments. We searched for quarterly information regarding goodwill impairments but Datastream did not provide us with such information. This is one of the main reasons why we are not able to capture goodwill impairments that are made on other occasions than the year-end report. If it would have been possible to collect quarterly reports via Datastream, we could have included impairments made in connection with quarterly reports. With that type of information even greater reliability could have been achieved.

3.3 Event Study

The usefulness with conducting event studies when it comes to share prices is that the effects of an event will be reflected immediately due to the rationality of a stock market. Furthermore, it is also the most common type of event study (MacKinlay, 1997). It is MacKinlay who in modern times has set the framework for event studies, and to fulfill our purpose, we are going to use this type of approach.

The initial task is to define the event of interest. In our case, it is the announcement of a goodwill impairment. Secondly, we have to identify the event window, i.e. the time in which the event takes place. Often, when it comes to daily data as share prices, the event window will include the one day of the announcement, and a day or two on both sides of the event (MacKinlay, 1997). We are going to use two trading days before and two trading days after the announcement, since it is easier to detect changes in abnormal returns when including multiple days, than just one day. Thirdly, an estimation window shall be defined. An estimation window is used for determining the expected return. There exist separate models for determining of the expected return, both economic models and statistical models (MacKinlay, 1997). Examples of economic models are the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). The CAPM was the most commonly used model in the 1970s. However, deviations from the model were discovered, which led to a possibility that the results from the conducted studies may be sensitive to the specific restrictions in the model. Because of this, the use of the CAPM has almost ceased. The main potential improvement by using a model based on the APT is to eliminate the biases in the CAPM. However, these biases are also eliminated when using statistical models and therefore dominate when conducting event studies. The Constant Mean Return Model and the Market Model are the most common statistical models, of which the Market Model dominates. By removing the portion of the return that is related to variation in the market's return, the Market Model brings a possible improvement over the Constant Mean Return Model. This can lead to increased ability to discover event effects (MacKinlay, 1997). Since the abnormal return is specifically used for measuring the market's reaction to release of information, this is the most suitable model to investigate this issue (Liberatore and Mazzi, 2010). When using daily data, 120 days before the event takes place is used when determining the parameters of the Market Model, i.e. T_0 to T_1 (MacKinlay, 1997). From above, the following timeline is drawn:



3.3.1 Abnormal Return

As said in the previous section, abnormal return is used to investigate if the markets do react to the released information about goodwill impairments. The simplified formula for abnormal return is as follows (Liberatore and Mazzi, 2010):

$$Abnormal\ Return\ (AR) = Actual\ Return - Expected\ Return \tag{1}$$

To calculate the actual return, we use the following the formula:

$$R_{i\tau} = \frac{P_{i\tau} - P_{i\tau-1}}{P_{i\tau-1}} \tag{2}$$

where:

$R_{i\tau}$ share price return of firm *i* at day τ
$P_{i\tau}$ share price of firm *i* at day τ
$P_{i\tau-1}$ share price of firm *i* at day τ -1

Expected return is calculated, as said before, by using the Market Model, which relates the return of any given security to the market portfolio return, directly or indirectly. The linear specification of the model follows the assumed joint normality of asset returns and for any security *i*, the Market Model is (MacKinlay, 1997):

$$R_{i\tau} = \hat{\alpha}_i + \hat{\beta}_i \cdot R_{m\tau} + \varepsilon_{i\tau} \tag{3}$$

where:

$R_{i\tau}$ share price return of firm *i* during day τ
$R_{m\tau}$ market portfolio return during day τ
$\varepsilon_{i\tau}$ zero mean disturbance term
α_i alpha value, the share price without market influence
β_i beta value, the association between share price returns and market index

β_i and α_i are calculated as follows:

$$\hat{\beta}_i = \frac{\sum_{\tau=T_0}^{T_1} (R_{i\tau} - \hat{\mu}_i)(R_{m\tau} - \hat{\mu}_m)}{\sum_{\tau=T_0}^{T_1} (R_{m\tau} - \hat{\mu}_m)^2} \tag{4}$$

$$\hat{\alpha}_i = \hat{\mu}_i + \hat{\beta}_i \cdot \hat{\mu}_m \tag{5}$$

To calculate the market return, the following formula is used:

$$R_{mt} = \frac{P_{m\tau} - P_{m\tau-1}}{P_{m\tau-1}} \tag{6}$$

where:

$R_{m\tau}$ market portfolio return at day τ
$P_{m\tau}$ market portfolio value at day τ
$P_{m\tau-1}$ market portfolio value at day τ-1

From equations (2), (3) and (6), we can derive the following formula used to calculate the abnormal return:

$$\widehat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i \cdot R_{m\tau} \tag{7}$$

The abnormal return is the Market Model's mean disturbance term and will, under the hypothesis that the event has no impact on the behavior of returns, be jointly normally distributed with a zero conditional mean and the conditional variance (MacKinlay, 1997):

$$\sigma^2(AR_{i\tau}) = \sigma_{\varepsilon_i}^2 \tag{8}$$

and the distribution of the sample for any given observation as follows:

$$\widehat{AR}_{i\tau} \sim N(0, \sigma^2(\widehat{AR}_{i\tau})) \tag{9}$$

3.3.2 Aggregation of Abnormal Return

To be able to draw overall conclusions and to test our hypotheses, we must aggregate the abnormal return (MacKinlay, 1997). The aggregated abnormal return is calculated for the two days after the event day, τ_1 and τ_2, and is as follows:

$$\widehat{CAR}_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \widehat{AR}_{i\tau} \tag{10}$$

with the following variance for every CAR_i:

$$\sigma_i^2(\tau_1, \tau_2) = (\tau_1 - \tau_2 + 1)\sigma_{\varepsilon_i}^2 \tag{11}$$

and the distribution for every CAR_i:

$$\widehat{CAR}_i(\tau_1, \tau_2) \sim N(0, \sigma_i^2(\tau_1, \tau_2)) \tag{12}$$

3.3.3 Mean-Comparison Test

As mentioned in section 2.4, we use a one-tailed mean-comparison test to measure if goodwill impairment announcements cause a negative CAR. We test whether the mean value of cumulative abnormal return, $\overline{CAR}$, equals zero, or is lower than zero. From this, the following null hypothesis is tested:

$$H_0: \overline{\widehat{CAR}_i}(\tau_1, \tau_2) = 0$$

against the alternative hypothesis:

$$H_A: \overline{CAR}_i(\tau_1, \tau_2) < 0$$

The reason for using the $\overline{CAR}$ is that if the stock market does not react to goodwill impairments, there would be no abnormal return, and the mean of CAR would equal zero. Thus, a rejected H_0 provides evidence that the stock market does react negatively to goodwill impairments, which indicates that goodwill impairments are value relevant. In our mean-comparison test we use statistical significance levels at α=0.01, α=0.05 and α=0.10. This means that there is a 1, 5 or 10 percent risk that a true null hypothesis is rejected. In statistics, to reject a true null hypothesis is called a type I error, and the opposite, to not reject a false null hypothesis, is called a type II error (Newbold et al., 2010). An overview of these types can be seen below:

	Given that the null hypothesis is	
	True	False
If rejected	Type I error	Correct decision
If not rejected	Correct decision	Type II error

Given a random sample of *n* observations, with mean $\overline{CAR}$ and standard deviation *s*, from a normally distributed population with mean μ, the random variable *t* follows the Student's t distribution with (n-1) degrees of freedom (Newbold et al., 2010). Now, we can determine the decision rule, which is to reject H_0 if

$$\overline{CAR}_i(\tau_1, \tau_2) < \mu - t_{n-1,\alpha}\, s/\sqrt{n}$$

where $t_{n-1,\alpha}$ is the Student's t value for (n-1) degrees of freedom with the tail probability of α.

3.3.4 The Regression Model

Together with the information about goodwill impairments, more accounting information is released. Therefore, we use a regression model to determine in which extent the goodwill impairment affects the CAR, or if it is some other information. The regression model for every CAR_i is as follows:

$$CAR_i = \alpha + \beta_1 GWIGW_i + \beta_2 EBIT_i + \beta_3 NSG_i + \beta_4 LEV_i + \beta_5 lnTA_i + \varepsilon_i \qquad (13)$$

where:

CAR_i	Cumulative Abnormal Return of τ_1 and τ_2 for any *i* observation
$GWIGW_i$	Goodwill Impairment Ratio for any *i* observation
$EBIT_i$	Earnings Before Interest and Tax for any *i* observation
NSG_i	Net Sales Growth for any *i* observation
LEV_i	Debt / Equity ratio for any *i* observation
$lnTA_i$	Natural Logarithm of Total Assets for any *i* observation
ε_i	Mean disturbance term for any *i* observation

The regression model describes how the CAR depends on accounting information, in this case GWIGW, EBIT, NSG, LEV and lnTA. GWIGW is the main independent variable and the others are used for controlling whether the market tends to react to them, instead of goodwill impairments.

4. Empirical Findings and Analysis

This chapter will begin with a presentation of how we developed the sample, which forms the basis for the entire thesis. In the next section we will focus on the chosen variables. Lastly, the outcome of each statistical testing of the hypotheses will be presented individually, included with analyses.

4.1 Sample Overview

From the beginning our data comprised 9142 companies listed on European stock markets, which represents the population. First, firms with incomplete information about impairments and announcement dates, as well as firms without goodwill impairments at all during the seven years, were excluded. From this exclusion we developed our firm sample, which consists of 1133 firms and a total of 7931 observations. After reshaping our data into panel data and excluding observations with incomplete and/or incorrect[2] information about the variables, 1758 observations from 830 firms remain and represent our sample. Despite the fact that we aimed to include a large and broad sample of European countries, missing values and incomplete information in the collected data have narrowed down our sample significantly. Below is a table describing how the sample is distributed over countries and years:

TABLE 1 Structure of Sample

COUNTRY	2006	2007	2008	2009	2010	2011	2012	TOT.
Austria	8	7	8	13	13	13	12	74
Belgium	7	9	8	5	5	9	8	51
Bulgaria	-	-	-	-	-	-	-	-
Croatia	-	-	-	1	-	1	-	2
Czech Republic	-	-	-	1	1	1	1	4
Cyprus	-	-	-	-	-	-	-	-
Denmark	6	6	12	14	5	4	6	53
Estonia	-	-	-	-	-	-	-	-
Finland	11	9	18	13	11	10	8	80
France	45	45	59	64	58	59	44	374
Germany	40	33	48	57	41	40	30	289
Greece	-	3	1	2	4	5	4	19
Hungary	-	-	2	1	2	4	-	9
Ireland	1	1	4	2	-	2	2	12
Italy	6	8	13	7	10	16	11	71
Latvia	-	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-
Luxemburg	-	-	-	-	-	-	-	-
Malta	-	-	-	-	-	-	-	-
Netherlands	14	15	18	17	14	21	20	119
Poland	2	2	3	5	2	4	6	24
Portugal	1	1	-	2	3	5	1	13
Romania	-	-	-	-	-	1	-	1
Slovakia	-	-	-	-	-	-	-	-
Slovenia	1	-	-	2	-	1	-	4
Spain	5	5	8	8	8	11	2	47
Sweden	17	10	21	23	20	23	12	126
United Kingdom	43	37	59	72	53	74	48	386
TOTAL	207	191	282	309	250	304	215	1758

[2] Incorrect information could, for example, be GWIGW values above 1, since it is impossible to impair more goodwill than that which exists in the balance sheet.

As we can see, 1294 observations (over 73%) belong to only five of the 28 countries in the EU. If this depends on deficient Datastream information, lack of goodwill impairments, accounting cultures or few listed companies, we leave unsaid. However, the panel data is unbalanced, which means that the number of observations per firm and year differ from each other. One firm could supply the sample with seven observations (all years), while another may only bring one observation to the sample. 2009 and 2011 contain observations, which could provide us with the information that these years were the most impairment-intensive in our study.

4.2 Variable Overview

In this section the variables are in focus. We will present descriptive statistics to get an overview of the most important information about the variables, but first we must investigate whether the chosen variables do correlate with each other or not. In the following correlation matrix, this will be examined:

TABLE 2 Pearson Correlation Matrix

Variable	CAR	GWIGW	EBIT	NSG	LEV	lnTA
CAR	1.0000					
GWIGW	-0.0550	1.0000				
EBIT	0.0097	-0.1570*	1.0000			
NSG	0.0095	0.0619	-0.0022	1.0000		
LEV	-0.0341	0.0142	0.1217*	-0.0030	1.0000	
lnTA	-0.0304	-0.2167*	0.4342*	-0.0352	0.2143*	1.0000

Correlation is significant at 0.01* level

The Pearson correlation matrix shows how the variables are correlated with each other and the purpose of doing this is to avoid the bias of multicollinearity when running the regression. Generally, variables with correlation coefficients below 0.35 are considered to have low or weak correlation (Taylor, 1990), which in our case is the most common outcome. The only variable that deviates is lnTA, which has a modest correlation with EBIT and a less low correlation with GWIGW and LEV. The correlation with between lnTA and EBIT could, even if they are control variables, affect the regression results. More of this will, however, be discussed and taken into account in section 4.4. What we can deduce from the fact that the other variables have a very low or weak correlation with each other is that these independent variables do not affect each other, and that the regression coefficients would not be biased due to multicollinearity. Now we can progress and take the next step, which is to give an overview of the chosen variables:

TABLE 3 Descriptive Statistics

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
CAR	1758	-0.0016000	-0.0020433	0.0517297	-0.4589138	0.4896454
GWIGW	1758	0.1260040	0.0364260	0.2113101	0.0000067	1
EBIT	1758	1120217.0	64604.500	4152216.0	-44600000	40500000
NSG	1758	0.1411426	0.0464470	1.7460140	-1	58.17842
LEV	1758	1.3293450	0.6690500	4.4921320	-93.577300	99.736700
lnTA	1758	14.697310	14.467870	2.5867580	7.3218500	21.905100

The descriptive statistics show that the mean of CAR (-0.16%) is less negative than the median (-0.20%). The lower mean can be explained by the fact that there are more observations with a value lower than zero than the opposite. Another noteworthy fact is that the standard deviation of CAR is, in its relationship to the mean, very large. When running the mean-comparison test, this is a significant issue and will be taken into account in 4.3. Other valuable information is that every single observation averaged impairments at 12.60% of goodwill net. When comparing this with the median, we can determine that there are more firms with lower impairment rates than the mean than there are firms with higher rates. Even here, we can see a large standard deviation.

4.3 Results and Analysis of *H1*

H1: The announcement of a goodwill impairment has a negative effect on share price returns.

4.3.1 Mean-Comparison Test Results

In order to test *H1* we begin by conducting a one-tailed mean-comparison test (described in 3.3.3) to clarify if the cumulative abnormal return does equal zero, or if it is lower than zero. The test examines whether there is a negative CAR or not as a direct consequence of the event (the announcement), without any other aspects taken into account. If the CAR is significantly lower than zero, the announcement of, in this case, an impairment of goodwill is value relevant. Below is the result:

TABLE 4 Mean-Comparison Test of CAR

Year	Obs.	Mean	Std. Err.	Std. Dev.	t
2006	207	-0.0029266	0.0019386	0.0278922	-1.5096*
2007	191	-0.0022218	0.0035303	0.0487897	-0.6293
2008	282	-0.0020698	0.0048841	0.0820181	-0.4238
2009	309	-0.0033332	0.0023071	0.0405550	-1.4448*
2010	250	-0.0007156	0.0027025	0.0427298	-0.2648
2011	304	0.0033359	0.0028704	0.0500466	1.1622
2012	215	-0.0046711	0.0031882	0.0467482	-1.4651*
TOT.	1758	-0.0016000	0.0012338	0.0517297	-1.2969*

Mean less than zero is significant at 0.10* level

The table shows that the mean of CAR is -0.0016 (the same as in section 4.2). We can conclude that the null hypothesis (mean of CAR equals zero) can be rejected at α=0.10 level. No mean value is significantly lower than zero at α=0.01 or α=0.05 level. What we can establish though is that at α=0.10 level, we can reject the null hypothesis for three of the years (2006, 2009 and 2012). If year 2011 were excluded from the test, the null hypothesis could be rejected, in favor of the alternative hypothesis, at α=0.05 level (see Appendix 4 for table). Thus, something tells us that the year of 2011 somehow interferes with the overall results of the test, which can indicate that 2011 in fact has a positive mean, even if we cannot ensure this statistically. To further underline this result, we can see that if 2011 is excluded, all but one yearly mean is lower than the total mean. Noticeable is that all means except from 2011, are lower than zero, but each is not significant in that matter.

4.3.2 Mean-Comparison Test Analysis

We did expect a distinct negative market reaction to the announcement of goodwill impairments. However, while the test tells us that market reaction is negative, it is not as distinct as we expected. The α=0.10 level is not a preferable significance level since it entails a considerable uncertainty, but it was the only level at which we were able to ensure the negative reaction. One main reason for this could be the large standard deviation. Previous

studies such as Hirschey and Richardson (2003) and Liberatore and Mazzi (2010) were able to demonstrate a higher degree of negative CAR as an effect of the announcement of goodwill impairments. However, it should be said that goodwill impairments were done in addition to amortizations in Hirschey and Richardson's (2003) study, and due to this, the reactions were presumably stronger to goodwill impairments.

By taking the efficient-market hypothesis into account, i.e. whether there is a strong efficiency, there should be no visible reaction when announcing information. In this case we see a reaction (at α=0.10 level), which implies that the actors on European stock markets do not have access to all information, or at least have not been able to predict actual goodwill impairments. Due to the relatively weak significance level, one could on the other hand argue that out of the information gathered, there actually exists a relatively strong efficiency on the stock markets involved in the study. Since the outcome from our study does not prove a distinct market reaction, in contrast to previous event studies, one is able to presume that firms nowadays tend to be more transparent in financial accounting and that investors have already taken the risk of impairments associated with capitalized goodwill into account in their firm valuation assessments.

What stands out the most in the mean comparison test is the result considering CAR in 2011, the only time during our observation period that we see a positive mean of CAR. One reasonable explanation could be the one presented by Duff & Phelps (2013), i.e. that a significant increase in goodwill impairments during 2011 was partly caused by the sovereign debt crisis that affected many European companies, in which the expectations of goodwill impairments may have risen. An extension of Duff & Phelps (2013) reasoning could be done by detecting Liberatore and Mazzi's (2010) findings, where they noticed a slight prevalence of positive reactions, which means that market operators have probably overrated the loss in the goodwill value compared to the one announced. This is something that very well could be the case during a debt crisis and goodwill impairments, as a consequence of the crisis in 2011, were probably not a surprise for investors. Duff & Phelps (2013) further explain that the reactions depend on what information is available on the market and that investors generally already know about the troubles a company is facing. We believe that these arguments could be the explanation for the reactions in 2011.

4.3.3 Regression Results

As referred to in 2.4, much more than information about goodwill impairments is released in year-end reports. Therefore, we control for other factors by using a multivariate regression model, which is presented in section 3.3.4 and is as follows:

$$CAR_i = \alpha + \beta_1 GWIGW_i + \beta_2 EBIT_i + \beta_3 NSG_i + \beta_4 LEV_i + \beta_5 lnTA_i + \varepsilon_i \qquad (14)$$

As mentioned in 3.1.3, we need to decide whether to use fixed or random effects regression. By conducting a Hausman Test, this is possible. The result can be seen in Appendix 5 and tells us that the preferred regression model is random effects. Now that all conditions regarding the regression model are clarified, we can run the regression. Firstly, we run a bivariate regression with CAR as dependent variable and GWIGW as independent variable. This is the result:

TABLE 5 Bivariate Random Effects Regression

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0125745	0.0062204	-2.02*	0.043

Number of obs. = 1758
Number of firms = 830

Correlation is significant at 0.05* level

From this, we can establish that there is a significant negative correlation at α=0.05 level between the variables. The coefficient is -0.0125745 and indicates that an increase by 1 unit in GWIGW decreases CAR by approximately 0.13 percentage points. However, to preclude, e.g., spurious relationships we must control for other factors. This is where the multivariate regression model is applicable. But firstly, the issue with the correlation between EBIT and lnTA (see section 4.2) has to be taken care of, and therefore we have run two different regressions, the first one without EBIT, and the second without lnTA. The results from those regressions can be seen in Appendix 6. However, the results do not significantly change the regression coefficients. What is noticeable though is the change in statistical significance between CAR and GWIGW when excluding lnTA, from a α=0.05 level to α=0.10 level. This could probably be explained by the weak, but nonetheless negative correlation between GWIGW and lnTA, which can be interpreted from TABLE 2. Regardless, we have decided to continue with the full-scale regression model, due to the important aspects that those variables control for. Below is the result:

TABLE 6 Multivariate Random Effects Regression

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0136639	0.0063767	-2.14*	0.032
EBIT	3.54E-10	4.27E-10	0.83	0.407
NSG	-0.0001846	0.0006936	-0.27	0.790
LEV	-0.0001956	0.0002657	-0.74	0.462
lnTA	-0.0011357	0.0006934	-1.64	0.101

Number of obs. = 1758
Number of firms = 830

Correlation is significant at 0.05* level

What we can interpret from the table above is that there still is a significant negative correlation between CAR and GWIGW. Since we do not see a noticeable change of the GWIGW coefficient, despite the fact that we are adding control variables, we can ensure that the correlation between CAR and GWIGW does not depend on these variables. This can be confirmed statistically at α=0.05 level. The coefficient is -0.0136639, which indicates that if a firm's impairment rate increases by 1 unit, all else being equal, CAR decreases by 0.0136639. With a mean of GWIGW at 12.60% (see TABLE 3), it is impossible for this variable to increase by 1 unit. Because of this the comparison is lame, but still provides

evidence that there is a negative correlation between the variables and that impairments affect the share price negatively.

4.3.4 Regression Analysis

What we can establish from the multivariate regression results is that there is a statistically significant negative correlation between CAR and GWIGW. Duff & Phelps's (2013) statement that the majority of the respondents argued that goodwill impairments affected the share price returns is something we can support. The purely economic effect is not as big as AbuGhazaleh et al. (2012) and Laghi et al. (2013) were able to demonstrate. Many different things could cause this; we are using different methods as well as other variables. What further distinguishes our results is that we are not able to ensure the statistical significance at a lower level than $\alpha=0.05$, when in their studies, they were able to ensure this at $\alpha=0.01$ level. Again, this could probably depend on the chosen variables.

The regression model also tells us that GWIGW is the best explanatory variable for changes in CAR out of the chosen variables. Based on our expectations, this is a very positive outcome, since we have attempted to control for the information that could possibly cause market reactions (growth via net sales, the financial situation via leverage, economic performance via EBIT and for firm size via the natural logarithm of total assets) and none of these control variables are statistically significant.

When summarizing the results from the mean-comparison test and the regression analysis, we can strengthen that *H1* is true: an announcement of a goodwill impairment undeniably has a negative effect on share price returns. More specifically, we base this on the significantly negative CAR, combined with the fact that GWIGW is the best explanatory variable for changes in CAR.

4.4 Results and Analysis of *H2*

H2: Goodwill impairment ratios under, or equal to, 5% tend to affect the share price returns to a higher degree than goodwill impairment ratios over 5%.

To test *H2,* we must split our sample into two pieces. The subsample with goodwill impairment rates over 0.05 includes 761 observations. The other subsample, with impairment rates equal to, or less than 0.05, includes 997 observations. We have run the same multivariate random effects regression as in section 4.4 and in the next section are the results (bivariate random effects regression results can be seen in Appendix 7).

4.4.1 Regression Results

TABLE 7 Random Effects Regression GWIGW>0.05

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0171616	0.0082925	-2.07*	0.038
EBIT	6.34E-10	6.53E-10	0.97	0.331
NSG	0.0003091	0.0008085	0.38	0.702
LEV	-0.0000527	0.0004258	-0.12	0.901
lnTA	-0.0013358	0.0008802	-1.52	0.129

Number of obs. = 761
Number of firms = 527

Correlation is significant at 0.05* level

TABLE 8 Random Effects Regression GWIGW≤0.05

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.3240371	0.1114485	-2.91*	0.004
EBIT	-1.08E-12	5.64E-10	0.00	0.998
NSG	-0.0009287	0.0020201	-0.46	0.646
LEV	-0.0006372	0.0004403	-1.45	0.148
lnTA	-0.0006656	0.0010062	-0.66	0.508

Number of obs. = 997
Number of firms = 496

Correlation is significant at 0.01* level

Firstly, the correlation between CAR and GWIGW is significant in both regressions, at α=0.05 level and α=0.01 level respectively. The results from the regressions also show that observations with a goodwill impairment ratio lower than, or equal to, 5% have a higher negative regression coefficient than observations with a goodwill impairment ratio over 5%, -

0.324 in relation to -0.017. Also, the GWIGW regression coefficient does not noticeably change when running multivariate regression instead of bivariate regression (see Appendix 7 for tables). This indicates that the correlation between CAR and GWIGW, in both subsamples, is not to a greater extent explained by other variables.

4.4.2 Regression Analysis

Since we in section 4.3.3 were able to establish the fact that goodwill impairments have a negative correlation with share price returns, we have examined whether the goodwill impairment ratio explains differences in share price returns. The results from the regressions show exactly what we expected, i.e. that observations with a goodwill impairment ratio lower than, or equal to, 5% have a higher negative regression coefficient than observations with a goodwill impairment ratio over 5% and thus, we can strengthen *H2*. The regression results indicate that we cannot reject what Laghi et al. (2013) claim. What we can establish is that the larger the impairment ratio is, the lower the negative effect on CAR becomes. The theory Laghi et al. (2013) posited, i.e. that investors are more careful when low goodwill impairment losses are recognized, was proved correct based on our subsamples. It also pointed to the fact that larger goodwill impairments in some cases can mean positive news and in the next step positive market reactions. One reason for this, according to Duff & Phelps (2013), is because it shows that management recognizes actual problems, realizes that things are not going as well as planned and then takes steps to resolve the problems. These events are in many cases perceived as good news and this could explain the differences in share price returns in relation to high or low goodwill impairment ratios. Furthermore, it can be said that relatively small impairments are often more unexpected and provide more information content, which probably enforces a market reaction. Relatively large impairments, on the other hand, are often expected and anticipated by investors, an explanation also mentioned by Duff & Phelps (2013).

5. Conclusions, Contribution and Further Research

This chapter will begin with conclusions drawn from the empirical findings and analysis. Based on this, the research questions will be answered. Then, suggestions for further research will be presented.

5.1 Conclusions

The purpose of this thesis was to provide a broader picture of the markets' reaction to firms' goodwill accounting choices.

The research questions that we aimed to answer were the following:

- Do investors find goodwill impairments value relevant?
    - If yes, does the size of the impairment generate different market reactions?

The purpose of *H1* is to answer the main research question: does there actually exist such a thing as value relevance of goodwill impairments? What we can interpret from the results of the mean-comparison test is that there is a statistically significant reaction in share price returns surrounding the announcement of a goodwill impairment, although at α=0.10 level. More specifically, the mean of CAR (-0.16%) is significantly lower than zero. Furthermore, if 2011 were excluded, we could ensure a reaction at α=0.05 level. What is not optimal with this test, though, is that we cannot ensure that this reaction only depends on goodwill impairments, since much more information is released together with the impairments. Because of this, it may be dubious to draw overhasty conclusions.

Therefore, a regression model is used for controlling for other factors, such as earnings, growth, leverage and capitalization. The result demonstrates that goodwill impairment ratio is the best explanatory variable for changes in cumulative abnormal returns. The regression coefficient of -0.0136639 indicates that if a firm's impairment rate increases by 1 unit, all else being equal, CAR decreases by 0.0136639. One could argue that the economic effect is very low, but there is still a significant correlation (at α=0.05 level) between the variables. In fact, due to the significant correlation between CAR and GWIGW, the results from the multivariate regression model indirectly strengthen the shortcomings with the mean-comparison test. When interweaving the results from the mean-comparison test and the regression analysis, we can conclude that the market does react to information about goodwill impairments and therefore the answer to the main research question is yes, investors do indeed find goodwill impairments value relevant.

In order to answer the sub-question we hypothesized that goodwill impairment ratios under, or equal to, 5% tend to affect the share price returns to a higher degree than goodwill impairment ratios over 5%. The outcome from the regression was in a latter stage able to verify if the size of the impairment in relation to total goodwill generates different market reactions. The outcome showed distinct differences between the two groups of observations: the group with a low goodwill impairment ratio had a negative coefficient at -0.324 in comparison to the group with a higher goodwill impairment ratio where the negative coefficient stated -0.017. What we can conclude with the second research question in mind is that the size of the impairment actually enforces different market reactions. In short, smaller impairments typically cause stronger negative share price returns than larger impairments.

5.2 Contribution and Further Research

We have contributed to the financial accounting literature with new information regarding market reactions to goodwill impairments in particular to two different parties. Firstly, standard setters have been provided with information that the problem area regarding goodwill impairments extends throughout Europe and that the given information about goodwill accounting seems to be hard to interpret for investors. The market reactions indicate that investors have been unable to predict, and in the later stage precede the impairments, as reflected by the abnormal returns during the event; investors are sometimes taken by surprise when an impairment is being made. Though the standards are written from an investor perspective, this information is of importance for standard setters.

Secondly, market reaction to a certain event is of importance for investors. A goodwill impairment is an example of such an event and gives the investors the opportunity to make more well-founded firm valuation assessments. It provides investors with an incentive to learn to interpret this type of information in order to gain advantages against other market participants. Finally, the study also contributes with a combination of the information content approach and the association approach. Because of this, we can see which effect the size of an impairment has on short-term market reaction, findings that previous studies have not contributed with.

However, this study does not examine whether the investors need to improve their skills of interpreting accounting information or if the disclosure requirements need to be clearer and easier to absorb. Thus, it is something worth considering in future research, i.e. wherein the symptom of the goodwill accounting problem lies. Another alternative approach that could be subject for further research would be to apply our methodology and hand-collect a smaller sample of companies. With a smaller sample one can include all quarterly reports from each company. In that case, since all impairments of goodwill are being included, even greater reliability could be achieved in order to draw appropriate and underpinned conclusions. An additional subject for further research could be to use a qualitative approach regarding the value relevance of goodwill impairments. Potential interviews with professionals on valuing companies might provide valuable input regarding the underlying causes to the market reactions. Furthermore, since our study does not take industry-specific factors into account, it could be interesting to investigate how investors react depending on which industry the firms operate in, as well as investigating if there are any differences regarding value relevance between countries.

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Appendix 1 – Firms

FIRM	COUNTRY	FIRM	COUNTRY
Allgemeine Baugesellschaft 'A' Porr	Austria	Boconcept Holding 'B'	Denmark
Andritz	Austria	Carlsberg 'B'	Denmark
At&S Austria Technologie and Systemtech.	Austria	Coloplast 'B'	Denmark
Atrium European Real Estate	Austria	Columbus	Denmark
Bene	Austria	Dalhoff Larsen and Horneman	Denmark
BWT	Austria	Danske Bank	Denmark
CA Immobilien Anlagen	Austria	DFDS	Denmark
Conwert Immobilien Invest	Austria	DSV 'B'	Denmark
Do&Company Restaurants and Catering	Austria	Exiqon	Denmark
Erste Group Bank	Austria	Flugger 'B'	Denmark
EVN	Austria	IC	Denmark
Flughafen Wien	Austria	Monberg and Thorsen 'B'	Denmark
Immofinanz	Austria	NKT	Denmark
Osterreichische Post	Austria	Nordic Shipholding	Denmark
Palfinger	Austria	North Media	Denmark
Polytec Holding	Austria	Novozymes	Denmark
Raiffeisen Bank International	Austria	Parken Sport and Entertainment	Denmark
S Immo	Austria	Per Aarsleff	Denmark
Schoeller-Bleckmann	Austria	Rockwool 'B'	Denmark
Strabag Securities	Austria	Royal Unibrew	Denmark
Telekom Austria	Austria	RTX	Denmark
Uniqa Insu Gross AG	Austria	Sanistal 'B'	Denmark
Update Software	Austria	TDC	Denmark
Voestalpine	Austria	Torm	Denmark
Wienerberger	Austria	Vestas Windsystems	Denmark
Wolford	Austria	Vestjysk Bank	Denmark
Zumtobel	Austria	Afarak Group	Finland
Ackermans and Van Haaren	Belgium	Ahlstrom	Finland
AGFA-Gevaert	Belgium	Alma Media	Finland
Atenor Group	Belgium	Aspocomp Group	Finland
Barco New	Belgium	Atria 'A'	Finland
CFE	Belgium	Capman 'B'	Finland
Cofinimmo	Belgium	Comptel	Finland
d'Ieteren	Belgium	Cramo	Finland
Deceuninck ECH	Belgium	Digia	Finland
Delhaize Group	Belgium	Elektrobit	Finland
Dexia	Belgium	Exel Composites	Finland
Econocom Group	Belgium	F-Secure	Finland
Floridienne	Belgium	Finnair	Finland
Fluxys Belgium 'D'	Belgium	Finnlines	Finland
Gamble New	Belgium	Glaston	Finland
Gimv	Belgium	Huhtamaki	Finland
Hamon and Compagnie	Belgium	Kemira	Finland
Ion Beam Applications	Belgium	Keskisuomalainen	Finland
KBC Group	Belgium	Kesko 'B'	Finland
Punch International	Belgium	Konecranes	Finland
Roularta Media	Belgium	Lassila and Tikanoja	Finland
Smartphoto Group	Belgium	Metsa Board 'B'	Finland
Tessenderlo	Belgium	Metso	Finland
Umicore	Belgium	Nokia	Finland
Van de Velde	Belgium	Outotec	Finland
Podravka Prehrambena Industrija	Croatia	PKC Group	Finland
CEZ	Czech Republic	Powerflute (di)	Finland
A P Moller - Maersk 'B'	Denmark	Raisio	Finland
Aktieselskabet Schouw and Company	Denmark	Ramirent	Finland
Almanij Brand	Denmark	Rautaruukki 'K'	Finland
Bang and Olufsen 'B'	Denmark	Sanoma	Finland

FIRM	COUNTRY	FIRM	COUNTRY
Sponda	Finland	Eurazeo	France
Stora Enso 'R'	Finland	Eurofins Scientific	France
Suominen	Finland	Europacorp Promesses	France
Talentum	Finland	Eurosic	France
Tecnotree	Finland	Faurecia	France
Teleste	Finland	FDL	France
Tieto OYJ	Finland	Fleury Michon	France
Tikkurila	Finland	Fonciere 6 et 7	France
Trainers House	Finland	Fonciere des Murs	France
UPM-Kymmene	Finland	Fonciere des Regions	France
Viking Line	Finland	GDF Suez	France
Wartsila	Finland	Generale de Sante	France
YIT	Finland	GFI Informatique	France
Accor	France	Groupe Crit	France
Actia Group	France	Groupe Guillin	France
Affine R E	France	Groupe Open	France
Alcatel-Lucent	France	Groupe Partouche	France
Ales Groupe	France	Groupe Steria SCA	France
Altarea	France	Haulotte Group	France
Alten	France	Havas	France
Altran Technologies	France	High Company	France
April	France	Hiolle Industries	France
Areva	France	Icade	France
Arkema	France	Iliad	France
Assystem	France	Imerys	France
AST Groupe	France	Ingenico	France
Atari	France	Interparfums	France
Atos	France	Jcdecaux	France
Audika Groupe	France	Kaufman et Broad	France
Avanquest Software	France	Kering	France
Avenir Telecom	France	Klepierre	France
Banque Nationale de Paris Paribas	France	l'Oreal	France
BIC	France	Lacroix	France
Big Ben Interactive	France	Lafarge	France
Boiron	France	Lagardere Groupe	France
Boursorama (ex Fimatex)	France	Latecoere	France
Bouygues	France	LDC	France
Bull	France	Le Belier	France
Bureau Veritas International	France	Lebon	France
Cap Gemini	France	Lesnxconstructeurs	France
Casino Guichard-P	France	Lisi	France
Christian Dior	France	LVMH	France
CNP Assurances	France	M6-Metropole Television	France
Compagnie des Alpes	France	Manitou	France
Compagnie Generale de Geophysique-Veritas	France	Medasys	France
Crcam Nord de France CCI	France	Mersen (ex LCL)	France
Credit Agricole	France	Michelin	France
CS Communication Systems	France	MR Bricolage	France
Danone	France	Natixis	France
Derichebourg	France	Neurones	France
Devoteam	France	Nexans	France
Direct Energie	France	Nexity	France
ECA	France	Norbert Dentressangle	France
Edenred	France	NRJ Group	France
EDF	France	OL Groupe	France
Encres Dubuit	France	Orange	France
ESI Group	France	Pernod-Ricard	France
Essilor International	France	Peugeot	France
Etam Developement	France	Poncin Yachts	France
Euler Hermes	France	Prismaflex International	France

FIRM	COUNTRY	FIRM	COUNTRY
PSB Industries	France	Bilfinger Berger	Germany
Publicis Groupe	France	Cancom	Germany
Radiall	France	Cash Life	Germany
Rallye	France	Celesio	Germany
Recylex	France	Centrotec Sustainable	Germany
Rexel	France	Commerzbank	Germany
Rodriguez Group	France	Compugroup Medical	Germany
Rougier	France	Conergy	Germany
Saint Gobain	France	Constantin Medien	Germany
Samse	France	Continental	Germany
Schneider Electric	France	COR and FJA	Germany
SEB	France	Curanum	Germany
Sequana	France	DAB Bank	Germany
Societe Generale	France	Data Modul	Germany
Soitec	France	Deag Deutsche Entertainment	Germany
Solving Efeso International	France	Deufol	Germany
Somfy	France	Deutsche Bank	Germany
Sopra Group	France	Deutsche Boerse	Germany
Spir Communication	France	Deutsche Post	Germany
Sqli	France	Deutsche Postbank	Germany
Stef	France	Deutsche Telekom	Germany
Suez Environnement	France	E On	Germany
Sword Group	France	Elexis	Germany
Synergie	France	Enbw Energie Baden-Wuerttemberg	Germany
Technicolor	France	Energiekontor	Germany
Teleperformance	France	Euromicron Communication and Control Tech	Germany
Tessi	France	Evotec	Germany
TF1 (Television Francaise 1)	France	Fielmann	Germany
Thales	France	Francotyp-Postalia Holding	Germany
Theolia	France	Fraport	Germany
Tour Eiffel	France	Fuchs Petrolub	Germany
Trigano	France	Funkwerk	Germany
U10	France	Generali Deutschland Holding	Germany
Ubisoft Entertainment	France	Gesco	Germany
Unibail-Rodamco	France	Gigaset	Germany
Valeo	France	Hamburger Hafen und Logistik	Germany
Vallourec	France	Hanseyachts	Germany
Veolia Environnement	France	Hawesko Holding	Germany
Vinci	France	HeidelbergCement	Germany
Vivendi	France	Heidelberger Druckmaschinen	Germany
VM Materiaux	France	Heliad Equity Partners	Germany
Wendel	France	Henkel	Germany
Aareal Bank	Germany	Highlight Communications	Germany
Adesso	Germany	Hoeft and Wessel	Germany
Adidas	Germany	Homag Group	Germany
Adler Modemarkte	Germany	Hornbach-Baumarkt	Germany
Adva Optical Networking	Germany	Indus Holding	Germany
Allgeier	Germany	Intershop Communications	Germany
Allianz	Germany	IVG Immobilien	Germany
Amadeus Fire	Germany	Jenoptik	Germany
Analytik Jena	Germany	Kloeckner and Company	Germany
Aragon	Germany	Koenig and Bauer	Germany
Augusta Technologie	Germany	KSB	Germany
Axel Springer	Germany	Kuka	Germany
Balda	Germany	KWS Saat	Germany
BASF	Germany	Lanxess	Germany
Baywa	Germany	Leoni	Germany
BDI-Bioenergy International	Germany	Linde	Germany
Beate Uhse	Germany	Logwin	Germany
Beiersdorf	Germany	Marseille-Kliniken	Germany

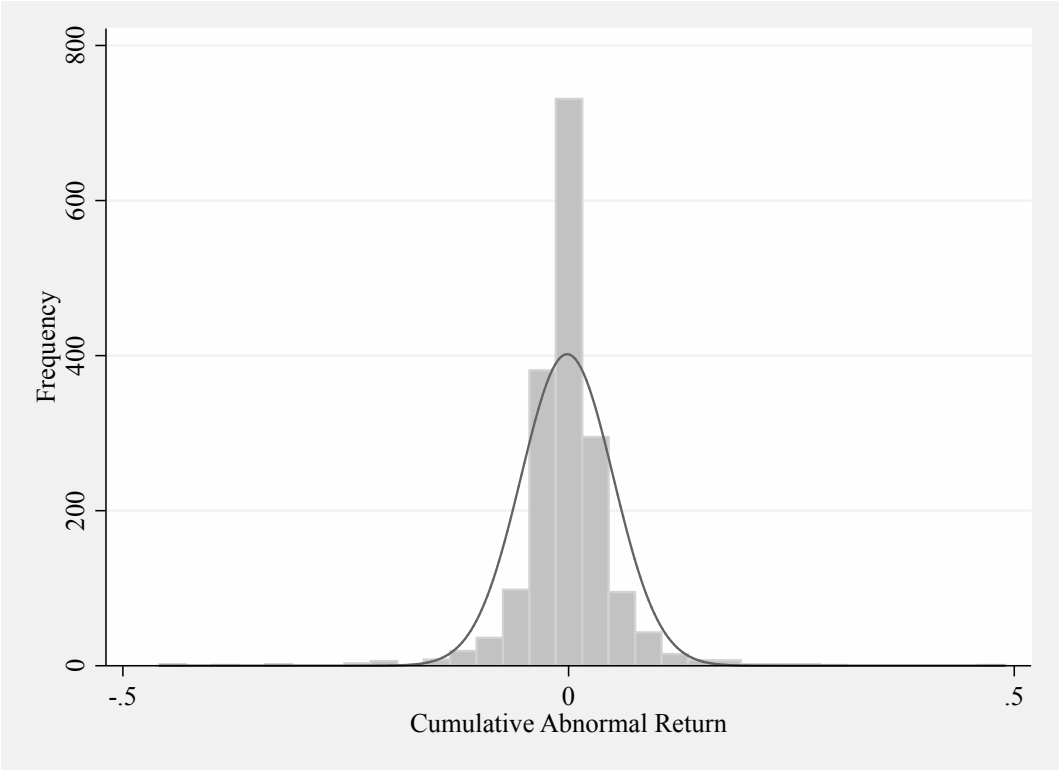
FIRM	COUNTRY	FIRM	COUNTRY
Masterflex	Germany	Hellenic Telecommunications Organisation	Greece
Mediclin	Germany	National Bank of Greece	Greece
Medigene	Germany	OPAP	Greece
Merck KGaA	Germany	Titan Cement CR	Greece
MPC Muenchmeyer Capital K	Germany	Magyar Telekom Telecommunications	Hungary
Muehlhan	Germany	Mol Magyar Olaj-ES Gazipari	Hungary
Muenchener Rückversicherung	Germany	OTP Bank	Hungary
MVV Energie	Germany	Pannergy	Hungary
Net	Germany	Richter Gedeon	Hungary
NTT Com Security	Germany	Allied Irish Banks	Ireland
OHB	Germany	CPL Resources (ESM)	Ireland
P&I Personal and Informatik	Germany	Fyffes (ESM)	Ireland
Pixelpark	Germany	Glanbia	Ireland
PNE Wind	Germany	Independent News and Media	Ireland
Praktiker	Germany	Kingspan Group	Ireland
Progress-Werk Oberkirch	Germany	Smurfit Kappa Group	Ireland
Puma	Germany	Total Produce (ESM)	Ireland
PVA Tepla	Germany	Acque Potabili	Italy
R Stahl	Germany	Amplifon	Italy
Roth and RAU	Germany	Antichi Pellettieri	Italy
RWE	Germany	Arnoldo Mondadori EDI	Italy
SAF-Holland	Germany	Autogrill	Italy
Salzgitter	Germany	Banca Monte dei Paschi	Italy
Schlott Gruppe	Germany	Banca Piccolo Credito Valtell	Italy
Schuler Neue Shares	Germany	Banca Popolare di Milano	Italy
Sedo Holding	Germany	Banca Popolare Emilia Romagna	Italy
Siemens	Germany	Banca Popolare Etruria Lazio	Italy
Singulus Technologies	Germany	Banco Popolare	Italy
Sinnerschrader	Germany	Caltagirone Editore	Italy
Software	Germany	Cementir Holding	Italy
Solar Fabrik	Germany	Datalogic	Italy
Solarworld K	Germany	Davide Campari Milano	Italy
Solon	Germany	Delclima	Italy
Stada Arzneimittel	Germany	Enel	Italy
Suedzucker	Germany	Fiat	Italy
Suess Microtec	Germany	Fiera Milano	Italy
Sunways	Germany	Finmeccanica	Italy
Sygnis	Germany	Gtech	Italy
Takkt	Germany	IMA Industria Macchine	Italy
Technotrans	Germany	Intesa Sanpaolo	Italy
Telegate	Germany	Luxottica	Italy
Teles	Germany	RCS Media Group	Italy
ThyssenKrupp	Germany	Sabaf	Italy
TUI	Germany	Safilo Group	Italy
United Internet	Germany	Save-Aeroporto di Venezia Marco Polo	Italy
United Labels	Germany	Sias	Italy
USU Software	Germany	Telecom Italia	Italy
Uzin UTZ	Germany	Telecom Italia Media	Italy
VBH Holding	Germany	Unicredit	Italy
Verbio Vereinigte Bioenergie	Germany	Unione di Banche Italian	Italy
Villeroy and Boch	Germany	Aegon	Netherlands
Wacker Neuson	Germany	Ahold Koninklijke	Netherlands
Washtec	Germany	Airbus Group	Netherlands
Xing	Germany	Akzo Nobel	Netherlands
Youniq	Germany	AMG Advanced Metallurgical Group	Netherlands
Zooplus	Germany	Arcelormittal	Netherlands
Bank of Piraeus	Greece	Ballast Nedam	Netherlands
Eurobank Ergasias	Greece	BAM Groep Koninklijke	Netherlands
Gross Sarantis	Greece	Batenburg Techniek	Netherlands
Hellenic Petroleum	Greece	Be Semiconductor	Netherlands

FIRM	COUNTRY	FIRM	COUNTRY
Corbion	Netherlands	Media Capital	Portugal
Corio	Netherlands	Mota Engil SGPS	Portugal
Ctac NM	Netherlands	Sonae SGPS	Portugal
Delta Lloyd Group	Netherlands	Sumol Compal	Portugal
Docdata	Netherlands	Banca Transilvania Cluj	Romania
DPA Group	Netherlands	Intereuropa	Slovenia
DSM Koninklijke	Netherlands	Mercator	Slovenia
Exact Holding	Netherlands	Petrol	Slovenia
Fugro	Netherlands	Atresmedia Corporation	Spain
Grontmij	Netherlands	Banco de Sabadell	Spain
HAL Trust	Netherlands	Banco Santander	Spain
Heijmans	Netherlands	Cementos Portland Valderrivas	Spain
Heineken	Netherlands	Deoleo	Spain
Heineken Holding	Netherlands	Ebro Foods	Spain
ICT Automatisering	Netherlands	Endesa	Spain
ING Groep	Netherlands	Fersa Energias Renovables	Spain
Kardan N V	Netherlands	General de Alquiler de Maquinaria	Spain
KAS Bank	Netherlands	Indra Sistemas	Spain
KPN KON	Netherlands	Mapfre	Spain
Macintosh Retail	Netherlands	Melia Hotels International	Spain
Pharming Group	Netherlands	Natraceutical	Spain
Philips Electronics Koninklijke	Netherlands	Prosr Compania Securidad	Spain
Postnl	Netherlands	Renta 4 Servicios de Inversion	Spain
Randstad Holding	Netherlands	Sacyr Vallehermoso	Spain
Royal Dutch Shell A	Netherlands	Service Point Solutions	Spain
Royal Imtech	Netherlands	Telefonica	Spain
Ten Cate	Netherlands	Vocento	Spain
TKH Group	Netherlands	Acando 'B'	Sweden
TNT Express	Netherlands	AF 'B'	Sweden
Tom Tom	Netherlands	Alfa Laval	Sweden
Unilever Certificates	Netherlands	Amasten Holding 'B'	Sweden
Unit 4	Netherlands	Aspiro	Sweden
USG People	Netherlands	Atlas Copco 'A'	Sweden
Vopak	Netherlands	Atrium Ljungberg 'B'	Sweden
Wessanen Koninklijke Certificates	Netherlands	Avanza Bank Holding	Sweden
Wolters Kluwer	Netherlands	Beijer Alma 'B'	Sweden
Xeikon	Netherlands	Bilia 'A'	Sweden
Agora	Poland	Billerud Korsnas	Sweden
Apator	Poland	Biotage	Sweden
Asseco Poland	Poland	Black Earth Farming SDB	Sweden
Boryszew	Poland	BTS Group	Sweden
Duda	Poland	Cherry	Sweden
Echo Investment	Poland	Cision	Sweden
Enea	Poland	Cybercom Group Europe	Sweden
Gant	Poland	Elanders 'B'	Sweden
Grupa Kety	Poland	Eniro	Sweden
Grupa Lotos	Poland	Fenix Outdoor 'B'	Sweden
Impexmetal	Poland	Getinge	Sweden
Kernel Holding	Poland	Global Health Partners	Sweden
KGHM	Poland	Gunnebo	Sweden
PBG	Poland	Hemtex	Sweden
PGF	Poland	ICA Gruppen	Sweden
PLKNC Naftowy Orlen	Poland	Industrial and Financial Systems 'B'	Sweden
Polnord	Poland	Intrum Justitia	Sweden
Tarczynski	Poland	Karolinska Development (WI)	Sweden
Banco Comercial Portugues 'R'	Portugal	Kinnevik 'B'	Sweden
Cimentos de Portugal SGPS	Portugal	Klovern	Sweden
EDP Energias de Portugal	Portugal	Know IT	Sweden
Ibersol - SGPS	Portugal	Lindab International	Sweden
Martifer	Portugal	Midsona 'B'	Sweden

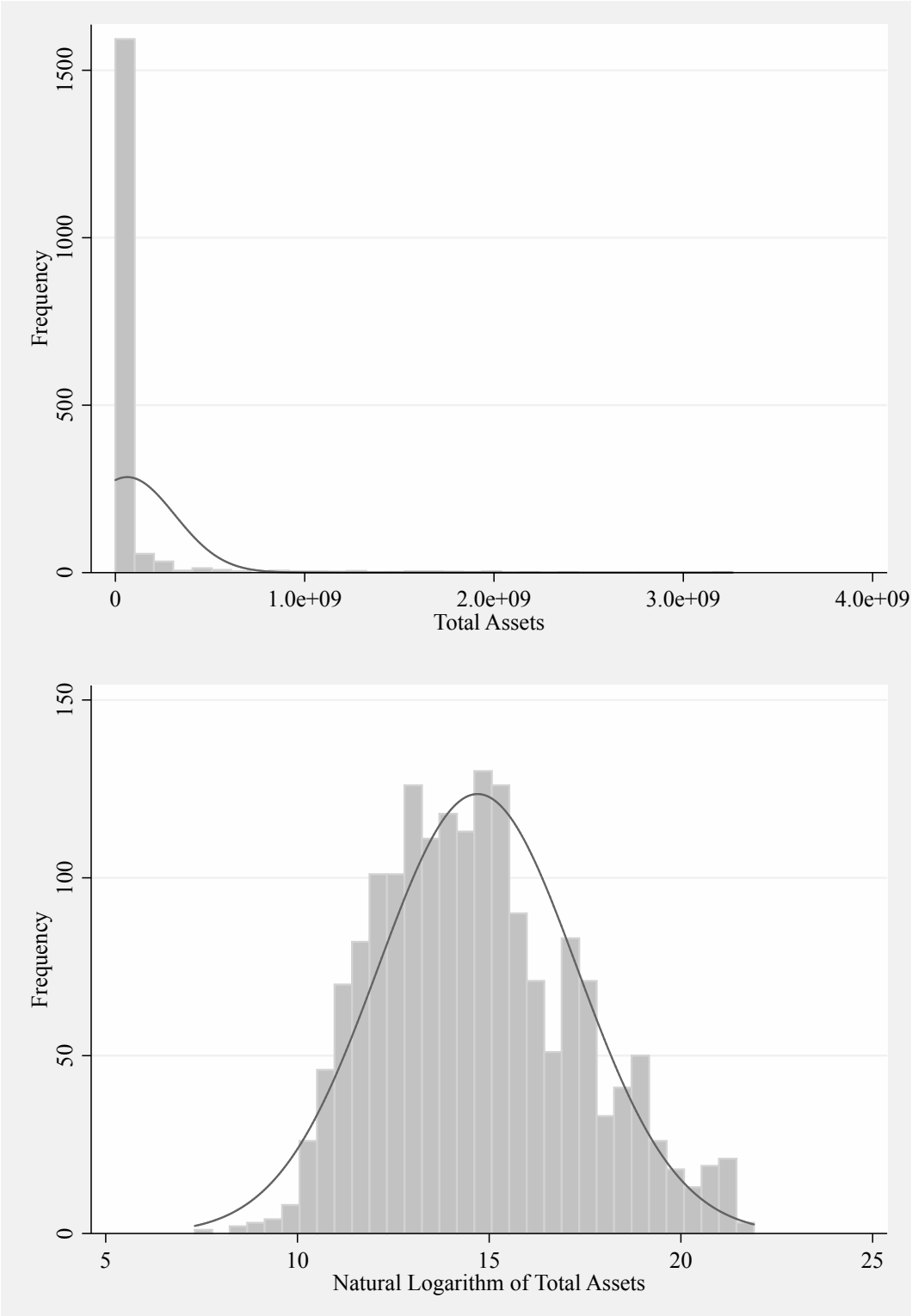
FIRM	COUNTRY	FIRM	COUNTRY
Modern Times Group Mortgage 'B'	Sweden	BP	United Kingdom
NCC 'B'	Sweden	Braemar Shipping Services	United Kingdom
New Wave Group 'B'	Sweden	British American Tobacco	United Kingdom
Nordea Bank	Sweden	Britvic	United Kingdom
Nordnet 'B'	Sweden	BTG	United Kingdom
Partnertech	Sweden	Burberry Group	United Kingdom
Peab 'B'	Sweden	BWIN Party Digital Entertainment	United Kingdom
Poolia 'B'	Sweden	Cable and Wireless Communications	United Kingdom
Proact IT Group	Sweden	Cairn Energy	United Kingdom
Proffice 'B'	Sweden	Camco Clean Energy	United Kingdom
Ratos 'B'	Sweden	Capital and Regional	United Kingdom
RNB Retail and Brands	Sweden	Carillion	United Kingdom
Saab 'B'	Sweden	Carr's Milling Industries	United Kingdom
Sandvik	Sweden	Castleton Technology	United Kingdom
SAS	Sweden	Centrica	United Kingdom
SCA 'B'	Sweden	Chemring Group	United Kingdom
Scania 'B'	Sweden	Circle Holdings	United Kingdom
Securitas 'B'	Sweden	Clarke (T)	United Kingdom
Semcon	Sweden	Clarkson	United Kingdom
Skanska 'B'	Sweden	Close Brothers Group	United Kingdom
SKF 'B'	Sweden	CLS Holdings	United Kingdom
Ssab 'A'	Sweden	Communisis	United Kingdom
Sweco 'B'	Sweden	Compass Group	United Kingdom
Swedbank 'A'	Sweden	Cranswick	United Kingdom
Systemair	Sweden	CRH	United Kingdom
TELE2 'B'	Sweden	Crimson Tide	United Kingdom
Teliasonera	Sweden	Daily Mail 'A'	United Kingdom
Tradedoubler	Sweden	Dairy Crest	United Kingdom
Trelleborg 'B'	Sweden	Dart Group	United Kingdom
Volvo 'B'	Sweden	DCC	United Kingdom
4IMPRINT Group	United Kingdom	Dewhurst	United Kingdom
600 Group	United Kingdom	Dixons Retail	United Kingdom
888 Holdings	United Kingdom	Domino Printing Sciences	United Kingdom
Access Intelligence	United Kingdom	E2V Technologies	United Kingdom
Air Partner	United Kingdom	Electric Word	United Kingdom
Altitude Group	United Kingdom	Enables IT Group	United Kingdom
Amec	United Kingdom	Euromoney Institutional Investor	United Kingdom
Amino Technologies	United Kingdom	Findel	United Kingdom
Andes Energia	United Kingdom	Fuller Smith 'A'	United Kingdom
Anglo American	United Kingdom	Future	United Kingdom
Animalcare Group	United Kingdom	G4S	United Kingdom
Anite	United Kingdom	Gem Diamonds (di)	United Kingdom
Asia Resource Minerals	United Kingdom	GKN	United Kingdom
Asos	United Kingdom	Globo	United Kingdom
Assura Group	United Kingdom	Go-Ahead Group	United Kingdom
Augean	United Kingdom	Gooch and Housego	United Kingdom
Avesco Group	United Kingdom	Green Compliance	United Kingdom
Aviva	United Kingdom	Gresham Computing	United Kingdom
BAE Systems	United Kingdom	GVC Holdings	United Kingdom
Balfour Beatty	United Kingdom	Hargreaves Lansdown	United Kingdom
Barclays	United Kingdom	Havelock Europa	United Kingdom
Barr (AG)	United Kingdom	Helphire Group	United Kingdom
Barratt Developments	United Kingdom	Henderson Group	United Kingdom
Berendsen	United Kingdom	Hill and Smith	United Kingdom
BG Group	United Kingdom	Holders Technology	United Kingdom
BHP Billiton	United Kingdom	Homeserve	United Kingdom
Biome Technologies	United Kingdom	HSBC Holdings (Ordinary $0.50)	United Kingdom
Bloomsbury Publishing	United Kingdom	Hunting	United Kingdom
Bodycote	United Kingdom	Huntsworth	United Kingdom
Boot (Henry)	United Kingdom	ICAP	United Kingdom

FIRM	COUNTRY	FIRM	COUNTRY
Idox	United Kingdom	Qinetiq Group	United Kingdom
IG Group Holdings	United Kingdom	Quarto Group	United Kingdom
Imperial Tobacco Group	United Kingdom	RCG Holdings	United Kingdom
Inchcape	United Kingdom	Reckitt Benckiser Group	United Kingdom
Informa	United Kingdom	Rentokil Initial	United Kingdom
Inmarsat	United Kingdom	Restore	United Kingdom
Innovation Group	United Kingdom	Rexam	United Kingdom
Intercontinental Hotels Group	United Kingdom	Rio Tinto	United Kingdom
International Consolidated Airlines Group	United Kingdom	RM	United Kingdom
Interquest Group	United Kingdom	Rolls-Royce Holdings	United Kingdom
Interserve	United Kingdom	Royal Bank of Scotland Group	United Kingdom
Intertek Group	United Kingdom	Royal Dutch Shell B	United Kingdom
IS Solutions	United Kingdom	RPC Group	United Kingdom
ITE Group	United Kingdom	RSA Insurance Group	United Kingdom
ITV	United Kingdom	Savills	United Kingdom
Jardine Lloyd Thompson	United Kingdom	Senior	United Kingdom
JD Sports Fashion	United Kingdom	Severn Trent	United Kingdom
Johnson Service Group	United Kingdom	Shanks Group	United Kingdom
Kazakhmys	United Kingdom	SIG	United Kingdom
Kennedy Ventures	United Kingdom	Sigma Capital Group	United Kingdom
Kingfisher	United Kingdom	Skyepharma	United Kingdom
Laird	United Kingdom	Smith (DS)	United Kingdom
Land Securities Group	United Kingdom	Smith and Nephew	United Kingdom
Lavendon Group	United Kingdom	Smiths Group	United Kingdom
Lloyds Banking Group	United Kingdom	Speedy Hire	United Kingdom
Lok'n Store Group	United Kingdom	Spirent Communications	United Kingdom
London Stock Exchange Group	United Kingdom	Spirit Pub Company	United Kingdom
Londonmetric Property	United Kingdom	Sports Direct International	United Kingdom
Lookers	United Kingdom	SSE	United Kingdom
M&C Saatchi	United Kingdom	Straight	United Kingdom
Majestic Wine	United Kingdom	STV Group	United Kingdom
Man Group	United Kingdom	Summit Corporation	United Kingdom
Management Consulting Group	United Kingdom	Synectics	United Kingdom
Marks and Spencer Group	United Kingdom	Synthomer	United Kingdom
Marshalls	United Kingdom	Tarsus Group	United Kingdom
Mecom Group	United Kingdom	Tesco	United Kingdom
Menzies (John)	United Kingdom	Thomas Cook Group	United Kingdom
Microgen	United Kingdom	Tribal Group	United Kingdom
Miton Group	United Kingdom	TUI Travel	United Kingdom
Mondi	United Kingdom	UBM	United Kingdom
Moneysupermarket Com Group	United Kingdom	Unilever (United Kingdom)	United Kingdom
Morrison (WM) Supermarkets	United Kingdom	Vernalis	United Kingdom
Mothercare	United Kingdom	Vesuvius	United Kingdom
National Express	United Kingdom	Vianet Group	United Kingdom
Nationwide Accident Repair Services	United Kingdom	Vislink	United Kingdom
Netplay Television	United Kingdom	Vitec Group	United Kingdom
Next	United Kingdom	Vodafone Group	United Kingdom
Next Fifteen Communication	United Kingdom	Whitbread	United Kingdom
Northern Bear	United Kingdom	William Hill	United Kingdom
Old Mutual	United Kingdom	Wincanton	United Kingdom
Paragon Group of Companies	United Kingdom	Wolseley	United Kingdom
Park Group	United Kingdom	Wood Group (John)	United Kingdom
Pendragon	United Kingdom	WPP	United Kingdom
Persimmon	United Kingdom	WYG	United Kingdom
Photo-ME International	United Kingdom	Wynnstay Group	United Kingdom
Polar Capital Holdings	United Kingdom	Xchanging	United Kingdom
Progility	United Kingdom		
Progressive Digital Media Group	United Kingdom		
Promethean World	United Kingdom		
Provident Financial	United Kingdom		

Appendix 2 – Distribution of CAR



Appendix 3 – Distribution of TA and lnTA



Appendix 4 – Mean-Comparison Test, excluding 2011

Obs.	Mean	Std. Err.	Std. Dev.	t
1454	-0.0026320	0.0013646	0.0520324	-1.9289*

Mean less than zero is significant at 0.05* level

Appendix 5 – Hausman Test

TABLE 5 Hausman Test

Variable	Coefficients (b) fixed	(B) random	(b-B) difference	sqrt(diag(V_b-V_B)) S.E.
GWIGW	-0.0138811	-0.0136639	-0.0002172	0.0096391
EBIT	3.60E-10	3.54E-10	5.67E-12	4.52E-10
NSG	-0.0011686	-0.0001846	-0.0009840	0.0005346
LEV	-0.0000271	-0.0001956	0.0001685	0.0001434
lnTA	-0.0022695	-0.0011357	-0.0011339	0.0063102

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: H_0: difference in coefficients not systematic

$Chi^2(4) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B) = 4.88$

$Prob > Chi^2 = 0.3000$

The decision rule is to reject the null hypothesis if $Prob > Chi^2$ is lower than 0.05. Since 0.3000 is higher than 0.05, we cannot reject the null hypothesis. This tells us that the preferred regression model to use is random effects.

Appendix 6 – Multivariate Random Effects Regression, excluding collinear variables

TABLE Excluding lnTA

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0121255	0.0063110	-1.92*	0.055
EBIT	1.33E-10	4.06E-10	0.33	0.743
NSG	-0.0001604	0.0006938	-0.23	0.817
LEV	-0.0002463	0.0002640	-0.93	0.351

Number of obs. = 1758
Number of firms = 830

Correlation is significant at 0.10* level

TABLE Excluding EBIT

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0142395	0.0063380	-2.25*	0.025
NSG	-0.0001753	0.0006935	-0.25	0.800
LEV	-0.0001790	0.0002650	-0.68	0.499
lnTA	-0.0009540	0.0006577	-1.45	0.147

Number of obs. = 1758
Number of firms = 830

Correlation is significant at 0.05* level

Appendix 7 – *H2* Bivariate Random Effects Regression

TABLE GWIGW>0.05

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.0165618	0.0081338	-2.04*	0.042

Number of obs. = 761
Number of firms = 527

Correlation is significant at 0.05* level

TABLE GWIGW≤0.05

Variable	Coef.	Std. Err.	z	P>z
GWIGW	-0.3049749	0.1106634	-2.76*	0.006

Number of obs. = 997
Number of firms = 496

Correlation is significant at 0.01* level