Differences between the Big Four Audit Firms:
Disclosure Quality and Compliance Levels of Goodwill under IFRS

Master Thesis

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* Last names are removed from this version for privacy reasons.

Preface

At last…, my master thesis is finished! There were some dark moments and I doubted I would ever make it to the end, but I am finally there. The creation of this master thesis has taken up most of my time over the last 6 months, and I am very glad I can now turn my attention to other things again. I would like to thank my coach Miriam K. and co-reader Ben B. for their support.

I hope you enjoy reading the thesis,

Wiebe

Executive Summary

This master thesis examines differences between the four large international audit firms (Big Four) in the accounting of goodwill following the adoption of International Financial Reporting Standards (IFRS) in the European Union per 1 January 2005. The adoption of IFRS introduced a new goodwill accounting treatment, under which goodwill is no longer amortized, but is tested instead at least annually for impairment and requires the disclosure of various aspects involved in the impairment testing. This new way to account for goodwill has been criticized for, among others, introducing subjectivity, inherent managerial discretion and thus creative accounting, blending of acquired goodwill and internally generated goodwill, and for being costly in its application.

Various aspects of the goodwill accounting treatment under IFRS are examined for differences between the Big Four audit firms (PriceWaterhouseCoopers, Ernst & Young, Deloitte, and KPMG); 1a) the overall level of compliance with 29 disclosure requirements from IAS 36, 1b) the pattern of compliance with individual disclosure requirements, 2a) the aggregation of cash-generating units (CGUs) compared to reportable segments, 2b) the level of allocation of goodwill to CGUs, and assumptions used in the determination of value in use as recoverable amount, 3a) the discount rates, 3b) the growth rates used, and 3c) the period over which cash flows are forecasting. A sample of 167 firms is drawn from companies listed on Euronext Amsterdam for the years 2005 and 2006. Firms are selected on carrying goodwill, reporting under IFRS, year-end 31 December, and using a Big Four auditor.

The results show clients of PWC and EY are more compliant with the disclosure requirements for goodwill than clients of KPMG and DL, but only in 2006 and no differences between the audit firms in 2005. The level of compliance is higher in 2006 compared to 2005. The analysis of the disclosure pattern between the audit firms revealed differences between the audit firms, for some items the clients of PWC and EY came out best, while for other items clients KPMG turned out to be the most compliant. No differences were found between the audit firms for the aggregation of CGUs relative to reportable segments. KPMG has a higher level of allocation in 2005, but there are no differences between the audit firms in the level of allocation in 2006, and the level of allocation is 0.15 higher in 2006 compared to 2005. The findings show no differences between the audit firms for the discount rates, growth rates, and forecasting period used in the cash flow modeling to determine value in use.

Systematic differences between the large audit firms in the way IFRS is enforced has implications for the success of IFRS and the comparability of financial statements, not just for cross-country comparability, but also for the comparability of firms from the same country. There could also be potential implications for reputations of the Big Four audit firms.

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Part I: Research Problem & Questions

Chapter 1: Introduction

1.1 Introduction

In 2002 and 2003 numerous accounting scandals and reporting irregularities came to light. The corporate giant Enron collapsed, resulting in the demise of its auditor, Arthur Andersen, one of the Big Five audit firms at the time. The events gave rise to questions about corporate governance, auditor independence and audit quality. New corporate governance legislation was passed in the US with the Sarbanes-Oxley Act, and the 8th EU Directive in the European Union to address the issues and restore public confidence.

Starting in 2005 listed companies in the European Union, are required to report under IFRS (International Financial Reporting Standards), introducing significant new accounting and reporting recognition, measurement and disclosure requirements (Ernst & Young, 2006: 2). While firms in some countries in the European Union could voluntarily adopt IAS or IFRS before the mandatory adoption, there was no established "best practice" for IFRS (Ernst & Young, 2006: 11), also in part as some of the new standards were only issued early in 2004, for example IFRS 3 *Business Combinations* and amendments to IAS 36 *Impairment of Assets*.

These events in the past few years amount together to a substantial disturbance for providers of audit services; increased pressure from the market in the wake of the accounting scandals, increased regulatory pressure as result, and the pressure from the transition to IFRS. This combination of events and the resulting pressure may have been better withstood by some providers of audit services than others, with implications for variation of audit quality (Carlin *et al.*, 2007: 22).

Audit quality is defined as the joint probability that the auditor will both discover a breach of reporting standards, and report the breach. The probability of discovering a breach depends on the auditor's competence, while the probability of reporting a discovered breach depends on the auditor's independence (DeAngelo, 1981: 186).

Research into audit quality has generally focused on the size of the audit firm, small versus large, following the works of DeAngelo (1981) and Shapiro (1983). Researchers made extensive use of this way to capture differences between audit service providers, and generally ignored the possibility for variation in audit quality provided by the large audit firms. Given the significant changes in the audit environment over the past couple of years, it may have merits to reconsider and re-examine the assumption that large audit firms provide similar levels of quality.

The thesis is organized in five parts, each with one or more chapters. Part I: Introduction, where *Chapter 1* continues with the formulation of the problem definition and research questions. Part II: Theoretical Foundations, where I review literature in *Chapter 2* (page 10), and develop hypotheses and the conceptual framework in *Chapter 3* (page 13). Part III: Research Methodology, where I outline the methodology employed for the thesis in *Chapter 4* (page 16). Part IV: Empirical Findings, where I discuss the empirical findings in *Chapter 5* (page 20). Part V: Conclusions, Implications and Further Research, where I discuss the conclusions, implications and directions for further research in *Chapter 6* (page 54).

1.2 Problem definition & research questions

With the adoption of IFRS by the European Union per 1 January 2005, came a new goodwill accounting regime. Prior to the transition to IFRS, the predominate approach was to capitalize purchased goodwill and amortize it over a number of years, under NL GAAP (Generally Accepted Accounting Principles) goodwill was amortized over a maximum of 20 years. Under the new goodwill accounting regime, goodwill is no longer amortized, but instead tested at least annually for impairment.

The IASB (International Accounting Standards Board) issued IFRS 3 *Business Combinations* and a revised IAS 36 *Impairment of Assets* in 2004 (International Accounting Standard), adopting an impairment-only approach for acquired goodwill to improve the quality of accounting for goodwill and seek international convergence (IAS 36.IN2). In the USA its FASB (Financial Accounting Standards Board) had adopted an impairment-only approach earlier in 2001 when it issued SFAS 141 *Business Combinations* and SFAS 142 *Goodwill and Other Intangible Assets* (Standard of Financial Accounting Standards). Despite the fact that the IASB and FASB seek convergence and both adopted an impairment-only regime for goodwill, considerable differences exist between the accounting for goodwill under IFRS and US GAAP (Shoaf and Zaldivar, 2005).

Goodwill acquired in a business combination represents a payment made by an acquirer in anticipation of future economic benefits from assets that are not capable of being individually identified and separately recognized (IAS 36.81). Under IFRS goodwill is to be allocated to CGUs (cash-generating units), which should represent the lowest level within the entity at which goodwill is monitored for internal management purposes, and a CGU should not be larger than a reportable segment as defined by IAS 14 *Segment Reporting* (IAS 36.80). Goodwill is to be tested for impairment annually, and whenever there is an indication that the unit may be impaired by comparing the carrying amount of the unit, including goodwill, with the recoverable amount of the unit (IAS 36.90). The recoverable amount of a unit is the higher of its fair value less costs to sell and its value in use, if the carrying amount of a unit exceeds its recoverable amount, the unit is impaired, and an impairment loss is recognized (IAS 36.6).

The advantage of the impairment-only treatment is that the valuation of goodwill on the balance sheet better reflects the asset value, rather than the arbitrary cost less

amortization, and that a write-off on goodwill in the income statement reflects a real economic decline in value, rather than the arbitrary systematic amortization. Therefore the new treatment is argued to better assist users of financial statements in their decision making (Wines *et al.*, 2007: 868). However, some issues with the new approach have been highlighted. It has been criticized for, among others, introducing subjectivity, inherent managerial discretion and thus creative accounting, blending of acquired goodwill and internally generated goodwill, and for being costly in its application (Schultze, 2005: 277; Wines *et al.*, 2007).

Since goodwill is no longer subject to systematic amortization, and only to impairment testing, the reliance placed on these impairment tests increases, for that reason IAS 36 requires additional disclosures on the impairment tests on goodwill to allow users of financial statements to evaluate the reliability of those tests (IAS 36.BC205). The compliance with these requirements and the quality thereof will have an important impact on the users' ability to evaluate these impairment tests.

IFRS requires a greater amount of information to be disclosed in the notes to the financial statements compared to the previous GAAPs companies followed in the European Union, a survey of 2005 annual reports of large companies by Ernst & Young (2006: 26), found the number of pages containing the notes increased on average by 10%. However, Libby *et al.* (2006) show in an experiment that partners of the Big Four audit firms are more likely to demand correction of a misstatement in recognized amounts in the financial statements, than they are to demand correction of a misstatement in disclosed amounts in the financial notes. Libby *et al.* (2006) also found that the partners spend more time on correction decisions for recognized information, than for disclosed information. This will have an impact on the disclosures of goodwill impairment testing, as it suggests auditors will give lower priority to checking for compliance with the many required disclosures (Carlin *et al.*, 2007: 23).

The lack of established "best practices" for IFRS means auditors have to rely more on their own judgment and interpretation of the standards, impacting the first element of audit quality, the auditor's competence. Carlin *et al.* (2007: 23) reason that assuming auditor competence is constant across the Big Four audit firms, it would still be possible to result in differences, as the same level of attention given to the information in the financial statements may not consistently be applied in the approach used by audit firms for the increased amount of information in the notes, impacting the second element of audit quality, the auditor's willingness to demand a correction of a detected misstatement.

Given the complexity and apparent inherent managerial discretion in the new goodwill treatment, it provides for a good setting to test for differences between the Big Four audit firms, these are PriceWaterhouseCoopers (PWC), Ernst & Young (EY), Deloitte (DL), and KPMG. I formulate the following problem definition:

Are there differences among the Big Four audit firms in the quality of goodwill accounting?

I formulate the following research questions based on a previous study by Carlin *et al.* (2007) and literature on the goodwill accounting treatment under IFRS by Wines *et al.* (2007). The first research question is based on the disclosure requirements for goodwill, while the second and third research questions are based on difficulties identified; the manner in which CGUs are defined, and the discount and growth rates used (Carlin *et al.*, 2007: 23; Wines *et al.*, 2007: 870). The foundations of the research questions in theory and literature are discussed in detail in *Chapter 3*.

R1: What is the relation between the firm's disclosures on goodwill and its audit firm?

The first research question is about the overall level of compliance with the disclosure requirements for goodwill from IAS 36, and the pattern of compliance with the individual disclosure requirements.

R2: What is the relation between the firm's goodwill CGUs and its audit firm?

The second research question is about the designation of the CGUs relative to the reportable segments which act as an upper limit, a CGU may not be larger than a reportable segment, and about the extent to which goodwill is allocated to CGUs.

R3: What is the relation between the firm's assumptions used for value in use estimates for goodwill impairment testing and its audit firm?

The third research question is about the assumptions used in the determination of the value in use as recoverable amount, the discount rate, the growth rate, and the cash flow forecasting period.

The problem definition and the research question form the core of the thesis, and the research objective is to find the answers to the research questions and problem definition. The thesis contributes to the audit literature by providing insights in the differences between the large audit firms in a novel setting; a new and more complex goodwill accounting regime under IFRS.

The research carried out in this thesis is of interest to a number of parties. First, it is of interest to the large audit firms themselves, as evaluation and comparison to their competitors. Also firms can compare themselves with the sample and determine whether they do better or worse than average. Second, IFRS should remain IFRS in whatever country it is applied, while it is anticipated that cross-country differences in accounting quality in the EU are likely to remain following IFRS adoption (Soderstrom and Sun, 2007), systematic differences between the large audit firms has implications for the success of IFRS. The success of IFRS and its adoption by the EU is of interest to many different parties, including the IASB, governments, stock exchanges, regulatory bodies and economic institutions, not only in jurisdiction that adopted IFRS recently, but also in jurisdictions planning to transition to IFRS (e.g. Canada in 2011, South Korea in 2011), or are considering doing so.

Part II: Theoretical Foundations

Chapter 2: Review of Literature

Prior research in the domain of audit quality has used various ways and settings to test for the level of quality of audit services. Audit quality is difficult to measure as the only observable outcome of the audit is the auditor's report, which typically has a standardized format, and most audit opinions are clean. Audit quality can be directly assessed in the case of clear audit failures (such as auditor litigation, business failures, investigations by authorities, and earnings restatements), but those are not common events (Francis, 2004: 352). Other research in audit quality is based on the notion that variation in audit quality (above the minimum of legal and professional standards) can exist and can be measured by comparing different groups or classes of auditors (Francis, 2004: 352).

2.1 Audit firm size: big vs. small

DeAngelo (1981) argues large audit firms provide higher audit quality than small audit firms, because large firms are less economically dependent on any single client than small audit firms, and large audit firms face greater reputation loses if they misreport. As a result of greater independence of large audit firms from their clients, audit firm size proxies for audit quality. Research has shown evidence in support of this hypothesis, a short overview.

Capital markets have been found to react positively when a firm changes its auditor from a small to a large audit firm (Nichols and Smith, 1983; Eichenseher *et al.*, 1989), firms using a large audit firm have been found to have a higher earnings response coefficient (Teoh and Wong, 1993), and firms making an initial public offering using a large audit firm have been found to experience less under-pricing (Beatty, 1989; Firth and Smith, 1992). Large audit firms have been found to charge higher audit fees (Palmrose, 1986; Craswell *et al.*, 1995), audit fees proxy for audit quality as a higher audit fee means more audit effort (more hours), or greater expertise of the auditor (higher billing rates) (Francis, 2004: 352). Large audit firms have been found to be the target of litigation less than small audit firms (Palmrose, 1988; DeFond and Jiambalvo, 1991), and client firms of large audit firms have been found to exhibit less earnings management (Becker *et al.*, 1998; Francis *et al.*, 1999a). Audit production differences have been found between the large audit firms and the small audit firms (Blokdijk *et al.*, 2006).

2.2 Large audit firms

Research has examined differences in audit quality among the large audit firms, mainly as a result of the accounting scandals and the collapse of Arthur Andersen. Fuerman (2004) finds that all of the Big Six audit firms, with the exception of Arthur Andersen, provided higher quality audits compared to small audit firms in the period 1996-1998, based on the outcomes of securities class actions involving auditors. In contrast, Eisenberg and Macey (2004) examine restatements from 1997-2001, and find no variation among the large audit firms. Tilis (2005)[1] finds variation among the large audit firms in earnings quality in each of four eras based on the number of large audit firms, and over time for the period 1980-2003. Strikingly, Tilis (2005) finds that Arthur Andersen showed higher than average quality in every period that it existed in, and better than average overall quality. Carlin *et al.* (2007) examine differences between the Big Four audit firms based on the compliance levels and disclosure quality of goodwill accounting, while they do find variation among the audit firms, the study is best seen as an exploratory study, as the methodology employed is only descriptive in nature.

The evidence on differences between the large audit firms is mixed, although it does demonstrate that differences among the large audit firms can exist. Another area of research in audit quality focuses on possible differences in audit quality within the large international audit firms. Three sources for differences have been investigated: 1) differences due to industry specialization, 2) differences across individual offices, and 3) differences across countries (Francis, 2004: 354). The first two are relevant for this study, while literature on differences across countries is left out as the focus in this study is on one country.

Industry expertise

The Big Four audit firms do not have equal market shares, and market shares in industries are not evenly distributed among the audit firms (Francis, 2004: 354). Due to greater experience in the industry, industry experts have greater knowledge enabling these experts to provide higher audit quality. When an accounting firm has a greater share in an industry (e.g. measured by the number of clients, or audit fees), then the auditors employed by the audit firm have a greater opportunity to gain better knowledge of the industry, potentially leading to industry expertise (Francis, 2004: 354; Solomon *et al.*, 1999).

Ferguson *et al.* (2003) find that an industry expert in Australia earns a fee premium, but only when the auditor is both the city-specific industry leader, and one of the top two firm nationally in the industry. Francis *et al.* (2005) demonstrate that industry experts in the US earn an audit fee premium, but only when they are both national industry leaders and city-specific industry leaders, while Basioudis and Francis (2007) only find a fee premium in the UK for city-specific industry leaders.

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[1] Because I have been unable to obtain the final publication (see Tilis, 2006), the working paper was used here.

Firms audited by an industry specialist have been found to have a higher earnings response coefficients (Balsam *et al.*, 2003), exhibit less earnings management (Krishnan, 2003; Balsam *et al.*, 2003), have earnings reflecting bad news more timely (Krishnan, 2004), have less earnings management in the context of initial public offerings (Zhou and Elder, 2001), and have a higher level of disclosure quality (Dunn and Mayhew, 2004). Dunn and Mayhew (2004) find that firms select auditors as part of their overall disclosure strategy.

Cross-office

Much research has examined the Big audit firms on a national level, however, Francis (2004: 355) argues it may be more interesting to examine the large audit firms at an office-level instead, because individual audit engagements are administrated by an office-based engagement partner, who is typically located in the same city as the client firm's headquarters. This shift in the level of analysis, changes the view of the Big audit firms considerably, a Big audit firm is not so big when the focus is moved from a national level to an office level (Francis, 2004: 355).

Francis *et al.* (1999b) examine the market shares of the Big Six audit firms at the city-level, and find considerable variation across cities, both between the Big Six audit firms as well as in the same firm across cities, revealing variation obscured in previous national-level analyses. Reynolds and Francis (2001) find that auditors treat relatively larger clients in offices more conservatively; larger clients exhibit less earnings management, and are more likely to receive a going concern audit report. When they perform the same analyses on a national level, these result disappear, demonstrating the importance of office-level examination.

2.3 Conclusions from literature

Evidence from the literature on differences in audit quality levels between the large international audit firms appears to be mixed, giving this research the opportunity to provide valuable insights. The auditor attests whether the financial statements give a true and far view in accordance with GAAP, and thus play a critical role in the success of IFRS, especially where IFRS is subjective and open to interpretation.

Chapter 3: Conceptual Framework and Hypotheses

Here I will formulate the hypotheses. I first repeat the research question and then discuss its motivation and foundation in theory and literature.

3.1 Research question 1

R1: What is the relation between the firm's disclosures on goodwill and its audit firm?

Level of Disclosure
The IFRS standard dealing with impairment of assets, IAS 36 requires a number of disclosures relating to goodwill. A disclosure index can be build based on these items, to capture the level of compliance with these requirements, to give insights into the level of compliance with the disclosures on goodwill. This leads to the following hypothesis:

> *H1a: There are differences in the level of compliance with the disclosure requirements on goodwill between the large audit firms.*

Pattern of Disclosure
While the disclosure index is used to examine the overall level of compliance with the disclosure requirements, the individual items used in its construction can also be used to examine the pattern of compliance. This will give insights whether the non-compliance with specific requirements by firms is related to their auditor. This leads to the following hypothesis which will be tested for all of the 29 disclosure items, where X is the item number from the disclosure index:

> *H1b.X: There are differences in compliance with disclosure requirement itemX on goodwill between the large audit firms.*

3.2 Research question 2

R2: What is the relation between the firm's goodwill CGUs and its audit firm?

Level of CGU aggregation
Goodwill is to be allocated to cash-generating units (CGUs), which should represent the lowest level within the entity at which goodwill is monitored for internal management purposes, and a CGU should not be larger than a reportable segment (primary or secondary) as defined by IAS 14 - *Segment Reporting* (IAS 36.80).

The level of CGU aggregation is interesting to examine because, all things being equal, defining less (more) CGUs, decreases (increases) the likelihood an impairment of the allocated goodwill is detected, resulting in a write-off of the asset against earnings. Aggregating the units at a higher level, means the "overvalue" of goodwill of one unit, can be offset by the "undervalue" of goodwill of the other units, a risk diversification effect occurs (Wines *et al.*, 2007: 868-9; Carlin *et al.*, 2007: 23-4).

For example, a firm has two production facilities A and B to which goodwill is allocated, both with carrying amounts of 100 which include goodwill, the recoverable amount for unit A is 90 and unit B 120. When units A and B are separately defined as CGU for goodwill impairment testing, CGU A has an impairment loss of 10 (100 - 90), while CGU B has no impairment. However, should the firm define one CGU which includes both unit A and B, then there is no impairment loss, as the carrying amount of the CGU is 200 (2*100), which is smaller than the recoverable amount of 210 (90+120) so there is no impairment loss recognized. Firms will thus have an incentive to define CGUs at higher levels, because it reduces the likelihood an impairment loss needs to be taken, and reduces the time and costs needed to perform the annual impairment tests

However, a possible counter argument is that by defining CGUs to which goodwill is allocated in such way that no single CGU has a significant carrying amount of goodwill allocated compared to the firm's total carrying amount of goodwill, the amount of information required to be disclosed is minimized. While IAS 36.134 covers the requirements for CGUs with significant carrying amounts of goodwill, IAS 36.135 covers the rest, and requires only the fact that the carrying amounts are not significant and the aggregate amount of goodwill allocated to them is disclosed.

Carlin *et al.* (2007) looked at CGU aggregation in two ways. First using three categories, more CGUs defined than business segments, equal number of CGUs defined and business segments, and fewer CGUs defined than business segments. Second a ratio was calculated of the defined CGUs to segments. This leads to the following hypothesis:

> *H2a: There are differences in the aggregation of CGUs to which goodwill is allocated between the large audit firms.*

Allocation of goodwill to CGUs
Goodwill is to be allocated to CGUs (IAS 36.80), and an entity is required to disclose the carrying amount of goodwill allocated to a CGU when the amount allocated is significant in comparison with the entity's total carrying amount of goodwill (IAS 36.134), and required to disclose the aggregate amount of goodwill allocated to CGUs with carrying amounts of goodwill not significant in comparison with the total carrying amount of goodwill (IAS 36.135).

Compliance with these requirements can be tested by looking at the amount of goodwill on the balance sheet, compared to the total amount of goodwill allocated to CGUs as disclosed in the notes to the financial statements. Carlin *et al.* (2007) did this by using three categories, "allocated all goodwill", "allocated all but an immaterial amount", and "not possible to determine how or if goodwill had been allocated". This leads to the following hypothesis:

> *H2b: There are differences in the level of allocation of goodwill to CGUs between the large audit firms.*

3.3 Research question 3

> R3: What is the relation between the firm's assumptions used for value in use estimates for goodwill impairment testing and its audit firm?

This research question and related hypotheses only apply to firms disclosing value in use as basis of estimate for the recoverable amount, and not to firms using fair value less costs to sell as basis.

The recoverable amount of a unit is the higher of its fair value less costs to sell and its value in use, if the carrying amount of a unit exceeds its recoverable amount, the unit is impaired, and an impairment loss is recognized (IAS 36.6). Value in use based on a present value calculation using expected future cash flows and estimates of discount rates do not represent objective measures for many CGUs, as a result, there is scope to bias the value in use basis to avoid having to recognize an impairment loss (Wines *et al.*, 2007: 870). This puts pressure on auditors when assessing the assumptions used in the cash flow modelling, especially for CGUs for which these values are more difficult to objectively assess.

In case value in use calculation is used as basis for recoverable amount, a number of disclosures are required to help the users of financial statements assess the robustness cash flow modelling. Three key factors used in the cash flow modelling need to be disclosed, which are the discount rate(s), the growth rate(s), and the period over which the cash flows have been projected (IAS 36.134). This leads to the following hypotheses:

Discount rate
Using a lower (higher) discount rate in the cash flow modelling decreases (increases) the recoverable amount, affected the likelihood an impairment loss needs to be recognized.
> *H3a: There are differences in the discount rates used in the value in use estimates between the large audit firms.*

Growth rate
Using higher (lower) growth rate in the cash flow modelling decreases (increases) the recoverable amount, affecting the likelihood an impairment loss needs to be recognized.
> *H3b: There are differences in the growth rates used in the value in use estimates between the large audit firms.*

Cash flow forecasting period
Forecasting cash flows over a longer (shorter) period increases (decreases) the uncertainty in the forecast. In case a period longer than five years is used, a justification for this needs to be disclosed (IAS 36.134).
> *H3c: There are differences in the cash flow forecasting periods between the large audit firms.*

Part III: Research Methodology

Chapter 4: Methodology

In this chapter I will discuss the methodology employed in the thesis. The research performed is an empirical study using secondary data. The research design is based on the relation diagram presented in Appendix A (page 64).

4.1 Disclosure index

For the construction of an item disclosure index, a dichotomous procedure will be used, where an item scores one if it is disclosed and zero otherwise.

$$Index = ActualDisclosure / TotalPossibleDisclosure = \sum_{i=1}^{m} d_i / \sum_{i=1}^{n} d_i$$

Where d equals 1 if item d_i is disclosed and 0 if item d_i is not disclosed, m is the number of items disclosed, and n is the maximum number of disclosure items possible for the firm, with a minimum of 1 and a maximum of 29 items. The result is an index ratio with a value between 0 and 1, which compares the actual level of disclosure with the total possible disclosure. This way the ratio is not affected by non-disclosure of items which were not relevant, and did not need to be disclosed by the firm (Chavent *et al.*, 2006: 184-6).

The items can also have more values than just 1 and 0, for example Wallace *et al.* (1994) used three possible values in order capture the comprehensiveness of the disclosures, where an item scored 0 if not disclosed, 1 if minimum required info is disclosed, and 2 if more than the minimum required info is disclosed. Similarly Inchausti (1997) coded some the items in his disclosure index 0, 0.5, and 1 depending on the extent of the disclosure.

Different constructs can be used to proxy for disclosure; adequacy, informativeness, timeliness, understandability or readability, and comprehensiveness (Wallace and Naser, 1995: 327). The disclosure index used in this study is a construct of adequacy, as it measures the compliance with an accounting standard, using disclosure items based on a number of requirements from IAS 36.

Each item in the disclosure index has three variables associated with it. The first variable reflects the disclosure (named *ItemX.d*, where X is the item number), coded 1 if the item is disclosed and 0 otherwise. The second variable reflects relevance (named *ItemX.r*), coded 1 if the item should have been disclosed and 0 otherwise. The summation of the *ItemX.d* variables and *ItemX.r* variables will give the term '*Actual Disclosure*' and the term '*Total Possible Disclosure*' needed to calculate the disclosure ratios, which will be used to test hypothesis *H1a disclosure level*. The third variable reflects compliance

(named *ItemX.c*), coded 1 if the firm was in compliance (variable *ItemX.d* equals 1), coded 0 otherwise, but only if this was relevant (variable *ItemX.r* equals 1). Each of these *ItemX.c* variables will be used to test hypothesis *H1b disclosure pattern*.

Two different variations of the disclosure index are created and used. A pure dichotomous index where all items are coded 1 or 0, named Disclosure A. Items that may need to be disclosed more than once, for example the disclosure items from IAS 36.130 and IAS 36.134, are coded 1 (full compliance), and 0 otherwise (any non-compliance). The value 0 then reflects a range of situations, anywhere from complete non-disclosure (never disclosed) to a one-time non-disclosure (disclosed for all but one).

In the second version, named Disclosure B, the items 23 (growth rate) and 24 (discount rate) are assigned values between 0 and 1 to capture more closely the extent of (non-)compliance. Carlin *et al.* (2007) classified firms in four categories with regards to these items; 1) no effective disclosure, 2) a range of rates disclosed, 3) a single rate disclosed, and 4) multiple rates disclosed. This is captured by assigning the values 0 (non-compliance), 0.33 and 0.67 (some compliance), and 1 (full compliance) to the disclosure variable (*ItemX.d*) and compliance variable (*ItemX.c*), while the relevance variable (*ItemX.r*) is still coded 1 or 0. In the Disclosure A version, these first three values are all coded 0 (Table 1). The items 23a and 24a are from the A version, while items 23b and 24b are from the B version.

Table 1: Disclosure A & B

	Non-compliant			Compliant
	No disclosure	*Range of rates*	*Single rate*	*Rate per CGU*
Disclosure A	0	0	0	1
Disclosure B	0	0.33	0.67	1

4.2 Variables

The main source for the data is the firm's corporate annual report, which was obtained from the company's website or from www.company.info. The data is collected from the financial statements and the notes to the financial statements. A list of variables and their description is included in Appendix B (page 65), and a list of the items in the disclosure index based on IAS 36 is included in Appendix C (page 68). An example of the note disclosures on goodwill impairment testing is shown in Appendix E (page 71).

The following data is collected from the annual reports: audit firm (audit report), country where the office is located signing the audit report (audit report), total assets (balance), total sales (income), basis used for recoverable amounts (notes), the disclosure items (income & notes), the number of CGUs (notes), the number of reportable segments (notes: segment report), goodwill (balance), allocated goodwill to CGUs (notes), discount rate (notes), growth rate (notes), forecasting period (notes), and stock exchange listings other than Euronext Amsterdam (miscellaneous).

The name of the firm, the ICB (Industry Classification Benchmark, www.icbenchmark.com) industry classifications, and the index membership on Euronext Amsterdam are collected from the Euronext website www.euronext.com. The other variables are constructed using the above mentioned data. Figures from firms reporting using a functional currency other than the Euro were converted to Euro amounts based on the currency to Euro exchange rate at balance sheet date using the converter tool from the European Central Bank at http://sdw.ecb.europa.eu/curConverter.do. This was needed for only a few cases; foreign currencies in the sample were the US Dollar (USD), UK pound sterling (GBP), and Swedish krona (SEK).

4.3 Sample selection

All listed firms on the stock exchange of Euronext Amsterdam in the month December 2005 and 2006 were included (Table 2), yielding a sample of 177 firms; a total of 290 firm observations (2005, 147; 2006; 143). For each observation in the sample, the annual report was obtained and analyzed. In 4 cases (2005, 2; 2006, 2) it was not possible to obtain the annual report. These were KPNQwest (both years, fraud case), Van der Hoop Bankiers (bankrupt end of 2005), and OncoMethylome (IPO in 2006). The annual reports were scanned for goodwill on the balance sheet, the reporting framework, the year-end, and Big Four auditor. In 91 cases the firm did not have goodwill, leaving a sample of 199 observations. Next 4 cases were excluded for reporting under a framework under than IFRS (US GAAP in all cases), 6 cases were excluded for using a year-end other than December 31 to preserve homogeneity in the sample. A further 16 cases were dropped from the sample for using a non-Big Four auditor, and 2 cases were excluded for using two auditors (Fortis in both years; the use of two auditors for financial statement auditing is required in France). The result is a final sample of 96 firms (78 firms 2005, 89 firms 2006), a total of 167 firm observations, and the same 71 firms in both years. A list of firms in the sample is included in Appendix D (page 70).

Table 2: Sample composition

	2005	2006	Total
Initial sample	147	143	290
No annual report	-2	-2	-4
No goodwill	-53	-38	-91
Reporting framework other than IFRS	-4	0	-4
Year-end other than December 31	-2	-4	-6
Non-Big Four auditor	-7	-9	-16
Two auditors	-1	-1	-2
Final sample	78	89	167

4.4 Reliability and validity

Reliability is the consistency of a set of measurements or measuring instrument. The majority of the data required is collected from annual reports, which are not likely to change (with the rare exception of restatements). The industry classifications used are what they were for the firms in those years, and will not be subject to change. The exchange rates used to convert foreign currency figures to Euro amounts, are also a given

fact of the past. This means the data collected is reliable, as it can be replicated by another researcher.

The construction of the disclosure index can potentially raise a number of practical problems, for example when assessing whether the non-disclosure of an item was relevant thus needs to penalize the firm, or whether the item was not disclosed because it was not relevant for the company. A number of items required to be disclosed in IAS 36 were left out of the disclosure index, because in advance it is clear it would be difficult to make a determination if the item is relevant for the firm or not in the event of non-disclosure. In Appendix C (page 68) in the list of the disclosure items, guidance is provided to aid in the collection of the items, and help prevent reliability issues.

Validity is whether the instrument measures what it was intended to measure. The annual report is the source of much of the data, and therefore the quality of the data is dependent on the quality of the annual report. In light of the validity question, it has to be kept in mind that the measurements are done from the annual reports. It is possible the situation depicted in the annual report does not exactly match the situation as it is in the firm, without this having to mean the report does not give a true and fair view. For example, it is not possible to determine whether the true number of CGUs and their carrying amounts of goodwill is disclosed or simply the carrying amounts of goodwill per reportable segment.

| Dataset | ← | Annual Report | ← | Firm |
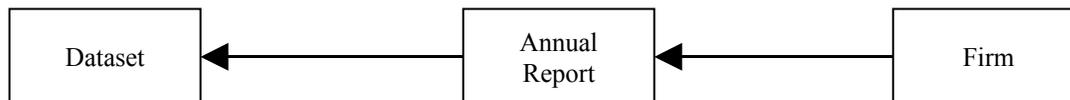
The disclosure index is intended to measure the compliance with the disclosures for goodwill accounting required by IAS 36. The disclosure index is build based on disclosure items from IAS 36, to capture the compliance with the legal standard. This leads to the conclusion that the disclosure index is valid, as it is intended to measure the compliance with the requirements of IAS 36 relating to goodwill and it is build from this.

The following elements are to be reflected in the calculation of value in use (IAS 36.30), either as adjustments to the future cash flows or as adjustment to the discount rate (IAS 36.32): 1) expectations about possible variations in the amount or timing of those future cash flows; 2) the price for bearing the uncertainty inherent in the asset; and 3) other factors, such as illiquidity, that market participants would reflect in pricing the future cash flows the entity expects to derive from the asset. This may mean that the discount rates disclosed in the annual reports are not always a measurement of the same thing. In some cases the firm may have made such adjustments to the future cash flows, while other firms made adjustments to the discount rate. Unfortunately, this possible validity issue cannot be overcome in the research design, it would require inside information from the firms.

The validity of the other variables (such as total assets, total sales, goodwill, growth rate, forecasting period, *et cetera*) is not in question; these variables measure what is intended to be measured.

Part IV: Empirical Findings

Chapter 5: Results empirical research

5.1 Univariate Analysis

In the univariate analysis the sample is described, the goal is to gain insights in the characteristics of the sample to investigate the research problem and draw inferences about the population characteristics. The focus in this section is on the individual variables. Figures are reported using English style; commas are used for thousands, and a dot is used for decimals.

5.1.1 Sample

The sample consists of 78 firms for 2005 and 89 firms for 2006, making a total of 167 observations based on 96 firms, with 71 firms in the sample for both years. For 2005 7 firms are not in the sample for 2006, of which 3 firms were de-listed after being taken over, 2 firms switched from a Big Four to a smaller audit firm, and 2 firms no longer had goodwill on their balance sheet. The sample for 2006 includes 18 firms not included in the sample from 2005, of which 12 firms did not have goodwill in 2005, 5 firms were listed at Euronext Amsterdam at the end of 2005 or during 2006, and 1 firm reported under US GAAP in 2005.

All firms in the sample are listed on Euronext Amsterdam, 42 cases are included in the AEX index (2005, 21; 2006, 21), which is made up of the 25 most active securities in the Netherlands. Further 38 cases are included in the AMX index (2005, 17; 2006, 21), 34 cases are included in the AScX index (2005, 16; 2006, 18), and 53 cases are not included in any of these indices (2005, 24; 2006, 29).

The distribution of the firms according to industry is shown in Table 3. Industrials is the largest with 53 cases, followed by consumer services with 28 cases, next are consumer goods, financials and technology with each around 20 cases. The industry basic materials is next with 11 cases, followed by oil & gas, healthcare and telecommunications with only a few cases.

Table 3: Industry

ICB	Industry	2005	2006	Total	ICB	Industry	2005	2006	Total
0	oil & gas	2	2	4	5	consumer services	13	15	28
1	basic materials	5	6	11	6	telecommunications	1	1	2
2	industrials	28	25	53	8	financials	9	12	21
3	consumer goods	9	11	20	9	technology	10	12	22
4	healthcare	1	5	6					
						total	78	89	167

Some firms in the sample have one or more listings on stock exchanges in other countries. These are 36 cases for USA, 19 for United Kingdom, 13 for Germany, 9 for Belgium, 8 for France, and 6 for Switzerland. The remaining countries are Japan (3), Hong Kong (2), Sweden (2), Luxembourg (1), and Spain (1). Firms in the sample have a mean for total assets of € 36 billion, a mean for sales of € 9 billion, and the mean of goodwill as percentage of total assets is 13.7%.

5.1.2 Audit firm

The variable of interest is the audit firm variable, Table 4 shows the frequencies of each audit firm for the two years and for the total sample. PWC and KPMG dominate the sample with 49 and 48 firms. EY and DL both come in last in 2005, with EY making a leap in 2006 from 15 to 25 firms, while the share of DL share remains fairly stable at 14 and 16 firms. The country where the audit office signing the audit report is located is the Netherlands in 155 cases (2005, 72; 2006, 83), United Kingdom in 6 cases (2005, 3; 2006, 3), and one case in each of the two years for Sweden, the Netherlands Antilles, and Belgium. The sample includes three auditor changes between the Big Four in 2006 compared to 2005, BE Semiconductor changed auditor from KPMG to EY, CSM changed auditor from PWC to DL, and Van Der Moolen changed auditor from PWC to EY.

Table 4: Audit firm

Year	PWC	EY	DL	KPMG	Total
2005	26	15	14	23	78
2006	23	25	16	25	89
Total	49	40	30	48	167

5.1.3 Research question 1

Disclosure items

The disclosure index is based on 29 items from IAS 36 in Appendix C (page 68). The items 1 and 2 are based on IAS 36.126 and item 3 is based on IAS 36.129, they relate to the amount of impairment loss on goodwill in total, amount per segment and the line item in the income statement where they are included. To clarify the table below, item 1 is relevant for 45 observations (N) in the sample, but was only actually disclosed in 43 cases (compliant).

Item	N	Compliant	Non-Compliant		Item	N	Compliant	Non-Compliant
1	45	43	2		3	43	36	7
2	45	40	5					

The items 4 to 11 are based on IAS 36.130 relate to material impairment losses, only one case in the sample reported an material impairment loss, Van Der Moolen (EY) reported an impairment loss of € 10 million in 2006, which is material in the context of its € 149 million turnover (considering a 5% threshold for materiality). The plan was to also calculate a disclosure index based on these items, but with these results that is not feasible.

The items 12 and 13 are based on IAS 36.131 for impairment losses which are not material relate to the classes of assets affected and the main events and circumstances. These two items are relevant for 44 cases in the sample, with non-compliance with item 12 in 20 instances and with item 13 in 29 cases.

Item	N	Compliant	Non-Compliant		Item	N	Compliant	Non-Compliant
12	44	24	20		13	44	15	29

The items 14 and 15 based on IAS 36.133 relate disclosure on goodwill acquired during the period but not yet allocated to CGUs. No firm in the sample disclosed these items, and it turned out to be difficult to assess whether or not a firm should have disclosed this, resulting in these items being coded 0 in all cases.

The majority of the disclosure index is based on the items 16 to 24, which are based on IAS 36.134. The items have around 130 cases, and relate to CGUs with significant carrying amounts of goodwill allocated in comparison with the total carrying amount of goodwill. These items have varying counts of non-compliance, from 5 for item 18, to 48 for item 19.

Item	N	Compliant	Non-Compliant		Item	N	Compliant	Non-Compliant
16	145	117	28		21	132	107	25
17	145	134	11		22	27	12	15
18	132	127	5		23	132	44	88
19	131	83	48		24	132	33	99
20	132	88	44					

The items 23 and 24 are from IAS 36.134, and relate to growth rates and discount rates used in the cash flow modeling to estimate value in use. These items are measured in two ways, first whether or not the entity was in full compliance or not with the requirement that a discount rate and growth rate be disclosed for each CGU with a significant carrying amount of goodwill allocated (version A), second based on four categories: no disclosure, range of rates, single rate, and multiple rates (version B). These items are relevant for 132 cases in the sample, the A version has 88 cases of non-compliance (66% out of 132 observations) with regards to growth rates (item 23), and 99 cases of non-compliance (75%) with discount rates (item 24). Version B is more forgiving and results in lower counts of non-compliance. For growth rates 51 instances with no disclosure (39%), 15 with a range (11%), 22 with a single rate (17%), and 44 with multiple growth rates disclosed (33%). For discount rates 18 cases with no disclosure (14%), 26 with a range (20%), 55 with a single rate (42%), and 33 with multiple rates disclosed (25%).

Item	N	Compliant	Non-Compliant		Item	N	Compliant	Non-Compliant
23a	132	44	88		24a	132	33	99
23b	132	Range 15			24b	132	Range 26	
		Single 22					Single 55	
		Multiple 44					Multiple 33	
		Total 81	51				Total 114	18

The items 25 to 28 are based on IAS 36.134 and are required when fair value less costs to sell is used as basis for recoverable amount. Item 25 is the requirement to disclose the methodology used to determine fair value less costs to sell, and the item has 11 observations all of which are compliant. The items 26 to 28 relate to the methodology

used to determine fair value less costs to sell in case this is not determined using an observable market price. These items are only relevant for one firm in the sample, Getronics (PWC) in 2006.

Item 29 is based on IAS 36.135 and is the requirement to disclose the aggregate amount of goodwill allocated to CGUs with carrying amounts of goodwill not significant in comparison with the total carrying amount of goodwill. The item has 73 observations, of which 66 are compliant and 7 are not compliant.

Item	N	Compliant	Non-Compliant
29	73	66	7

The method used to determine recoverable amount was not disclosed in 17 cases (10% of 167 observations), in 7 cases (4%) a mix of the two methods was disclosed, in 6 cases (4%) fair value less costs to sell was disclosed as basis, and in 137 cases (82%) value in use was disclosed as basis. A breakdown per year reveals no noteworthy differences between 2005 and 2006.

Disclosure index

A number of cases has missing values in the disclosure index, this is caused by the fact that in these instances the disclosure on goodwill are of such nature, that it is not possible to determine whether or not an item is relevant in the case of non-disclosure. The sample has 93 observations with 0 missing values (56% of 167 observations) for the disclosure index, 42 cases with 1 missing value (25%), 3 cases with 2 (2%), 6 cases with 11 (4%), 1 case with 12 (1%), and 22 cases with 14 missing values (13%).

Missing values	0	1	2	11	12	14
Observations	93	42	3	6	1	22

A breakdown of missing values per item is as follows: item 22 missing 54 values (32% of 167 observations), item 29 missing 46 values (28%), items 18-21 & 23-28 each are missing 29 values (17%), and items 16-17 each missing 22 values (13%). Missing values occur due to the fact that the disclosure items may be interrelated with one or more other items (see Appendix C, page 68). For example, missing values for item 22 (*justification for using cash flow forecasting period greater than five years*) occur in the event of non-disclosure of item 21 (*cash flow forecasting period*), which makes it impossible to determine relevance for item 22. While at a broader level, missing values for items 18-24 (*disclosures related to value in use*) and items 25-28 (*disclosures related to fair value less costs to sell*) occur when item 17 (*the basis used to determine recoverable amount*) is not disclosed. Missing values for item 29 (*aggregate amount of goodwill allocated to not significant CGUs*) arise because of the disclosure of allocation of goodwill to CGUs is missing or lacking detail to determine relevance.

Item	16 & 17	18 to 21	22	23 to 28	29
Missing values per item	22	29	54	29	46

An example of why missing values occur is shown below (Table 5), it is from Reed Elsevier (DL) taken from its corporate annual report for 2005, note 13 Goodwill (page 80). This is all the firm disclosed about goodwill in its notes; no indication of how or if at all goodwill was allocated to CGUs, no disclosure how or if at all goodwill had been tested for impairment and the assumptions used. As a result of this, it is one of the observations with 14 missing values in the disclosure index, for items 16 to 29.

Table 5: Example poor disclosure

13 Goodwill

	2005 €m	2004 €m
At start of year	3,682	3,461
Acquisitions	266	507
Disposals/transfers	(21)	-
Exchange translation differences	497	(286)
At end of year	4,424	3,682

The net carrying amount of goodwill under previous GAAP is deemed under IFRS to be the cost of goodwill on transition to IFRS at 1 January 2004. The cumulative amortisation deducted in arriving at the net carrying amount under previous GAAP was € 2,574m. The equivalent amount at 31 December 2005, after taking account of foreign exchange movements, would have been € 2,697m (2004: € 2,427m).

For 17 cases (2005, 9; 2006, 8) in the sample this leads to 0 divided by 0 in the calculation of the disclosure ratio, resulting in a missing value. For these items, the ratio is set to 0, justified by the fact that the total possible disclosure score does not matter, the actual disclosure score is 0, and thus always results in a ratio of 0 ($\frac{0}{x} = 0$ with unknown $x > 0$). It is known x is greater than 0 because there is goodwill, so at least one item in the disclosure index should have been disclosed.

For another 12 cases (2005, 8; 2006, 4) in the sample with missing values for 11 to 14 items, the ratio is still calculated as there are other items disclosed. The term '*Actual Disclosure*' is known, but the true value of '*Total Possible Disclosure*' is not known due to these missing values, and therefore these 12 of the 167 cases are excluded in any analyses using the disclosure ratios.

$$Index = ActualDisclosure / TotalPossibleDisclosure = \sum_{i=1}^{m} d_i / \sum_{i=1}^{n} d_i$$

The average number of items disclosed in the sample is 6.1 (2005, 5.7; 2006, 6.4) with a minimum of 0 and a maximum of 14 items. The average number of items that should have been disclosed in the sample is 8.8 (2005, 8.4; 2006, 9.1) with a minimum of 3 (excluding the above problem cases) and a maximum of 19 items. The resulting disclosure ratio (Table 6) has a mean of 0.62 (2005, 0.59; 2006, 0.65) for the A version, while the B version has a mean of 0.67 (2005, 0.63; 2006, 0.69), and as expected, it is less strict and about 0.04 points higher. On average the firms in the sample disclosed 67% (2005, 64%; 2006, 69%) of the items they should have disclosed included in this index.

Table 6: Disclosure index

| | | Disclosure A | | | | Disclosure B | |
| | | | Standard | | | | Standard |
Year	N	Mean	Deviation		N	Mean	Deviation
2005	70	0.592	0.281		70	0.634	0.295
2006	85	0.648	0.264		85	0.691	0.275
Total	155	0.622	0.273		155	0.666	0.285

The disclosure index 134 (Table 7) based on items 16-28 from IAS 36.134 has a mean of 0.69 (2005, 0.66; 2006, 0.70), and the B version has a mean of 0.74 (2005, 0.72; 2006, 0.76). Again the B version is less strict, resulting in a higher ratio. The mean of the ratio based on items from IAS 36.134 alone is higher in all cases than the overall disclosure index; it seems firms are more compliant with IAS 36.134 than with the other requirements measured in the disclosure index.

Table 7: Disclosure index 134

| | | Disclosure 134 A | | | | Disclosure 134 B | |
| | | | Standard | | | | Standard |
Year	N	Mean	Deviation		N	Mean	Deviation
2005	61	0.663	0.184		61	0.718	0.184
2006	77	0.703	0.190		77	0.762	0.187
Total	138	0.685	0.188		138	0.743	0.186

A breakdown per year and audit firm of Disclosure A is given in Table 8, and the results for Disclosure B are similar but slightly higher (not reported). PWC has the highest mean with 0.67 and lowest standard deviation overall, closely followed by EY 0.64, while DL and KPMG have a mean of 0.58. In 2005 KPMG has the highest mean with 0.62, followed by PWC with 0.60, while EY and DL have a mean of about 0.55. However, in 2006 KPMG comes in last with a mean of 0.55, a loss of 0.07, while PWC and EY gain 0.13, followed by DL with a gain of 0.05. PWC comes out best with a mean of 0.73, followed by EY at 0.69, DL with 0.60, and last KPMG with a mere 0.55.

Table 8: Disclosure A - per audit firm

| | | 2005 | | | | 2006 | | | | Total | |
| | | | Standard | | | | Standard | | | Mea | Standard |
Auditor	N	Mean	Deviation		N	Mean	Deviation		N	n	Deviation
PWC	25	0.607	0.254		23	0.730	0.158		48	0.666	0.220
EY	14	0.559	0.363		23	0.694	0.299		37	0.643	0.327
DL	12	0.550	0.301		15	0.603	0.214		27	0.580	0.252
KPMG	19	0.622	0.252		24	0.551	0.313		43	0.582	0.286
Total	70	0.592	0.281		85	0.648	0.264		155	0.622	0.273

5.1.4 Research question 2

Aggregation

The average number of CGUs to which goodwill is allocated in the sample is 3.17 (2005, 2.79; 2006, 3.50), and the values are widespread given the standard deviation of about 3 in both years. The average number of CGUs to which significant amounts of goodwill are allocated in the sample is 2.28 (2005, 2.03; 2006, 2.50), less spread values compared to

the number of CGUs with a standard deviation of about 2 in both years. Segment reporting has two bases for segmentation, based on business (e.g. product types) and geographic (e.g. based on country). The average number of primary segments defined for segment reporting is 3.75 and for secondary segments 4.27 with no differences between the two years.

Four different CGU-to-Segment ratios have been calculated (Table 9) using different measures of segments; primary segments with an average of 1.11 (2005, 0.98; 2006, 1.22), secondary segments with a mean of 0.95 (2005, 0.85; 2006, 1.04), average of segments with a mean of 0.85 (2005, 0.76; 2006, 0.93), and last using the higher of the two types with a mean of 0.69 (2005, 0.62; 2006, 0.75). The means and standard deviation decrease with each version, while the means increase in 2006 compared to 2005. The standard deviation decreases, except for first type based on primary segments. Both types of segments act as an upper limit for the size of the CGUs (IAS 36.80). Disclosures in the annual accounts are of such nature that in most cases it is not possible to determine which of the two is most applicable, and therefore both types have been collected and are used.

Table 9: CGU to Segment ratios

Variable	N	Mean	Standard Deviation	Variable	N	Mean	Standard Deviation
CGU	155	3.17	3.10	CGU / Segment Primary	155	1.11	1.39
CGU Significant	159	2.28	1.97	CGU / Segment Secondary	155	0.95	1.10
Segment Primary	167	3.75	1.99	CGU / Segment Average	155	0.85	0.79
Segment Secondary	167	4.27	2.59	CGU / Segment Highest	155	0.69	0.67

A breakdown per audit firm of the CGU to reportable segment ratios is shown in Table 10. The ratio means are fairly even among the audit firms, except for the ratio based on primary segments where PWC stands out with a higher ratio, but also has a higher spread of values. The different types of ratios provide a mixed view, each with a different audit firm coming out higher or lower compared to the remained of the group.

Table 10: CGU to Segment ratios - per audit firm

Variable	N	Primary Mean	Primary Standard Deviation	Secondary Mean	Secondary Standard Deviation	Average Mean	Average Standard Deviation	Higher Mean	Higher Standard Deviation
PWC	45	1.27	1.64	1.02	1.35	0.88	0.78	0.67	0.55
EY	33	1.06	1.06	0.82	0.85	0.76	0.86	0.63	0.78
DL	29	1.02	1.04	0.93	0.94	0.89	0.81	0.76	0.75
KPMG	48	1.04	1.04	0.99	1.09	0.86	0.75	0.70	0.66
Total	155	1.11	1.39	0.95	1.10	0.85	0.79	0.69	0.67

In Table 11 the CGU to Segment ratios are categorized, 1) fewer CGUs than segments, 2) equal number of CGUs as segments, and 3) more CGUs than segments. Based on primary segments 79 cases (51% of 155 observations) defined fewer CGUs than segments, while for secondary segments in 88 cases (57%), average amount of segments in 91 cases (59%), and based on the highest in 100 cases (65%). The 2nd and 3rd category are perhaps better considered together as the 2nd category only includes cases where the ratio ends up at precisely 1. Taking them together shows a fairly even distribution considering the percentages above. Based on primary segments, 76 cases (49%) defined equal or more

CGUs than segments, for secondary segments in 67 cases (43%), for average amount of segments in 64 cases (41%), and based on the higher of primary or secondary segment in 55 cases (35%).

Table 11: CGU to Segment categories

Variable	CGUs < Segments	CGUs = Segments	CGUs > Segments
Segment Primary	79	32	44
Segment Secondary	88	21	46
Segment Average	91	9	55
Segment Highest	100	27	28

Allocation

The average amount of goodwill a firm has in the sample is € 716 million (Table 12), with a standard deviation of € 1,760 million, indicating the amounts of goodwill are widespread. The average amount of goodwill allocated to CGUs is lower with € 481 million, and less spread with a standard deviation of € 1,117 million. The average amount of goodwill allocated to CGUs with significant carrying amounts of goodwill is € 460 million average, with a standard deviation of € 1,017 million. Based on this, it would appear that on average most of the goodwill is allocated to CGUs with significant amounts of goodwill, which is consistent with the large number of observations for the disclosure items from IAS 36.134, items 16 to 28.

Table 12: Allocation variables

Variable	N	Mean	Standard Deviation
Goodwill	167	€ 716 million	€ 1,760 million
Goodwill Allocated to CGUs	165	€ 481 million	€ 1,117 million
Goodwill Allocated to CGUs with significant amounts	161	€ 460 million	€ 1,017 million
Goodwill Allocation Ratio	165	0.727	0.441

A breakdown of the allocation ratio per year and audit firm (Table 13) reveals the following. In 2005, KPMG has the highest mean (0.81) and the lowest spread of values (0.39), while EY and DL have the lowest means and the highest standard deviations. In 2006 PWC and EY have the highest means and the lowest standard deviations. Comparison of 2006 with 2005 reveals an overall increase of the mean with 0.15 and a decrease of the standard deviation. In 2006 EY has the highest increase with 0.29, following by DL and PWC with a gain of about 0.20, and KPMG has once again a decrease, albeit a small one in this case of just 0.05. Overall, KPMG has the highest mean and the lowest standard deviation, PWC and EY are about the same, and DL has the lowest mean, but about the same standard deviation as PWC and EY.

Table 13: Allocation ratio

	2005			2006			Total		
Auditor	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation
PWC	26	0.615	0.496	23	0.814	0.386	49	0.709	0.454
EY	15	0.532	0.515	24	0.827	0.378	39	0.713	0.453
DL	14	0.562	0.506	16	0.790	0.402	30	0.684	0.460
KPMG	22	0.813	0.393	25	0.760	0.436	47	0.785	0.413
Total	77	0.646	0.478	88	0.798	0.396	165	0.727	0.441

The allocation ratio divided into four categories (Table 14); 1) no disclosure (0% allocation), 2) significant amount not allocated (between 0 and 95% allocation), 3) insignificant amount not allocated (between 95 and 100% allocation), and 4) all allocated (100% allocation). Overall, 113 (68%) cases have 100% allocation, and 46 cases (28%) have no allocation, while the other two categories have only a few cases. In comparison of 2006 with 2005 the number of cases with no allocation decreased, while the number of cases with 100% allocation increased.

Table 14: Allocation categories

	2005	*2006*	*Total*
No Allocation	28	18	46
Significant amount not allocated	2	4	6
Insignificant amount not allocated	1	1	2
All Allocated	47	66	113
Total	78	89	167

5.1.5 Research question 3

Discount rate

The mean discount rate used is 10.8% (2005, 10.2%; 2006, 11.2%), a breakdown by audit firm and year (Table 15) shows the following. For 2005 the means are about the same at 10%, except for DL with a lower mean of 8.7%, while the spread of values is relatively even with standard deviations of about 2.5. For 2006, DL has the highest mean with 12.8% and highest spread with 8, while KPMG and PWC have the lowest means of about 10% and the lowest spreads with about 2.7. Overall, the mean in 2006 increase with about 1% compared to 2005, and the standard deviation increases with 1.8. DL with the lowest case count has the highest increase for the mean in 2006 with 4 points. In the overall sample, DL has the highest standard deviation and lowest case count, and the means per audit firm are all about 10-11%.

Table 15: Discount rates

	2005			2006			Total		
Auditor	*N*	*Mean*	*Standard Deviation*	*N*	*Mean*	*Standard Deviation*	*N*	*Mean*	*Standard Deviation*
PWC	21	10.32	2.73	19	10.47	2.80	40	10.39	2.73
EY	10	10.55	2.11	19	12.13	3.59	29	11.58	3.21
DL	6	8.72	2.27	10	12.84	8.02	16	11.29	6.67
KPMG	14	10.50	2.33	17	9.95	2.62	31	10.20	2.47
Total	51	10.23	2.46	65	11.18	4.22	116	10.76	3.57

IAS 36.55 requires the use of a pre-tax discount rate, while 14 cases in the sample (2005, 5; 2006, 9) disclosed the use of a post-tax discount rate, in the remaining 103 cases a pre-tax rate is stated or no info is disclosed. The 14 cases of disclosing a post-tax discount rate are spread over the audit firms as follows: PWC 2 counts out of 40 cases (5%), EY 3 of 29 (10%), DL 0 of 17 (0%), and KPMG 9 of 31 (29%).

Growth rate

The mean growth rate used is 1.8% (2005, 1.78%; 2006, 1.82%), a breakdown per year and audit firm (Table 16) reveals the following. DL has the lowest case counts with 2 in 2005 and 7 in 2006, and has the highest mean in 2005 of 9.75, much higher than the other means and a possible indication of an outlier. In 2006 DL has the highest mean with 2.4%, and the highest spread of values with standard deviation of 3.6. In 2006 PWC, EY, and KPMG have a higher mean compared to 2005, with KPMG also an increase in the spread of values with a higher standard deviation. Overall EY has the lowest mean with 0.9%, followed by KPMG and PWC with a mean of about 2%.

Table 16: Growth rates

	2005			2006			Total		
Auditor	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation
PWC	12	1.66	1.87	13	1.93	1.95	25	1.80	1.88
EY	8	0.60	1.14	12	1.13	1.51	20	0.92	1.37
DL	2	9.75	13.79	7	2.43	3.55	9	4.06	6.61
KPMG	11	1.32	1.27	16	1.98	1.61	27	1.71	1.49
Total	33	1.78	3.51	48	1.82	2.03	81	1.80	2.71

Cash flow period

The average period used for cash flow forecasting is 5.8 years (2005, 5.9; 2006, 5.7), and a breakdown per year and audit firm (Table 17) shows the following. In 2005 PWC and KPMG have the highest mean of about 6.4 years and the highest spread with a standard deviation of 4 and 5.6. EY has the lowest mean with 4.8 years and the lowest spread with 2.2. In 2006 EY and DL have the highest mean of about 6.3 years, but also the highest spread with a standard deviation of 4 and 3, while PWC has the lowest mean at 4.9 years and the lowest spread with 2.1. Overall DL has the highest mean with 6.1, while KPMG has the highest spread with 4.4.

Table 17: Cash flow period

	2005			2006			Total		
Auditor	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation
PWC	20	6.40	4.04	18	4.92	2.14	38	5.70	3.33
EY	11	4.82	2.23	17	6.18	4.13	28	5.64	3.52
DL	5	5.20	2.86	10	6.60	3.50	15	6.13	3.27
KPMG	14	6.36	5.62	14	5.32	2.70	28	5.84	4.36
Total	50	5.92	4.11	59	5.66	3.16	109	5.78	3.61

5.1.6 Confidence intervals

A confidence interval is an interval estimate of a population parameter, used to indicate the reliability of an estimate. The sample mean is an estimate of the unknown population mean. To examine how reliable the sample mean is as estimate of the population mean, the 95% confidence intervals are calculated for the dependent variables.

First it should be noted that the sample in this study may be considered as the total population rather than a random drawn sample. This of course depends on the how the population is defined, but all listed firms on Euronext Amsterdam carrying goodwill and using a Big Four auditor were included, which could be considered as the total population. However, for example there are Dutch public firms with a foreign listing and without a domestic listing, or other countries with a similar environment to the Netherlands. The sample can also be considered as a sample drawn from a population across years, of which 2005 and 2006 were drawn. When the sample is considered as the total population, confidence intervals and significance of analyses are not of interest as the population characteristics are known. Nonetheless, the 95% confidence intervals are determined and analyses are performed and their significance reported.

The sample means of the disclosure ratios are all within the estimated range of the population's mean. The intervals for the ratio based on items from IAS 36.134 are smaller with a range of 0.06 compared to the intervals of the overall index ratio with a range of 0.10. The difference between the A and B versions of the disclosure indices is that all the values are slightly higher with about 0.05, while the ranges of the intervals remain about the same. All of the sample means for disclosure are within the estimated range and positioned near the centre point of the interval, and the intervals are relatively narrow, the sample means are near the population mean. The confidence intervals for the years separately yield similar results (not reported).

Variable	Mean	Lower Bound	Upper Bound	Within Range	Variable	Mean	Lower Bound	Upper Bound	Within Range
Disclosure A	0.622	0.579	0.666	yes	Disclosure 134 A	0.675	0.641	0.709	yes
Disclosure B	0.666	0.620	0.711	yes	Disclosure 134 B	0.732	0.698	0.766	yes

The intervals for the CGU-to-Segment ratios get smaller with each version, the same trend the means follow. The version based on the number of primary segments has an interval range of about 0.4, while the version based on the highest segment count in each case has a range of about 0.2. The means are for these ratios are positioned near the centre point of the intervals, with the range being relatively narrow, the sample means are close to the population mean. The confidence intervals for the years separately yield similar results (not reported).

The interval for the discount rate is 10.1% to 11.4%, relatively narrow range of 1.3 and with a sample mean of 10.8% near the centre point of the interval. The population mean for growth rate is estimated to be between 1.3% and 2.6%, with a sample mean of 2%,

again the mean is positioned near the centre point of the interval, and the interval is relatively narrow. The sample mean of the number of years over which cash flows are predicted is 5.8 years, while the population mean is estimated to be between 5.1 years and 6.5 years. The sample mean is near the population mean, as the interval is relatively narrow, and the sample mean is near the interval centre point. The confidence intervals for the years separately yield similar results (not reported).

Variable	Mean	Lower Bound	Upper Bound		Variable	Mean	Lower Bound	Upper Bound
CGU / Segment Primary	1.107	0.886	1.328		Allocation Ratio	0.727	0.659	0.795
CGU / Segment Secondary	0.951	0.777	1.125		Discount Rate	10.76	10.11	11.42
CGU / Segment Average	0.851	0.726	0.976		Growth Rate	1.967	1.306	2.629
CGU / Segment Highest	0.687	0.580	0.793		Cash Flow Period	5.78	5.09	6.47

5.1.7 Outliers

Outliers are observations that fall outside the range of the other observations in the sample. They are important for two reasons, 1) unrecognized outliers can lead to misleading results as they can distort the sample mean, and 2) outliers can be observations of exceptional cases which may be interesting to examine more closely. In Table 18 the minimum and maximum z-scores are displayed for the variables in the dataset, 95% of the observations should have a z-score between -2 and +2, while 99% of the observations should have a z-score between -3 and +3. Observations with an absolute z-score greater than 3 could be an outlier, while an observation with an absolute z-score greater than 5 are almost certain to be an outlier.

There are no outliers in the disclosure ratio variables. The CGU-to-Segment ratio variables may have some outliers at the top, with maximum z-score of 3 to 5. Discount rates, growth rates and cash flow period may also have outliers with maximum z-scores of 5 and 6. The control variables may also have outliers with maximum z-scores of 6 to 8, and goodwill intensity with 3.8.

Table 18: Outliers Z-scores

Variable	Minimum z-score	Maximum z-score		Variable	Minimum z-score	Maximum z-score
Disclosure A	-2.283	1.386		Discount Rate	-1.332	**6.782**
Disclosure B	-2.336	1.174		Growth Rate	-0.665	**6.524**
Disclosure 134 A	-2.316	1.676		Cash Flow Period	-1.323	**5.319**
Disclosure 134 B	-2.642	1.381				
CGU / Segment Primary	-0.795	**5.309**		Total Assets	-0.214	**7.099**
CGU / Segment Secondary	-0.867	**5.513**		Total Sales	-0.299	**8.097**
CGU / Segment Average	-1.081	**3.999**		Impairment Loss	-0.230	**8.871**
CGU / Segment Highest	-1.023	**4.935**		Goodwill	-0.407	**6.957**
Goodwill Allocation Ratio	-1.647	0.619		Goodwill Intensity	-0.996	**3.767**

Outliers for the CGU-to-Segment ratio variables are shown in Table 19. The ratio based on primary segments has three possible outliers with values 8.5, 7.5, and 7, with the next closest values of 5 and six times 4. The first is Unit 4 Agresso (EY) in 2006, caused by the fact that the firm defined 17 CGUs to which goodwill is allocated, while the firm has only 2 primary segments. The other two cases are Aalberts Industries (PWC) in both years, with 2 primary segments in both years, and 14 and 15 CGUs. Excluding the cases step by step lowers the mean by about 4% each time, while together the mean is lowered by about 12%.

The ratio based on secondary segments has two possible outliers with values 7 and 5, with the next closest values of five times 4 and five values between 3 and 3.5. The two extreme cases are Getronics (PWC) in both years with 7 and 5 CGUs for goodwill with 1 secondary segment in both years. Removal of the cases step by step lowers the mean with 3 to 4%, while combined the mean is lowered by 7%.

The ratio based on the average of the primary and secondary segments has two possible outliers with two values of 4, with the closet value of 3 and nine values between 2 and 2.7. The two cases are BE Semiconductor 2005 (KPMG) and 2006 (EY), with 4 CGUs , 1 primary and 1 secondary segment in both years. Exclusion of each case step by step lowers the mean with about 2.5%, while combined the mean is lowered by 4.8%.

The ratio based on the higher of primary or secondary segments has three possible outliers with two values of 4 and one value of 3, with the next closest values of 2.5 and 1.8. The first two cases are again BE Semiconductor for 2005 (KPMG) and 2006 (EY), the last case with value 3 is HITT (DL) in 2005, with 3 CGUs and 1 primary and 1 secondary segment. Excluding these cases step by step lowers the mean with 2.5 to 3% each time, while combined the mean is lowered with 8.6%.

Table 19: Outliers research question 2

Segment	Mean	Extreme Values	New Mean	Change Mean in %	Cum. Change Mean in %	Outlier	Outlier Total
Primary	1.107	8.5	1.059	-3.8	-3.8	no	
		7.5	1.017	-4.0	-8.1	no	
		7	0.978	-3.9	-11.7	no	yes
Secondary	0.951	7	0.912	-4.1	-4.1	no	
		5	0.885	-2.9	-6.9	no	yes
Average	0.851	4	0.831	-2.4	-2.4	no	
		4	0.810	-2.5	-4.8	no	no
Highest	0.687	4	0.665	-3.1	-3.1	no	
		4	0.644	-3.3	-6.3	no	
		3	0.628	-2.4	-8.6	no	yes

To clarify these tables, the column '*Change Mean in %*' shows the difference between the mean shown in '*New Mean*' and the previous mean, that is the individual effect of the extreme value (e.g. Primary 1.059 -> 1.017 = -4.0%). The column '*Cum. Change Mean in %*' shows the differences between the new and the original mean shown in column '*Mean*', that is the combined effect of the extreme values thus far (e.g. Primary 1.107 -> 0.978 = -11.7%).

Outliers for the discount rates, growth rates, and cash flow period are shown in Table 20. The discount variable has a possible outlier with value 35%, and the next closest values are 20, 19, 18, 17, 17 and 16%. The extreme case is Octoplus (DL) in 2006, and exclusion lowers the mean with 2%, leading to the conclusion that this is not an outlier.

Growth rate has a possible outlier with value 19.5%, and the next closest values are 10% and five values between 5 to 5.5%. The extreme case is HITT (DL) in 2005 disclosing the use of growth rates of 17 to 22%. Exclusion of this case lowers the mean with 12%.

The cash flow period has three potential outliers with values 25, 20, and 20 years, the next closest values are 12 years and sixteen times 10 years. The three extreme cases are Stork (KPMG) in 2005, Pharming (EY) in 2006, and Shell (PWC) in 2005. Excluding each case step by step lowers the mean with 2.3 to 3.1%, while combined the mean is lowered by 7.8%.

Table 20: Outliers research question 3

Variable	Mean	Extreme Values	New Mean	Change Mean in %	Cum. Change Mean in %	Outlier	Outlier Total
Discount Rate	10.76	35.0	10.55	-2.0	-2.0	no	no
Growth Rate	1.803	19.5	1.582	-12.3	-12.3	yes	yes
Cash Flow Period	5.78	25	5.60	-3.1	-3.1	no	
		20	5.47	-2.3	-5.4	no	
		20	5.33	-2.6	-7.8	no	yes

The possible outliers for the control and other variables are shown in Table 21. Total assets and total sales appear to have 4 outliers, each of them strongly influencing the mean, for assets between 20 and 30%, and for sales 11 to 16%. For total assets these are ING (EY) and ABN AMRO (EY) in both years, ING with total assets of € 1,200 billion and ABN AMRO with total assets of € 900 billion, the next closest values are € 314, 311, 186 and 178 billion. Outliers for sales are Shell (PWC) and ING (EY) in both years, Shell with sales of € 250 billion and ING with sales of € 120 billion, while the next closest values are € 56, 45, and three times 44 billion. After transforming the variables into a natural log function, the z-score are -1.93 and +3.05, and for sales -4.20 and +2.50, the extreme low value for assets is Pharming (EY) in 2006 with € 147 million turnover.

Impairment loss has three possible outliers with € 131, 99 and 65 million, the next closest values are € 40, 30, 21, 19, and 19 million. The extreme cases are Unilever (PWC) in 2005, USG People (PWC) in 2006, and Getronics (PWC) in 2006. Exclusion step by step lowers the mean with about 20% each time, while combined the mean is lowered with 52%. The strong influence may be in part explained by the lower number of cases (44) for this variable. After the variable is transformed into natural log function, the z-scores no longer give an indication of possible outliers, with a minimum z-score of -2.19 and maximum z-score of +2.08.

Goodwill has four possible outliers with values of € 12, 12, 7, and 6 billion, the next closest values are five times € 4 billion. The extreme cases are Unilever in both years (PWC), ABN AMRO (EY) in 2006, and Mittal Steel (DL) in 2006. Removal step by step lowers the mean with 6 to 11%, while overall removal lowers the original mean with 31%. Transforming the variable into natural log function results in z-scores of -2.90 and +2.10, no indication of outliers.

Goodwill intensity has two possible outliers with 66 and 64%, the next closest values are 51, two times 47, 45, 42, and 42%. The extreme cases are Wegener (EY) in both years, with goodwill of about € 500 million, and total assets of about € 700 to 800 million. Removing the cases from the sample lowers the mean in total by 4.5%, leading to the conclusion that these are no outliers.

Table 21: Outliers control variables

Variable	Mean	Extreme Values	New Mean	Change Mean in %	Cum. Change Mean in %	Outlier	Outlier Total
Total Assets (millions of euros)	35,827	1,226,000	28,655	-20.0	-20.0	yes	
		1,158,000	21,807	-23.9	-39.1	yes	
		987,000	15,921	-27.0	-55.6	yes	
		880,000	10,615	-33.3	-70.4	yes	yes
Total Sales (millions of euros)	9,273	260,000	7,762	-16.3	-16.3	yes	
		242,000	6,342	-18.3	-31.6	yes	
		120,000	5,647	-11.0	-39.1	yes	
		108,000	5,015	-11.2	-45.9	yes	yes
Impairment Loss (thousands of euros)	3,312	131,000	2,538	-23.4	-23.4	yes	
		99,000	1,950	-23.2	-41.1	yes	
		65,000	1,563	-19.8	-52.8	yes	yes
Goodwill (millions of euros)	716	12,000	642	-10.3	-10.3	yes	
		12,000	571	-11.1	-20.3	yes	
		7,000	531	-7.0	-25.8	yes	
		6,000	497	-6.4	-30.6	yes	yes
Goodwill Intensity (percentage)	13.72	65.58	13.41	-2.3	-2.3	no	
		63.93	13.10	-2.3	-4.5	no	no

A number of outliers have been identified, the observations are not removed from the sample, but instead analyses in the next sections are performed with and without these cases to examine what influence they have on the outcomes. Each analyses is ran twice, one time with all cases and another time without all the outliers, so analyses are not performed by excluding the identified outliers step by step as is done here.

5.2 Bivariate Analysis

In the bivariate analysis the relations between the variables are examined. The relation between the dependent variables and the audit firm variable is examined for the overall sample and for the years separately. The statistical analysis techniques most used in this section are shortly outlined below (Table 22). The X-variable is the audit firm, while the Y-variables are the various dependent variables. Results reported are flagged to indicate their significance; * indicates the result is significant at α 10%, ** indicates the result is significant at α 5%, and *** indicates the result is significant at α 1%.

The one-way Anova (analysis of variances) is used to test for differences among two or more independent groups. The analysis technique tests for equality of the means among the populations. The technique makes the assumption that the independent variable is normally distributed, and the variances in the groups are equal. A rule of thumb is that the largest subpopulation must be smaller than two times the smallest subpopulation ($N_{max} < 2N_{min}$). The assumption of equal variances is examined using the Levene test (denoted with F_L), and when the variances are not equal, the Welch statistic (denoted with F_W) can be used to conduct the Anova hypothesis test. The Welch statistic is only reported when the Levene test is significant on at least α 10%.

The Kruskal-Wallis is a non-parametric test, meaning it does not assume a normal population, and tests for equality of the population medians among the groups. Assumptions: random, mutually independent samples are from populations whose distribution functions have the same shape, equal variances. Each sample consists of five or more measures.

Table 22: Statistical techniques

	Y-variable		
X-variable	Nominal	Ordinal	Interval/Ratio
Nominal (none-dichotomous)	Crosstabs	Kruskal-Wallis	Large sample: Anova Small sample, Y normally distributed: Anova Small sample, Y not normally distributed: Kruskal-Wallis

5.2.1 Research question 1

R1: What is the relation between the firm's disclosures on goodwill and its audit firm?

Disclosure index

To answer research question 1, two hypotheses have been formulated, the first hypothesis was:

> *H1a: There are differences in the level of compliance with the disclosure requirements on goodwill between the large audit firms.*

First the hypothesis is examined using the overall disclosure ratios (Table 23). The variables have 155 observations (PWC 48; EY 37; DL 27; KPMG 43). The result for Disclosure A ($F = 1.010$, $p = 0.390$) is not significant and the results for disclosure B are similar. Based on these results, there are no differences in the extent of compliance with the disclosure requirements between the audit firms.

Table 23: Disclosure - Anova

	Disclosure A		Disclosure B	
	F	*Significance*	*F*	*Significance*
Anova	1.010	0.390	0.977	0.406
Levene	2.350	0.075*	1.994	0.117
Welch	1.177	0.324	1.204	0.314

Next the hypothesis is examined using the disclosure 134 ratios (Table 24). The variables have 138 observations (PWC 46; EY 32; DL 24; KPMG 36). The result for Disclosure 134 A ($F_W = 1.297$, $p = 0.282$) is not significant, while the result for Disclosure 134 B ($F = 1.602$, $p = 0.192$) is slightly better, but also not significant. Based on these results, there are no differences between the audit firms in the level of compliance with the disclosure requirements from IAS 36.134.

Table 24: Disclosure 134 - Anova

	Disclosure 134 A		Disclosure 134 B	
	F	*Significance*	*F*	*Significance*
Anova	1.343	0.263	1.602	0.192
Levene	3.019	0.032**	1.127	0.341
Welch	1.297	0.282	1.631	0.191

Performing the analyses per year instead of overall reveals no interesting results for the disclosure 134 ratios in both years and no interesting results for the overall disclosure ratios in 2005. However, in 2006 some interesting results emerge (Table 25), the other results are not reported. The overall disclosure ratios for 2006 have 85 observations (PWC 23; EY 23; DL 15; KPMG 24). The result for Disclosure A ($F_W = 2.694$, $p = 0.059$) is almost significant at α 5%. The result for Disclosure B ($F_W = 2.420$, $p = 0.080$) is weaker, but significant at α 10%. Based on these results, there are differences between the audit firms. The mean of Disclosure A for 2006 is 0.65, and a breakdown per audit firm: PWC 0.73, EY 0.69, DL 0.60, and KPMG 0.55. The mean of Disclosure B for 2006

is 0.69, and a breakdown per audit firm: PWC 0.78, EY 0.73, DL 0.65, and KPMG 0.60. The clients of PWC are most compliant followed by clients EY, clients of DL are less compliant, and clients of KPMG are the least compliant.

Table 25: Disclosure 2006 - Anova

| | Disclosure A | | | Disclosure B | |
	F	*Significance*		*F*	*Significance*
Anova	2.287	0.085*		1.934	0.131
Levene	2.757	0.048**		2.921	0.039**
Welch	2.694	0.059*		2.420	0.080*

In light of the observed difference in means in 2005 and 2006, the overall the means of disclosure indices for 2006 are 0.05 higher than for 2005, it may be insightful to examine whether there are differences between the two years. No explicit hypothesis was formulated for this. However, considering the argument that there were no established "best practices" for IFRS at the time of adoption, and that these will emerge over time, an increase in the level of compliance over time is expected. The hypothesis is examined using the T-test for paired samples which tests for equality of means in the two dependent populations. The sample has 71 firms for both years, the variables Disclosure A and B have 64 observations for both years (PWC 23; EY 13; DL 10; KPMG 18) and the variables Disclosure 134 A and B have 56 observations for both years (PWC 22; EY 10; DL 8; KPMG 16). The results (Table 26) are significant for all disclosure ratios at α 1%. Based on these results, the level of compliance with the disclosure requirements is higher in 2006 compared to 2005. Similar results are obtained using the Wilcoxon's Signed Ranks test (not reported), a non-parametric analysis technique which tests for equality of medians in the two dependent populations.

Table 26: Disclosure - T-test paired sample

Variable	T_D	Significance (2-tailed)		Variable	T_D	Significance (2-tailed)
Disclosure A	-3.200	0.002***		Disclosure 134 A	-2.879	0.006***
Disclosure B	-3.176	0.002***		Disclosure 134 B	-3.196	0.002***

Missing values in the disclosure items are caused by non-compliance of such nature that it is impossible to determine the relevance of some of the disclosure items. The number of missing values acts as proxy for disclosure quality. The examine whether there are differences between the audit firms, two variables are examined: 1) *n*Missing, the number of missing values in the disclosure items, and 2) *d*Missing, a dummy variable coded 1 if there are 11 or more missing values, else coded 0. The variables have 167 observations (PWC 49; EY 40; DL 30; KPMG 48). The result for *n*Missing ($F_W = 2.811$, $p = 0.045$) is significant at α 5%, and *d*Missing ($F_W = 3.159$, $p = 0.029$) is also significant at α 5%. The mean for *n*Missing is 2.6; PWC has the lowest number of missing values with a mean of 1.2, while the remainder of the group has a mean of 2.9, with KPMG at the top with 3.6. The frequencies for *d*Missing provide a similar result, overall 29 counts out of 167 cases; PWC 3 counts out of 49 cases (6%), EY 8 counts out of 40 (20%), DL 6 counts out of 30 (20%), and KPMG 12 counts out of 48 (25%).

Table 27: Disclosure missing items - Anova

		nMissing			dMissing
	F	Significance		F	Significance
Anova	2.072	0.106		2.237	0.086*
Levene	10.650	0.000***		12.067	0.000***
Welch	2.811	0.045**		3.159	0.029**

The usefulness of these results is limited due to the fact that the missing values may be a poor approximation of the actual disclosure quality. However, it is interesting to see these results are similar to the results from the disclosure ratios for 2006, and so this result is perhaps best considered as a robustness check.

Disclosure pattern

To answer research question 1, two hypotheses have been formulated, the second hypothesis was:

> *H1b.X: There are differences in compliance with disclosure requirement itemX on goodwill between the large audit firms.*

The hypothesis is tested for each of the disclosure items, because the dichotomous items can be considered as quasi-ratio variables, one-way Anova analysis is used. The results shown in Table 28 (page 40) are significant for some items. Kruskal-Wallis analyses are run as well as robustness check and yielded similar results (not reported).

The Welch statistic cannot be determined when the variance within a group is zero, because a division by the group variance is done. In the analysis of the disclosure pattern, this is the case for items 1, 2, 13, 17, 18, and 29. These items are coded 1 for compliance and 0 for non-compliance, and when all the firms in the group are all compliant or non-compliant, the group variance is zero. A little trick is used so the Welch statistic can still be determined. In case all the values in the group are 1, then the value for one observation is changed to $1 - 10^{-10}$ which effectively is still 1. In case the values are all 0, then one value is changed to 10^{-10} which effectively is still 0. The small alteration does not affect the result of the Anova, but since the group variance is no longer equal to zero, the Welch statistic can be determined. The *F* value of the Welch statistic is prefixed with a ~ in case this has been done.

Item 13 is the requirement to disclose the main events and circumstances that led to immaterial impairment losses (IAS 36.131). The item has 44 observations (PWC 13; EY 6; DL 12; KPMG 13), failing the rule of thumb (13 >= 2*6). The result ($F_W = 8.270$, $p = 0.002$) is significant at α 1%. Non-compliance with item 13 is spread as follows over the audit firms: clients of PWC are in non-compliance in 7 out of 13 cases (54%), EY 3 out of 6 (50%), DL 6 out of 12 (50%), and KPMG 13 out of 13 cases (100%). All clients of KPMG in the sample are in non-compliance with this requirement, while for the remainder of the group this is only the case for half of their clients.

The items 16 to 28 are disclosure requirements for CGUs with significant carrying amounts of goodwill allocated in comparison with the total carrying amount of goodwill (IAS 36.134). Item 16 is the requirement to disclose the amount of goodwill allocated to the CGU, and item 17 is the requirement to disclose the basis used to determine the recoverable amount, that is value in use or fair value less costs to sell (IAS 36.134). The two items have 145 observations (PWC 46; EY 34; DL 26; KPMG 39). The result for item 16 ($F_W = 2.377$, $p = 0.077$) is significant at α 10%, and for item 17 ($F_W = \sim 3.963$, $p = 0.013$) significant at α 5%. For item 16, non-compliance per audit firm is as follows: PWC 11 counts of non-compliance out of 46 cases (24%), EY 9 out of 25 (36%), DL 5 out of 21 (24%), and KPMG 3 out of 36 (10%). For item 17 as follows: PWC 0 counts of non-compliance out of 46 cases (0%), EY 2 out of 34 (6%), DL 4 out of 26 (16%), and KPMG 5 out of 34 (15%).

Item 23 is requirement to disclose the long-term growth rate(s) used in the cash flow forecasting. The item has 132 observations (PWC 43; EY 31; DL 22; KPMG 36). The results ($F_W = 3.925$, $p = 0.012$) is significant at α 5%. The counts of non-compliance with item 23 are as follows: PWC 30 counts of non-compliance out of 43 cases (70%), EY 13 out of 31 (42%), DL 18 out of 22 (82%), and KPMG 27 out of 36 (75%). EY stands out with a much lower percentage of non-compliance.

Item 23a was coded 1 in case the firm disclosed a growth rate for each CGU with significant carrying amounts of goodwill. The item was also coded 1 in case a single growth rate of 0 was disclosed for all. In case the firm has only one CGU with a significant amount of goodwill allocated, only one rate needs to be disclosed. To examine whether the use of growth rate of 0, and whether having a single CGU with a significant amount of goodwill influences the results, the Anova is run again, excluding these cases separately and combined. The results do not change the findings (not reported), and the Welch statistic remains significant in every scenario and becomes slightly stronger. EY comes out as the best of the group in every scenario, when excluding cases with CGU 1 and cases with growth rate of 0; PWC has a mean of 0.09, EY 0.71, DL 0.00, and KPMG 0.07. The latter analysis has 38 observations (PWC 11; EY 7; DL 5; KPMG 15) failing the rule of thumb (15 >= 2*5). The initial results are not overturned when excluding cases with growth rate 0 or cases with a single CGU. The results for item 24a do not change when excluding cases with one CGU (not reported).

Item 29 is the requirement to disclose the aggregate amount of goodwill allocated to CGUs with carrying amounts of goodwill not significant in comparison with the total carrying amount of goodwill (IAS 36.135). The item has 73 observations (PWC 24; EY 14; DL 15; KPMG 20). The results ($F_W = \sim 2.470$, $p = 0.084$) is significant at α 10%. The counts of non-compliance with item 29 are as follows: PWC 2 counts of non-compliance out of 24 cases (8%), EY 3 out of 14 (21%), DL 2 out of 15 (13%), and KPMG 0 out of 20 (0%). KPMG stands out with 100% compliance compared to the remainder of the group, although the differences are relatively small.

Table 28: Disclosure pattern - Anova

Item	Anova F	Anova Significance	Levene F_L	Levene Significance	Welch F_W	Welch Significance	Audit N	PWC	EY	DL	KPMG
1	0.530	0.664	2.543	0.069*	~0.674	0.579	45	13	7	12	13
2	1.162	0.336	5.225	0.004**	~1.767	0.187	45	13	7	12	13
3	0.499	0.685	2.084	0.118	0.467	0.709	43	13	7	10	13
12	1.978	0.133	2.435	0.079*	2.134	0.130	44	13	6	12	13
13	3.718	0.019**	1589.2	0.000***	~8.270	0.002***	44	13	6	12	13
16	1.721	0.165	9.296	0.000***	2.377	0.077*	145	46	34	26	39
17	2.635	0.052*	13.438	0.000***	~3.963	0.013**	145	46	34	26	39
18	1.323	0.270	5.932	0.001***	~1.676	0.185	132	43	31	22	36
19	0.675	0.569	2.449	0.067*	0.673	0.572	131	43	31	22	35
20	1.256	0.292	3.813	0.012**	1.210	0.313	132	43	31	22	36
21	2.401	0.071*	8.140	0.000***	1.977	0.127	132	43	31	22	36
22	0.805	0.504	1.562	0.226	0.809	0.515	27	10	6	5	6
23	4.312	0.006***	4.675	0.004***	3.925	0.012**	132	43	31	22	36
24	0.930	0.428	3.131	0.028**	0.840	0.477	132	43	31	22	36
29	1.572	0.204	7.932	0.000***	~2.470	0.084*	73	24	14	15	20

Item 23b and 24b have four categories: 1) no rate disclosed, 2) range of rates disclosed, 3) a single rate disclosed, and 4) multiple rates disclosed. These two variables are ordinal in nature and are examined using the Kruskal-Wallis analysis technique. The result for item 23b ($\chi^2 = 7.425$, $p = 0.060$) is significant at α 10%, PWC has a mean rank of 63, EY 79, DL 52, and KPMG 68. Again EY comes out as best of the group for item 23 in every scenario. The result for item 24b ($\chi^2 = 5.131$, $p = 0.162$) is not significant. The findings do not change when switching category 2 and 3 and also not when merging category them (not reported).

	Item23b N	Item23b χ^2	Item23b Significance	Item24b N	Item24b χ^2	Item24b Significance
All cases	132	7.425	0.060*	132	5.131	0.162
Excl. CGU = 1	99	7.973	0.047**	99	2.949	0.399
Excl. Growth = 0	46	7.976	0.047**			
Excl. Growth = 0 and CGU = 1	38	7.557	0.056*			

The analysis of the pattern of compliance yielded some interesting results; overall PWC and EY appear to come out as the best of the group, while KPMG does score best on two requirements it comes out as worst for two other requirements. These results are consistent with the results of the disclosure ratio for 2006.

5.2.2 Research question 2

R2: What is the relation between the firm's goodwill CGUs and its audit firm?

Aggregation

To answer research question 2, two hypotheses have been formulated, the first hypothesis was:

> *H2a: There are differences in the aggregation of CGUs to which goodwill is allocated between the large audit firms.*

First the hypothesis is tested using four CGU-to-Segment ratios (Table 29): 1) primary segments, 2) secondary segments, 3) average of primary and secondary segments, and 4) the higher of primary or secondary segments. These variables have 155 observations (PWC 45; EY 33; DL 29; KPMG 48). The results for all the four types are weak and are not significant. There are no differences for the aggregation of CGUs for goodwill between the audit firms. The results do not change when the outliers identified in the univariate analysis are excluded, and the results per year do not yield new insights (not reported).

Next the hypothesis is examined using the category variables (Table 29): 1) fewer CGUs than segments, 2) equal number of CGUs as segments, and 3) more CGUs than Segments. Again the results are weak and not significant. There are no differences for the aggregation of CGUs for goodwill between the audit firms. The results do not change when the analysis is performed separately for 2005 and 2006, and the results also do not change when merging categories 2 and 3 (not reported).

Table 29: Aggregation - Anova & Kruskal-Wallis

	Anova		Kruskal-Wallis	
Variable	*F*	*Significance*	χ^2	*Significance*
CGU / Segment Primary	0.284	0.837	2.548	0.467
CGU / Segment Secondary	0.231	0.875	0.880	0.830
CGU / Segment Average	0.181	0.909	3.117	0.374
CGU / Segment Highest	0.211	0.889	1.213	0.750

Allocation

To answer research question 2, two hypotheses have been formulated, the second hypothesis was:

> *H2b: There are differences in the level of allocation of goodwill to CGUs between the large audit firms.*

First the hypothesis is examined with the one-way Anova technique using the ratio of goodwill allocated to CGUs to the total carrying amount of goodwill (Table 30). The variable has 165 observations (PWC 49; EY 39; DL 30; KPMG 47). The result ($F = 0.397$, $p = 0.755$) is not significant. There are no differences in the degree of allocation of

goodwill to CGUs between the audit firms. The results for 2005 are stronger than for 2006, but both are not significant.

Next the hypothesis is tested with the Kruskal-Wallis analyses using an ordinal variable with four categories (Table 30): 1) no disclosure, 2) significant amount not allocated, 3) insignificant amount not allocated, and 4) all allocated. The result ($\chi^2 = 2.085$, $p = 0.555$) is not significant. There are no differences in the extent of allocation of goodwill to CGUs between the audit firms. The results for 2005 are stronger than for 2006, but both are not significant.

Table 30: Allocation - Anova & Kruskal-Wallis

| | Anova | | Kruskal-Wallis | |
	F	*Significance*	χ^2	*Significance*
2005	1.375	0.257	4.352	0.226
2006	0.131	0.942	0.198	0.978
Total	0.397	0.755	2.085	0.555

Allocation and the disclosure ratios are both a measure of compliance with requirements from IAS 36. The relation between the allocation ratio and the disclosure items 16 and 29 is as follows. Items 16 to 28 are disclosure requirements for CGUs with significant carrying amounts of goodwill allocated in comparison with the total carrying amount of goodwill, where item 16 is the requirement to disclose the amount of goodwill allocated to the CGU (IAS 36.134). Item 29 is the requirement to disclose the aggregate amount of goodwill allocated to CGUs with carrying amounts of goodwill not significant in comparison with the total carrying amount of goodwill (IAS 36.135).

Pearson's correlation coefficient is used to examine the relation between allocation and the disclosure ratios. There are 153 observations to examine the relation with the overall disclosure ratios, and 136 observations for the disclosure 134 ratios. The results (Table 31) are highly significant for all disclosure ratios and in support of the above assumption.

Table 31: Allocation - Correlations

Variable	*r*	*Significance (2-tailed)*	*Variable*	*r*	*Significance (2-tailed)*
Disclosure A	0.643	0.000***	Disclosure 134 A	0.315	0.000***
Disclosure B	0.643	0.000***	Disclosure 134 B	0.303	0.000***

The mean of the allocation ratio of 0.798 in 2006 is 0.152 higher compared to the mean of 0.646 in 2005. The same argument applies here as for the disclosure indices, as there were no established "best practices" for IFRS at the time of adoption, and that these will emerge over time, an increase in the level of allocation of goodwill to CGUs over time is expected. Since there is a relation between allocation and disclosure quality, this analysis is also a robustness check for the increase found for the disclosure ratios in 2006.

The hypothesis is examined using the T-test for paired samples which tests for equality of means in the two dependent populations. The sample has 71 firms for both years, and the variable Allocation has 69 observations for both years (PWC 23; EY 14; DL 12; KPMG

20). The result of the T-test (T_D = -3.481, p = 0.001) is highly significant. The level of allocation of goodwill to CGUs is higher in 2006 compared to 2005. Similar results are obtained using the Wilcoxon's Signed Ranks test (not reported), a non-parametric analysis technique which tests for equality of medians in the two dependent populations.

5.2.3 Research question 3

R3: What is the relation between the firm's assumptions used for value in use estimates for goodwill impairment testing and its audit firm?

Discount rates

To answer research question 3, three hypotheses have been formulated, the first hypothesis was:

> *H3a: There are differences in the discount rates used in the value in use estimates between the large audit firms.*

The hypothesis is examined with the one-way Anova analysis technique (Table 32). The variable has 116 observations (PWC 40; EY 29; DL 16; KPMG 31), failing the rule of thumb (40 >= 2*16). The result (F = 1.033, p = 0.381) is not significant, exclusion of the possible outlier with value 35% improves the result (F = 2.076, p = 0.107), but also lowers the number of cases for DL to 15. The results of the Kruskal-Wallis analysis yield no new insights (not reported). There are no differences between the audit firms in the discount rates used to determine value in use.

Table 32: Discount rates - Anova

	All cases		Excl. outliers	
	F	*Significance*	*F*	*Significance*
2005	0.873	0.462	0.873	0.462
2006	1.533	0.215	1.930	0.134
Total	1.033	0.381	2.076	0.107

Growth rates

To answer research question 3, three hypotheses have been formulated, the second hypothesis was:

> H3b: There are differences in the growth rates used in the value in use estimates between the large audit firms.

The hypothesis is examined with the one-way Anova analysis technique (Table 33). The variable has 81 observations (PWC 25; EY 20; DL 9; KPMG 27), failing the rule of thumb (27 >= 2*9). The result (F = 3.001, p = 0.036) is significant, but closer examination reveals this is caused by the outlier of 19.5%, the result without outlier (F = 1.259, p = 0.295) is not significant. The Kruskal-Wallis analysis yields similar results (not reported). There are no differences between the audit firms in the growth rates used to determine value in use.

Table 33: Growth rates - Anova

	All cases		Excl. outliers	
	F	*Significance*	*F*	*Significance*
2005	5.354	0.005***	1.022	0.398
2006	0.709	0.552	0.709	0.552
Total	3.001	0.036**	1.259	0.295

Cash flow period

To answer research question 3, three hypotheses have been formulated, the third hypothesis was:

> H3c: There are differences in the cash flow forecasting periods between the large audit firms.

The hypothesis is examined with the one-way Anova analysis technique (Table 34). The variable has 109 observations (PWC 38; EY 28; DL 15; KPMG 28), failing the rule of thumb (38 >= 2*15). The result (F = 0.069, p = 0.977) is rather poor, and without the three outliers (F = 0.681, p = 0.566) is not significant. The Kruskal-Wallis analysis yields similar results (not reported). There are no differences between the audit firms in period over which cash flows are forecasted to determine value in use.

Table 34: Cash flow period - Anova

	All cases		Excl. outliers	
	F	*Significance*	*F*	*Significance*
2005	0.443	0.724	0.437	0.728
2006	0.822	0.487	0.959	0.419
Total	0.069	0.977	0.681	0.566

5.3 Multivariate Analysis

In the multivariate analysis the relations between 3 or more variables are examined. The variables for assets and sales are denoted in billions of euros, the variables for goodwill intensity and goodwill allocation are ratios with values between 0 and 1. The OLS (Ordinary Least Squares) regression analysis technique is used here.

Multicollinearity is a phenomenon in which two or more variables in the regression model are highly correlated. In this situation the coefficient estimates may change erratically in response to small changes in the data. Multicollinearity does not reduce the predictive power or reliability of the model as a whole, but only affects calculations regarding individual predictors. The VIF (Variance Inflationary Factor) measures the degree to which each explanatory variable is explained by other explanatory variables. Multicollinearity is not considered to be a problem when the VIF value is not greater than 10 (Chavent *et al.*, 2006: 186). The variables for audit firm and industry are transformed to dummy variables before they are used in the regression models. To keep the population regression model simple, the variables for audit firm and industry type, as well as the variables for listing are represented as a group by a single variable in the model depicted here.

5.3.1 Research question 1

R1: What is the relation between the firm's disclosures on goodwill and its audit firm?

> *H1a: There are differences in the level of compliance with the disclosure requirements on goodwill between the large audit firms.*

Assets and Sales act as proxy for size, and based on prior research (e.g. Ahmed and Courtis, 1999) a positive relation is expected with disclosure levels. Goodwill intensity is also expected to have a positive relation with disclosure levels, since the greater part of total assets consists of goodwill, the more important goodwill and its disclosure become to stakeholders. There are no specific expectations for the industry variables, prior research has shown mixed results for the relation between disclosure levels and industry type, possibly due to the variations in the way industries are defined (Ahmed and Courtis, 1999: 39). Differences in disclosure levels on goodwill between industries may exist as goodwill may be less (more) common or important in some industries than others. For the listing variables the expectation is that a cross-listing on a stock exchange with stricter rules, regulations, and liability laws can increase the disclosure level. Specifically for the US listing variable a positive relation with disclosure levels is expected, because the US changed to an impairment only approach for goodwill earlier in 2001, and the regulations in the US are stricter compared to the Netherlands (La Porta *et al.*, 2006). The indices variables are expected to have a positive relation with disclosure levels. A firm is included in these indices based on the turnover of its shares (the amount of shares traded in a period times the price). More actively traded equities receive more attention from the

market (analysts following, news coverage, *et cetera*) which is expected to increase disclosure levels. Year is expected to have a positive relation with disclosure levels based on arguments (lack of "best practices", learning curve) and the results from comparing disclosure levels from 2006 with 2005 in the bivariate analysis. The variables CGU1 (coded 1 when the firm defined one CGU) and Growth0 (coded 1 when growth rate zero is disclosed) are expected to have a positive relation with disclosure, because with one CGU or growth rate zero it is easier to be compliant for some items.

The population regression model for disclosure is shown below. The left out category for industry is *d*Industrials and for audit firms *d*DL. The variable *d*ListingHK has no observations for the included cases, and *d*ListingES and *d*ListingLU have only one observation for the same case, the latter is excluded from the model.

$$Disclosure = \alpha + \beta_1 \, Assets + \beta_2 \, Sales + \beta_3 \, Goodwill\_Itensity + \beta_4 \, Industry + \beta_5 \, Listing + \beta_6 \, AuditFirm + \varepsilon_i$$

$$\varepsilon \sim iin(0, \sigma)$$

The regression model for Disclosure A and B explain 54% of the variation in the level of disclosure, and both models ($F = 5.000$, $p = 0.000$) are highly significant. There are no multicollinearity problems in the models; the variable Assets has the highest VIF value of 6.2. The outliers for Assets and Sales are excluded from the model, other variables added to the model are: *d*Year, *d*AEX, *d*AMX, *d*AScX, *d*CGU1, and *d*Growth0. To save space the standard errors are omitted from the sample model shown below, and only control variables with a significant contribution to the model are shown. The coefficients, standard errors, and significance for all variables in the model for Disclosure A and B are shown in Table 35 (page 72). In the model for Disclosure B the variable *d*AMX and *d*AScX are no longer significant, while *d*Technology becomes significant at α 5%. Interestingly the coefficient for Assets is negative and in contrast with expectation, while Sales does have a positive coefficient. The variable for listing in the US is not significant and has a negative coefficient.

Disclosure A = 0.405*** + -0.004Assets*** + 0.007Sales* + -0.729*d*Oil&Gas*** + -0.213*d*ConsumerGoods*** + -0.364*d*ListingFR* + 0.390*d*ListingBE** + 0.169*d*ListingDE* + -0.350*d*ListingSE** + 0.231*d*AEX*** + 0.091*d*AMX* + 0.146*d*AScX*** + 0.071*d*Year** + 0.195*d*CGU1*** + 0.124*d*PWC** + 0.142*d*EY** + 0.057*d*KPMG

($R^2 = 0.547$; $\hat{\sigma}^2 = 0.040$; n = 150)

Disclosure B = 0.448*** + -0.004Assets*** + 0.006Sales* + -0.771*d*Oil&Gas*** + -0.232*d*ConsumerGoods*** + 0.130*d*Technology** + -0.388*d*ListingFR** + 0.409*d*ListingBE** + 0.195*d*ListingDE* + -0.398*d*ListingSE** + 0.211*d*AEX*** + 0.129*d*AScX** + 0.072*d*Year** + 0.173*d*CGU1*** + 0.121*d*PWC* + 0.132*d*EY** + 0.074*d*KPMG

($R^2 = 0.546$; $\hat{\sigma}^2 = 0.043$; n = 150)

The influence of the variables *d*PWC and *d*EY are significant in both models, albeit weaker in the Disclosure B model, while *d*KPMG is not significant in either model. The results show differences between the audit firms; clients of PWC and EY are more compliant with the disclosure requirements on goodwill.

	Disclosure A			Disclosure B	
Variable	*T*	*Significance*		*T*	*Significance*
*d*PWC	2.103	0.038**		1.970	0.051*
*d*EY	2.280	0.024**		2.020	0.046**
*d*DL	-	-		-	-
*d*KPMG	0.989	0.325		1.234	0.220

The separate models per year show a similar result as in the bivariate analyses, and again there are no noteworthy differences between the audit firms for 2005. The regression model for 2006 explains 63% of the variation in both models with 82 observations and the models ($F = 3.349$, $p = 0.000$) are significant. The sample models are similar to the models above and the complete models are shown in Table 36 (page 73). The influence of the variable *d*PWC an *d*EY are significant for Disclosure A, and are much weaker in Disclosure B where *d*EY is no longer significant.

	Disclosure A			Disclosure B	
Variable	*T*	*Significance*		*T*	*Significance*
*d*PWC	2.254	0.028**		1.798	0.078*
*d*EY	1.715	0.092*		1.436	0.157
*d*DL	-	-		-	-
*d*KPMG	0.205	0.838		0.235	0.815

Overall, the findings support the hypothesis; there are differences in the level of compliance between the audit firms. Clients of PWC and EY are more compliant than clients of KPMG and DL. The observed differences are the strongest for PWC and weaker for EY. The separate analyses per year support the earlier findings; there are differences in the level of compliance between the audit firms in 2006, but not in 2005.

The regression model for *n*Missing explains 45.6% of the variation and the model ($F = 4.014$, $p = 0.000$) is highly significant. There are no multicollinearity problems in the model; the variable Assets has the highest VIF value of 8.2. The outliers for Assets are excluded from the model, the natural log for Goodwill_Intensity is used, and variables added to the model are: *d*Year, *d*AEX, *d*AMX, *d*AScX. The complete model is shown in Table 37 (page 74).

$$n\text{Missing} = 1.660 + 0.062\text{Assets}^{***} + -0.110\text{Sales}^{***} + -0.714\text{LN(Goodwill\_Intensity)}^{**} +$$
$$11.297d\text{Oil\&Gas}^{***} + 3.387d\text{BasicMaterials}^{**} + 3.667d\text{ConsumerGoods}^{***} +$$
$$2.408d\text{ListingUS}^{**} + -3.749d\text{ListingDE}^{**} + 7.364d\text{ListingHK}^{**} + -10.097d\text{ListingES}^{*} +$$
$$-1.135d\text{Year}^{*} + -1.772d\text{PWC} + -1.333d\text{EY} + -0.410d\text{KPMG}$$
$$(R^2 = 0.456; \hat{\sigma}^2 = 15.038; n = 163)$$

The influence of the audit firm variables in the regression model are not significant, the strongest result is for *d*PWC ($T = -1.619$, $p = 0.108$) and is just short of being significant at α 10%.

Variable	*T*	*Significance*		*Variable*	*T*	*Significance*
*d*PWC	-1.619	0.108		*d*DL	-	-
*d*EY	-1.141	0.256		*d*KPMG	-0.387	0.700

While the results are not significant, they are interesting as the outcome is consistent with the findings for the disclosure ratios. Clients of PWC and EY appear to have fewer missing values than clients of DL and KPMG.

5.3.2 Research question 2

R2: What is the relation between the firm's goodwill CGUs and its audit firm?

Aggregation

H2a: There are differences in the aggregation of CGUs to which goodwill is allocated between the large audit firms.

Assets and Sales act as proxy for size and are expected to have a negative relation with aggregation, since the larger the firm the more reportable segments the firm can have. Goodwill_Intensity is expected to have a positive relation with aggregation, since the greater amount of assets consists of goodwill, the more CGUs can be defined. There are no specific expectations for the industry variables, differences between industries may exist as goodwill may be less (more) common in some industries than others, and reportable segments may differ across industries. There are no specific expectations for the listing variables, the rules on the stock exchange, regulations and liability laws applicable there may affect the level of compliance and thus the level aggregation. The indices variables are expected to have a positive influence, as firms included in these indices receive more attention affecting the level of compliance.

The population regression model for CGU aggregation is shown below. The left out categories are dIndustrials and dDL.

$$\text{Aggregation} = \alpha + \beta_1 \text{Assets} + \beta_2 \text{Sales} + \beta_3 \text{Goodwill\_Itensity} + \beta_4 \text{Industry} + \beta_5 \text{AuditFirm} + \varepsilon_i$$

$$\varepsilon \sim iin(0, \sigma)$$

The regression models for aggregation explain 32 to 42% of the variation, and all four models are highly significant. There are no multicollinearity problems in the models with highest VIF values of 4.8. The outliers for Assets, Sales, and the dependent variable are excluded in the primary model, while Assets is excluded from the other models, and the outliers are included. The natural log of Goodwill_Intensity is used, the listing variables are added, and other variables added to the models are: dYear, dAEX, dAMX, and dAScX. The coefficients, standard errors, and significance for all variables in the models for aggregation are shown in Table 38 (page 75).

$$\text{Aggregation(Primary)} = 1.297^{***} + -0.039\text{Sales}^{**} + 0.202\text{LN(Goodwill\_Intensity)}^{***} +$$
$$0.812d\text{ListingUS}^{***} + 1.999d\text{ListingCH}^{***} + -1.242d\text{ListingSE}^{*} +$$
$$-0.889d\text{Healthcare}^{*} + 0.495d\text{AScX}^{**} +$$
$$-0.151d\text{PWC} + -0.005d\text{EY} + 0.029d\text{KPMG}$$
$$(R^2 = 0.419; \hat{\sigma}^2 = 0.776; n = 149)$$

$$\text{Aggregation(Secondary)} = 0.821^{**} + 0.155\text{LN(Goodwill\_Intensity)}^{**} +$$
$$0.813d\text{Technology}^{***} + -0.722d\text{ListingUK}^{**} + 1.028d\text{AEX}^{***} +$$
$$0.032d\text{PWC} + -0.064d\text{EY} + 0.149d\text{KPMG}$$
$$(R^2 = 0.322; \hat{\sigma}^2 = 0.974; n = 155)$$

Aggregation(Average) = 1.167*** + 0.191LN(Goodwill_Intensity)*** + -0.503dBasicMaterials* + -0.765dHealthcare** + 0.366dAMX** + 0.407dAScX** + -0.182dPWC + -0.081dEY + -0.072dKPMG

($R^2 = 0.383$; $\hat{\sigma}^2 = 0.457$; n = 155)

Aggregation(Higher) = 1.035*** + 0.156LN(Goodwill_Intensity)*** + -0.724dHealthcare** + 0.295dTechnology* + 0.316dListingUS* + 0.265dAMX* + 0.315dAScX** + -0.261dPWC + -0.113dEY + -0.121dKPMG

($R^2 = 0.347$; $\hat{\sigma}^2 = 0.351$; n = 155)

The influences of the audit firm variables are not significant in any of the models. The strongest result is for dPWC ($T = -1.621$, $p = 0.108$) in the higher of primary or secondary segments model. Although result is not significant, it is interesting as it is in contrast with earlier findings. Clients of PWC appear to define less CGUs relative to reportable segments compared to clients of the remainder of the group. However, since this only occurs in one scenario, it is not enough to conclude there are systematic differences between the audit firms with regards to CGU aggregation. The regression models separate for each year do not improve the results.

Variable	Primary		Secondary		Average		Higher	
	T	Significance	T	Significance	T	Significance	T	Significance
dPWC	-0.621	0.536	0.119	0.906	-0.990	0.324	-1.621	0.108
dEY	-0.019	0.985	-0.226	0.822	-0.416	0.678	-0.666	0.507
dDL	-	-	-	-	-	-	-	-
dKPMG	0.123	0.902	0.574	0.567	-0.405	0.686	-0.779	0.437

The findings are not in support of the hypothesis; there are no differences in the CGU aggregation between the audit firms.

Allocation

> *H2b: There are differences in the level of allocation of goodwill to CGUs between the large audit firms.*

Because of the relation between the level of allocation and the level of disclosure as discussed and examined earlier, the same expectations for the variables for disclosure (page 45) are relevant for allocation.

The population regression model for goodwill allocation is shown below. The left out categories are dIndustrials and dDL.

$Allocation = \alpha + \beta_1 Assets + \beta_2 Sales + \beta_3 Goodwill\_Itensity + \beta_4 Industry + \beta_5 AuditFirm + \varepsilon_i$

$\varepsilon \sim iin(0, \sigma)$

The regression model for goodwill allocation explains 38.1% of the variation. The natural log of Assets and Goodwill_Intensity is used, and no outliers are excluded. The listing variables are added, and other variables added to the models are: dYear, dAEX, dAMX, and dAScX. The model ($F = 2.996$, $p = 0.000$) is highly significant. There are no

multicollinearity problems with the highest VIF value of 6.7 for LN(Assets). The coefficients, standard errors, and significance for all variables in the model are shown in Table 39 (page 77).

Allocation = 0.645*** + -0.065LN(Assets)* + 0.003Sales* + 0.079LN(Goodwill_Intensity)*** + -0.779dOil&Gas*** + -0.287dBasicMaterials* + -0.344dConsumerGoods*** + -0.235dListingUK* + 0.415dAEX*** + 0.252dAMX** + 0.244dAScX** + 0.151dYear** + 0.081dPWC + 0.123dEY + 0.173dKPMG*

$$(R^2 = 0.381; \; \hat{\sigma}^2 = 0.145; \; n = 165)$$

The audit firm variables are not significant compared to the left out audit firm dDL, except for dKPMG ($T = 1.663$, $p = 0.099$) at α 10%. Clients of KPMG have a higher allocation ratio. The regression models for the two years separately show an even stronger result for 2005 ($R^2 = 0.511$; n = 77), and a weaker result for 2006 ($R^2 = 0.376$; n = 88). Clients of KPMG had a higher allocation ratio in 2005, but there are no significant differences between the audit firms in 2006.

	Total			2005			2006	
Variable	T	Significance		T	Significance		T	Significance
dPWC	0.747	0.456		1.041	0.303		0.120	0.905
dEY	1.119	0.265		0.281	0.780		0.884	0.380
dDL	-	-		-	-		-	-
dKPMG	1.663	0.099*		2.390	0.021**		0.120	0.905

The coefficients for the audit firm variables for the 2005 and 2006 model are shown below. Clients of KPMG allocated +40% of their goodwill to CGUs, PWC +18%, and EY +5% in 2005 compared to DL.

2005	+0.180dPWC	+0.052dEY	+0.398dKPMG
2006	+0.018dPWC	+0.129dEY	+0.017dKPMG

Overall, the findings are weakly in support of the hypothesis; KPMG has a higher allocation ratio significant at α 10%. The findings for 2006 show no differences, while in 2005 KPMG has a higher allocation ratio significant at α 5%. A remarkable result considering the relation with disclosure and the differences found between the audit firms there. For disclosure PWC and EY came out as best of the group in 2006, while for allocation KPMG emerges as best of the group in 2005.

5.3.3 Research question 3

R3: What is the relation between the firm's assumptions used for value in use estimates for goodwill impairment testing and its audit firm?

Cash flow projections are to be based on reasonable and supportable assumptions that represent management's best estimate of the range of economic conditions that will exist over the remaining useful life of the asset (IAS 36.33). The company's characteristics, such as firm size, the amount of goodwill relative to size, the industry the firm is active in, and the activity level of the firm's shares are expected to have an influence on the assumptions. There are no specific expectations for the directions of the coefficients.

Discount rates

> *H3a: There are differences in the discount rates used in the value in use estimates between the large audit firms.*

The population regression model for discount rates is shown below. The left out categories are dIndustrials and dDL.

$$\text{Discount rate} = \alpha + \beta_1 \text{Assets} + \beta_2 \text{Sales} + \beta_3 \text{Goodwill\_Itensity} + \beta_4 \text{Industry} + \beta_5 \text{AuditFirm} + \varepsilon_i$$

$$\varepsilon \sim iin(0,\sigma)$$

The regression model for discount rate explains 43.4% of the variation. The natural log Goodwill_Intensity is used, and the industry variable dOil&Gas is excluded due to multicollinearity problems with Sales. The model ($F = 6.023$, $p = 0.000$) is highly significant. There are no multicollinearity problems; dPWC has the highest VIF value with 2.9. The coefficients, standard errors, and significance for all variables in the model are shown in Table 40 (page 78). The highly significant negative relation between discount rate and goodwill intensity stands out. It seems that the greater portion of assets consists of goodwill and thus the greater the impact of a potential impairment of goodwill on the firm's value, the lower the discount rate used in the cash flow modeling.

$$\text{Discount rate} = 6.668^{***} + -0.025\text{Sales}^{***} + -1.378\text{LN(Goodwill\_Intensity)}^{***} +$$
$$6.546d\text{Healthcare}^{***} + 4.098d\text{Technology}^{***} +$$
$$0.387d\text{PWC} + -0.012d\text{EY} + -0.940d\text{KPMG}$$
$$(R^2 = 0.434; \hat{\sigma}^2 = 8.148; n = 116)$$

The audit firm variables are not significant compared to dDL.

Variable	T	Significance	Variable	T	Significance
dPWC	0.404	0.687	dDL	-	-
dEY	-0.012	0.990	dKPMG	-0.972	0.333

The findings do not support the hypothesis; there are no differences in the discount rates used between the audit firms to determine value in use. The regression model without outliers for discount rate, assets and sales, and the regression models per year separately do not change the findings (not reported).

Growth rate

> *H3b: There are differences in the growth rates used in the value in use estimates between the large audit firms.*

The population regression model for growth rates is shown below. The left out categories are dIndustrials and dDL.

$$\text{Growth rate} = \alpha + \beta_1 \text{Assets} + \beta_2 \text{Sales} + \beta_3 \text{Goodwill\_Itensity} + \beta_4 \text{Industry} + \beta_5 \text{AuditFirm} + \varepsilon_i$$

$$\varepsilon \sim iin(0,\sigma)$$

The regression model for growth rate is very poor and explains only 15.7% of the variation. The natural log Goodwill_Intensity is used, and outliers for growth rate and Assets are excluded. The variable Sales is excluded due to multicollinearity problems with Assets. Added to the model are: dYear, dAEX, dAMX, and dAScX. The model ($F = 0.783$, $p = 0.691$) is not significant, and there are no multicollinearity problems with highest VIF value of 3.7 for dPWC. The coefficients, standard errors, and significance for all variables in the model are shown in Table 40 (page 78).

$$\text{Growth rate} = 1.283 + -0.423d\text{PWC} + -1.465d\text{EY} + -0.464d\text{KPMG}$$
$$(R^2 = 0.157; \hat{\sigma}^2 = 3.633; n = 79)$$

The audit firm variables are not significant compared to dDL.

Variable	T	Significance	Variable	T	Significance
dPWC	-0.474	0.637	dDL	-	-
dEY	-1.613	0.112	dKPMG	-0.561	0.577

The findings do not support the hypothesis; there are no differences between the audit firms for the growth rates used to determine value in use. The strongest result is for EY ($T = -1.613$, $p = 0.112$), but is not significant. The model is very poor, none of the variables have a significant influence; this indicates the variables explaining growth rate are not present in this research.

Cash flow period

> H3c: There are differences in the cash flow forecasting periods between the large audit firms.

The population regression model for cash flow period rates is shown above. The left out categories are dIndustrials and dDL.

$$\text{Cash flow period} = \alpha + \beta_1 \text{Assets} + \beta_2 \text{Sales} + \beta_3 \text{Goodwill\_Itensity} + \beta_4 \text{Industry} + \beta_5 \text{AuditFirm} + \varepsilon_i$$
$$\varepsilon \sim iin(0,\sigma)$$

The regression model for cash flow period explains 36.9% of the variation. The outliers of Cash flow period, Assets and Sales are excluded. Added to the model are: dYear, dAEX, dAMX, and dAScX. The model ($F = 3.186$, $p = 0.000$) is highly significant, and there are no multicollinearity problems with the highest VIF value of 4.8 for Sales. The coefficients, standard errors, and significance for all variables in the model are shown in Table 40 (page 78).

$$\text{Cash flow period} = 4.663^{***} + 0.100\text{Sales}^{**} + -4.269\text{Goodwill\_Intensity}^{**} +$$
$$1.435d\text{Technology}^{**} + 1.576d\text{AEX}^{**} +$$
$$0.414d\text{PWC} + 0.418d\text{EY} + 0.286d\text{KPMG}$$
$$(R^2 = 0.369; \hat{\sigma}^2 = 4.455; n = 104)$$

The audit firm variables are not significant compared to dDL.

Variable	Total			2005			2006	
	T	Significance		T	Significance		T	Significance
dPWC	0.553	0.582		1.630	0.113		-0.495	0.623
dEY	0.503	0.616		0.621	0.539		0.468	0.642
dDL	-	-		-	-		-	-
dKPMG	0.375	0.709		0.977	0.336		0.048	0.962

The results of separate regression models for the years (not reported) do change the findings slightly; 2005 ($R^2 = 0.507$; $\hat{\sigma}^2 = 3.619$; n = 48) and 2006 ($R^2 = 0.379$; $\hat{\sigma}^2 = 5.762$; n = 56). The model for 2005 ($F = 2.429$, $p = 0.018$) is significant at α 5%, and the model for 2006 (F = 1.628, p = 0.109) is not significant. The audit variables are not significant in 2005 and 2006; in 2005 dPWC (T = 1.630, p = 0.113) is the strongest but not significant.

The findings do not support the hypothesis; there are no differences between the audit firms for the period over which cash flows are forecasted to determine value in use.

Part V: Conclusions, implications and further research

Chapter 6: Conclusions, implications and further research

6.1 Empirical Conclusions

The average compliance rate with the disclosure requirements for goodwill is 59% in 2005, 64% in 2006, and 62% overall. The average CGU-to-segment ratios based on primary, secondary, average, and higher of ratios are 1.1, 1.0, 0.9, and 0.7 respectively, and on average 72% of the carrying amount of goodwill is allocated to CGUs. The average discount rate used for cash flow modeling is 10.8%, the average growth rate is 1.8%, and the mean period over which the cash flows are forecasted is 5.8 years. The research objective was to find an answer to the problem definition:

> *Are there differences among the Big Four audit firms in the quality of goodwill accounting?*

To answer the problem definition three research questions (page 7) were formulated from which hypotheses (page 13) were derived and examined in the previous chapter (page 20), which yielded the following answers.

R1: What is the relation between the firm's disclosures on goodwill and its audit firm?
It was found that clients of PWC and EY are more compliant with the disclosure requirements for goodwill than clients of KPMG and DL, but only in 2006 and not in 2005. The level of compliance is higher in 2006 compared to 2005.

The analysis of the disclosure pattern between the audit firms revealed that clients of KPMG were the least compliant with item 13 (*main events and circumstances that led to non-material impairment losses*), while for item 16 (*amount of goodwill allocated to CGU with significant carrying amount of goodwill*) the clients of KPMG were most compliant. For item 17 (*basis used to determine recoverable amount*) clients of PWC and EY were more compliant, for item 23 (*growth rate used in cash flow modeling*), the clients of EY were most compliant, and for item 29 (*aggregate amount of goodwill allocated to not significant CGUs*) the clients of KPMG turned out to be the most compliant.

R2: What is the relation between the firm's goodwill CGUs and its audit firm?
PWC has the lowest CGU-to-reportable-segments ratio, but only for the variant based on the higher of primary or secondary segments, and no differences between the audit firms for the other variants. KPMG has a higher level of allocation in 2005, but there are no differences between the audit firms in the level of allocation in 2006. This finding is consistent with the results for items 16 and 29 (*amounts of goodwill allocated to CGUs*),

where KPMG comes out as best. The level of allocation is 0.15 higher in 2006 compared to 2005.

> R3: What is the relation between the firm's assumptions used for value in use estimates for goodwill impairment testing and its audit firm?

The findings show no differences between the audit firms for the discount rates, growth rates, and forecasting period used in the cash flow modeling to determine value in use.

The findings for the disclosure levels are the most important, where PWC comes out best of the group followed by EY in 2006. The results for allocation show a different picture altogether with KPMG as best and a different year. However, since allocation is also included in the disclosure index by items 16 and 29 (where KPMG also came out as best), the result for the level allocation carries less weight than the results for the disclosure indices. The results for aggregation are weak with a lower CGU-to-reportable-segments ratio for PWC, but only for the variant based on the higher of primary or secondary segments. While this would indicate clients of PWC aggregate CGUs more than clients of the other audit firms relative to reportable segments, the result is not robust as it occurs only in one of the four variants of aggregation ratio examined.

A comparison with the studies discussed in the literature review that found differences between the large audit firms, these were Tilis (2005) and Carlin *et al.* (2007), the other studies found no differences. Tilis (2005) finds variation among the large audit firms in earnings quality in each of four eras based on the number of large audit firms, and over time for the period 1980-2003. She finds in the Big Four era PWC is the best followed by DL, next is EY and KPMG at the last place (Tilis, 2005: 15-6). The study by Tilis (2005) is different from the current study, both in research design and sample characteristics, but it is interesting to note that PWC comes out as best of the group (for the disclosure compliance) in this study as well, while EY comes in at second place compared to DL and KPMG. Carlin *et al.* (2007) examine differences between the Big Four audit firms based on the compliance levels and disclosure quality of goodwill accounting. Comparison of my findings with their results is less meaningful because of their limited sample and analyses. However, Carlin *et al.* (2007) concluded that clients of KPMG were less compliant compared to the remainder group, in particular to clients of EY, reasonably consistent with the findings for the disclosure level in this study.

6.2 Implications for practice

The found differences in the way IFRS is applied and enforced by the Big Four audit firms has implications for the success of IFRS. IFRS was adopted in the EU to, among others, increase comparability of financial statements between firms from different member states. Differences in accounting quality between countries are expected to remain following IFRS adoption (Soderstrom and Sun, 2007), and the fact that financial statements appear to retain a strong national identity (Ernst & Young, 2006: 11), both affecting the cross-country comparability. However, systematic differences between the large audit firms in the way IFRS is enforced has further implications for the

comparability of financial statements, not just for cross-country comparability, but also for the comparability of firms from the same country.

The differences in the way IFRS is enforced by Big Four audit firms has potential implications for their reputations in the audit service market. An audit firm with higher level of compliance has the opportunity to distinguish it from the others, especially if the differences are persistent over time. For an audit firm with a lower level of compliance this may be a potential threat to their reputation. However, this does depend on whether the market is aware of such differences and whether the market values a higher level of compliance.

Another implication for the Big Four audit firms is that there is room for improvement regardless of the differences between them. The extent of compliance with the disclosure requirements for goodwill, with the roughly 70% compliance level and 80% of goodwill allocated to CGUs, there remains considerable room for improvement. While the audit firm in their role to enforce GAAP, it is also a responsibility of the firms themselves to comply with the many disclosures under IFRS for goodwill and other standards.

6.3 Implications for theory

The findings are consistent with the argument that the substantial disturbance (i.e. the accounting scandals, new regulation, adoption of IFRS) in the past few years for audit service providers may have lead to differences between the large audit firms. While the goodwill accounting treatment under IFRS is argued to be subjective and complex (Schultze, 2005: 277; Wines *et al.*, 2007), the disclosure requirements are clear and not open to interpretation, and yet the average level of compliance is not 100% or even close to that. This appears to be consistent with the findings of Libby *et al.* (2006) and the arguments based on that by Carlin *et al.* (2007: 23) that auditors give lower priority to checking for compliance with the many required disclosures.

The findings have implications for the big-small audit firm classification used in research, and are in support of a refinement of this measure. It should be little extra effort to collect the name of the audit firm instead of simply coding a variable 1 or 0 based on whether it is a large audit firm or not, and adjust the research design accordingly. Another reason to look beyond big versus small audit firms is the market share of the Big Four audit firms, for example more than 90% of the public listed companies in the US are audited by the Big Four, and the low variance in the experimental variable, big versus small, has implications for the power of the research design (Francis, 2004: 354). In the initial sample there were only 16 firm observations using a non-Big Four auditor, compared to 30 observations for DL which had the lowest number of observations in the sample.

Differences have been found between the audit firms in 2006, but not in 2005. This could have been caused by the changes in the sample between the two years, or it may be just a onetime 'random' occurrence. Unfortunately it was not feasible to include firms for 2007

in the sample, but it could have provided an answer to the question whether or not differences between the audit firms in 2006 are persistent overtime or a onetime occurrence. Intuitively, the expectation was that if there were differences between the audit firms, they would be strongest in the first year under the IFRS reporting regime and possibly become weaker overtime. However, the findings may suggest another possibility, in the first year the audit firms start the same and in subsequent years each firm goes through a learning curve at their own pace resulting in differences, and possibly after some learning period, the audit firms have adopted similar practices and there are no differences anymore. However, only further research may shed light on these possibilities.

6.4 Limitations

The limitations of the research are the relatively small sample size, and small time span of two years and the mixed results for the two years, limiting the possibility of generalizing the results beyond the sample period. The regression models explained 32 to more than 50% of the variation in the dependent variables, with the exception of the growth rate regression model which was poor and only explained 16%. The models may be improved upon with the inclusion of additional variables not collected in this study, particularly for the growth rate model. Another limitation is the potential for subjectivity to have slipped in with the disclosure index, as making the determination whether a non-disclosed item is relevant is not always straightforward. Not all of the items were relevant for every firm, while for some firms the ratio is based on as few as 2 items and for other firms the ratio is based on as many as 19 items. The disclosure ratios express the actual level of disclosure to the total possible disclosure for the firm, but which such wide varying counts of relevant items this may not always be a fair comparison between firms. The disclosure index used here is unweighted, as each item counted as much as every other item in the index, while some items may be perceived to be more (less) important than others.

6.5 Recommendations for future research

There are many possible directions for further research, but for one a repeat study in the future expanding the sample with inclusion of additional years (for example 2005-2010), which may confirm or refute the findings over a longer time span. While a bigger sample of Dutch listed firms in short term is not possible, a bigger sample can be examined by looking at another country, like the United Kingdom or Germany, or perhaps France with the unique situation were two auditors are involved in auditing the financial statements. The note disclosures on goodwill is examined here, further research can consider other potentially complex accounting issues and related note disclosures under IFRS. Further research can also go one step further by looking inside the audit firms and their clients and study the methods and procedures used to check for compliance with the goodwill disclosures or other disclosures under IFRS.

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List of Keywords

Keyword	Description
CGU	Cash Generating Unit A cash generating unit is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets (IAS 36.6).
GAAP	Generally Accepted Accounting Principles For example US GAAP, the generally accepted accounting principles in the United States of America.
IFRS	International Financial Reporting Standards Narrow: IFRSs refers to the new numbered series of pronouncements that the IASB is issuing, as distinct from the IASs series issued by its predecessor. Broad: IFRSs refers to the entire body of IASB pronouncements, including standards and interpretations approved by the IASB and IASs and SIC interpretations approved by the predecessor IASC (see IASB).
IFRS 3	IFRS 3 – *Business Combinations* The IFRS standard covering business combinations; a business combination is a transaction or event in which an acquirer obtains control of one or more businesses.
IASB	International Accounting Standards Board The IFRS accounting standards setting body, its predecessor, the International Accounting Standards Committee (IASC), issued International Accounting Standards (IAS), which were later revised and adopted to IFRS. www.iasb.org
FASB	Financial Accounting Standards Board The American accounting standards setting body. www.fasb.org
SFAS	Statement of Financial Accounting Standard American accounting standards, issued by the FASB.
SFAS 141	SFAS 141 – *Business Combinations*
SFAS 142	SFAS 142 – *Goodwill and Other Intangible Assets*
IAS	International Accounting Standard (see IASB)
IAS 14	IAS 14 – *Segment Reporting* The IFRS standard covering segment reporting, its objective is to establish principles for reporting financial information by line of business and by geographical area.
IAS 36	IAS 36 – *Impairment of Assets* The IFRS standard covering impairment of assets including goodwill, its objective is to ensure that assets are carried at no more than their recoverable amount, and to define how recoverable amount is calculated.
Big Four	The four large international audit firms (from 2001); PWC, EY, DL, and KPMG
Big Five	The five large international audit firms (1998-2001); PWC, EY, DL, KPMG, and Arthur Andersen
Big Six	The six large international audit firms (1989-1998); PriceWaterhouse, Coopers & Lybrand, Ernst & Young, Deloitte & Touche, KPMG, and Arthur Andersen
Big Eight	The eight large international audit firms (1980-1989); PriceWaterhouse, Coopers & Lybrand (later PWC); Arthur Young, Ernst & Whinney (later EY); 'Deloitte, Haskins & Sells' and Touche Ross (later DL); Peat Marwick Main (later KPMG); Arthur Andersen
PWC	PriceWaterhouseCoopers www.pwc.com
EY	Ernst & Young www.ey.com
DL	Deloitte www.deloitte.com
KPMG	KPMG www.kpmg.com
ICB	Industry Classification Benchmark www.icbenchmark.com

Keyword	Description
AEX	Amsterdam Exchange Index The index includes the 25 most active securities on Euronext Amsterdam.
AMX	Amsterdam Midkap Index The index includes the 26th to 50th most active securities on Euronext Amsterdam.
AScX	Amsterdam Small Cap Index The index includes the 51st to 75th most active securities on Euronext Amsterdam.
Multicollinearity	Multicollinearity is a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated (*see page 45*).
VIF	Variance Inflationary Factor It is a method of detecting the severity of multicollinearity (*see page 45*).
Impairment	An impairment loss is the amount by which the carrying amount of an asset or a cash-generating unit exceeds its recoverable amount (IAS 36.6). An impairment loss in Dutch is 'een bijzondere waardevermindering'.
Recoverable amount	The recoverable amount of an asset or a cash-generating unit (CGU) is the higher of its fair value less costs to sell and its value in use (IAS 36.6).
Value in use	Value in use is the present value of the future cash flows expected to be derived from an asset or cash-generating unit (IAS 36.6).
Fair value less costs to sell	Fair value less costs to sell is the amount obtainable from the sale of an asset or cash-generating unit in an arm's length transaction between knowledgeable, willing parties, less the costs of disposal (IAS 36.6).
Materiality	Materiality deals with defining what is significant or important in the context of the financial statements being audited.

Appendix A: Relation diagram

Based on the research questions and hypotheses, the following relation diagram emerges:
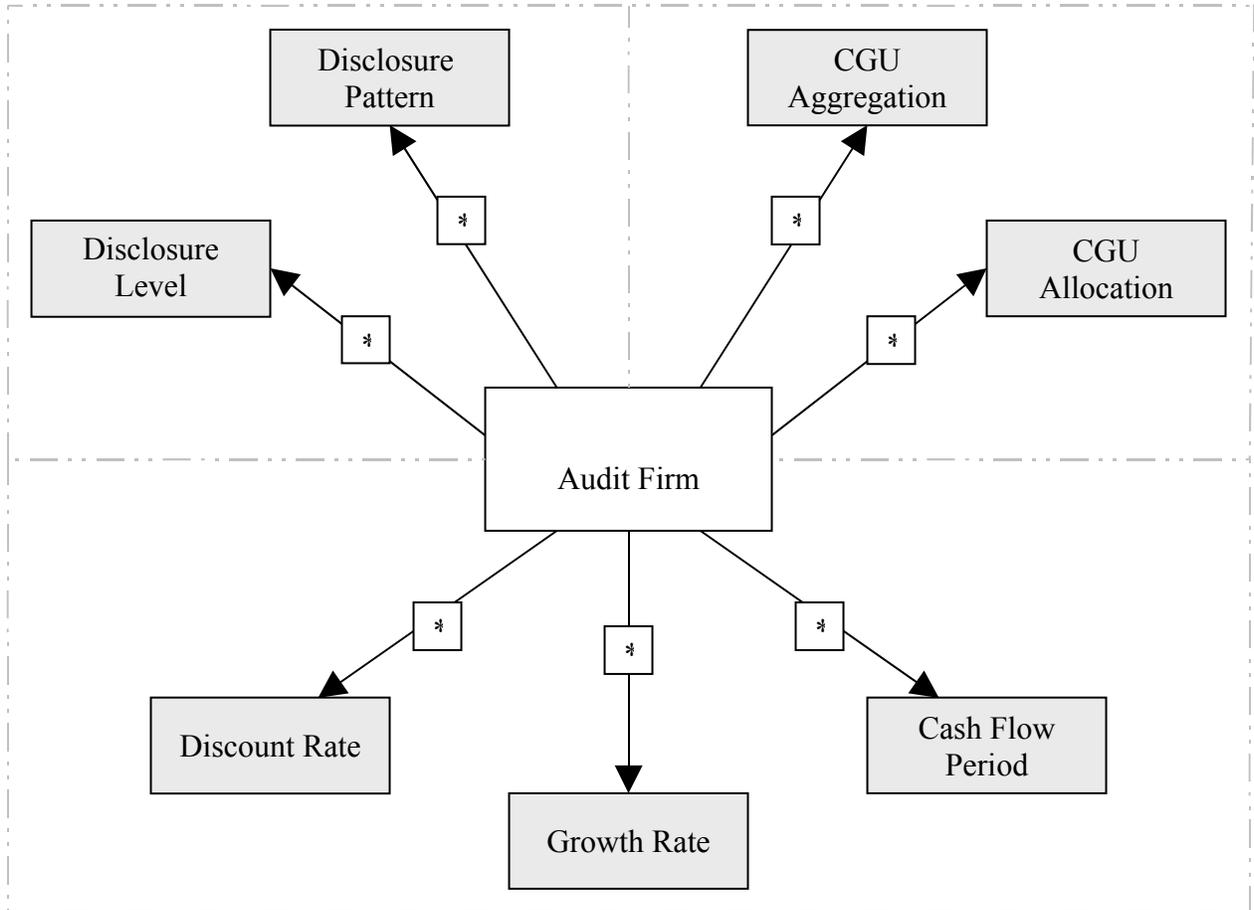
Appendix B: List of variables

Research question 1	Variable Description
Disclosure	Ratio of a firm's actual disclosure to its total possible disclosure on goodwill on all items from the disclosure index.
Disclosure130	Ratio of a firm's actual disclosure to its total possible disclosure on goodwill items 4-11 from IAS 36.130.
Disclosure134	Ratio of a firm's actual disclosure to its total possible disclosure on goodwill items 16-28 from IAS 36.134.
ItemX.d	Disclosure items, X is number 1 to 29, dummy variables; coded 1 if an item is disclosed, else 0.
ItemX.r	Disclosure items, X is number 1 to 29, dummy variables; coded 1 if an item should have been disclosed, else 0.
ItemX.c	Disclosure items, X is a number 1 to 29, dummy variables; coded 1 if ItemX.d is 1, else 0, but only in case ItemX.r equals 1.
nMissing	Number of missing values in the disclosure items.
dMissing	Dummy variable, coded 1 if nMissing is equal to 11 or greater, else 0.

Research question 2	Variable Description
nCGU	Number of CGUs defined by a firm for goodwill allocation for the reporting year. *Missing value when the exact number is not known, but it is known to be greater than zero, e.g. "X amount allocated to CGU Y, and remaining amount to multiple CGU, each with an insignificant amount …". Include in the count the other or rest item, when included in the CGU list.*
nCGU_Significant	Number of CGUs defined by a firm with a significant carrying amount of goodwill allocated compared to the total carrying amount of goodwill for the reporting year. *A significant carrying amount of goodwill is 5% or more of the total carrying amount of goodwill.*
nSegment_Primary	Number of primary reportable segments in the segment report (IAS 14) defined by a firm for the reporting year. *In case no primary reporting segments are used, assign value 1. Categories like other, rest, and corporate also count, while eliminations by itself does not.*
nSegment_Secondary	Number of secondary reportable segments in the segment report (IAS 14) defined by a firm for the reporting year. *In case no secondary reporting segments are used, assign value 1. Categories like other, rest, and corporate also count, while eliminations by itself does not.*
CGU_Segment	Ratio of a firm's defined CGUs for goodwill to its number of reportable segments. nCGU / nSegment
Goodwill	Goodwill of a firm at the end of the reporting year.
Goodwill_Allocated	Total amount of goodwill allocated by a firm to CGUs in the reporting year. *Reasonable clarity, e.g. "X amount allocated to CGU Y, remaining amount to multiple CGUs …" is complete allocation. The statement "goodwill has been allocated to CGUs …" without stating any amounts is zero allocation. However, disclosure that all goodwill is allocated to CGUs each with an insignificant carrying amount is complete allocation.*

Research question 2 (continued)	Variable Description
Goodwill_Allocated_Significant	Total amount of goodwill allocated to CGUs with significant carrying amounts of goodwill compared to the total carrying amount of goodwill. *A significant carrying amount of goodwill is 5% or more of the total carrying amount of goodwill.*
Goodwill_Allocation_Ratio	Ratio of a firm's allocated goodwill to its total goodwill in the reporting year. Goodwill_Allocated / Goodwill

Research question 3	Variable Description
	For firms disclosing value in use as basis for recoverable amount estimates:
Discount_rate	Discount rate a firm used for value in use estimates. *Use unweighted average of the discount rates in case multiple rates are disclosed. In case ranges or multiple rates for more than one CGU are disclosed, first calculate unweighted average per CGU, and then calculate overall unweighted average.*
Growth_rate	Growth rate a firm used for value in use estimates. *Use unweighted average of the growth rates in case multiple rates are disclosed. In case ranges or multiple rates for more than one CGU are disclosed, first calculate unweighted average per CGU, and then calculate overall unweighted average.*
Cash_flow_period	Cash flow forecasting period used by a firm in value in use cash estimate of recoverable amount. *Use the unweighted average in case multiple forecasting periods are disclosed.*

Control & Misc.	Variable Description
AuditFirm	Auditor of a firm. Nominal variable, EY for Ernst & Young, PWC for PriceWaterhouseCoopers, DL for Deloitte, KPMG for KPMG.
Industry	Industry type of a firm based on ICB. Nominal variable with 9 categories; 0 for Oil & Gas, 1 for Basic Materials, 2 for Industrials, 3 for Consumer Goods, 4 for Health Care, 5 for Consumer Services, 6 for Telecommunications, 8 for Financials, 9 for Technology.
Assets	Total assets of a firm at the end of the reporting year in Euros.
Sales	Turnover of a firm for the reporting year in Euros. *In some cases the exact amount(s) from the income statement are not clear, for example for banks, in such cases the amount is collected from the 'Sales' key figure from Thomson ONE Banker*
Goodwill_Intensity	Ratio of a firm's goodwill to its total assets. Goodwill / Assets
Index	Index the firm is listed on at Euronext Amsterdam at the end of the reporting year. Ordinal variable; 3 for AEX (large cap), 2 for AMX (mid cap), 1 for AScX (small cap) index, and 0 for none,
Year	Reporting year of a firm.
Method	Basis used by a firm for the recoverable amount estimate. Nominal variable; ND for no effective disclosure, MIX for combination of methods, FV for fair value less cost to sell, and VIU for value in use.
Name	Name of the firm.
AuditorCountry	Country where the office is located that signed the audit report.
ListingXX	Firm is listed on stock exchange in country XX in the reporting year.

Regression	Variable Description
*d*PWC	Coded 1 if PWC is the audit firm, else 0.
*d*EY	Coded 1 if EY is the audit firm, else 0.
*d*DL	Coded 1 if DL is the audit firm, else 0.
*d*KPMG	Coded 1 if KPMG is the audit firm, else 0.
*d*Oil&Gas	Coded 1 if the firm is in the Oil & Gas industry (ICB 0), else 0.
*d*BasicMaterials	Coded 1 if the firm is in the Basic Materials industry (ICB 1), else 0.
*d*Industrials	Coded 1 if the firm is in the Industrials industry (ICB 2), else 0.
*d*ConsumerGoods	Coded 1 if the firm is in the Consumer Goods industry (ICB 3), else 0.
*d*Healthcare	Coded 1 if the firm is in the Healthcare industry (ICB 4), else 0.
*d*ConsumerServices	Coded 1 if the firm is in the Consumer Services industry (ICB 5), else 0.
*d*Telecommunications	Coded 1 if the firm is in the Telecommunications industry (ICB 6), else 0.
*d*Financials	Coded 1 if the firm is in the Financials industry (ICB 8), else 0.
*d*Technology	Coded 1 if the firm is in the Technology industry (ICB 9), else 0.
*d*ListingUS	Coded 1 if the firm is listing on a stock exchange in the USA, else 0.
*d*ListingFR	Coded 1 if the firm is listing on a stock exchange in France, else 0.
*d*ListingBE	Coded 1 if the firm is listing on a stock exchange in Belgium, else 0.
*d*ListingUK	Coded 1 if the firm is listing on a stock exchange in the United Kingdom, else 0.
*d*ListingJA	Coded 1 if the firm is listing on a stock exchange in Japan, else 0.
*d*ListingCH	Coded 1 if the firm is listing on a stock exchange in Switzerland, else 0.
*d*ListingDE	Coded 1 if the firm is listing on a stock exchange in Germany, else 0.
*d*ListingHK	Coded 1 if the firm is listing on a stock exchange in Hong Kong, else 0.
*d*ListingSE	Coded 1 if the firm is listing on a stock exchange in Sweden, else 0.
*d*ListingLU	Coded 1 if the firm is listing on a stock exchange in Luxembourg, else 0.
*d*ListingES	Coded 1 if the firm is listing on a stock exchange in Spain, else 0.
*d*AEX	Coded 1 if the firm is included in the AEX index, else 0.
*d*AMX	Coded 1 if the firm is included in the AMX index, else 0.
*d*AScX	Coded 1 if the firm is included in the AScX index, else 0.
*d*None	Coded 1 if the firm is not included in any of the above indices, else 0.
*d*CGU1	Coded 1 if the firm defined 1 CGU, else 0.
*d*Growth0	Coded 1 if the firm disclosed the use of growth rate 0.
*d*Year	Coded 1 if the year is 2006, else 0.

Appendix C: Disclosure items

Coding of the names shows where the disclosure item comes from in IAS 36. Format XXX.YY-Z, where XXX is the paragraph number of IAS 36, YY is the bullet point number (and optionally includes a sub-point number), Z is a number to distinguish variables in case multiple variables are from the same point or sub-point. For example name 126.a-1 is paragraph 126, point (a), and name 130.d.iii is paragraph 130, point (d), sub-point (iii).

IAS 36.126		Item Description
		Total amount of impairment losses on goodwill:
1	126.a-1	Amount of impairment losses
2	126.a-2	Line item(s) in the income statements containing the impairment loss *Stated in the text, or in one of the notes referred to from the income statement.*

IAS 36.129		Item Description
		Total amount of impairment losses on goodwill per reportable segment (IAS 14 - Segment Reporting):
3	129.a	Amount of impairment losses per reportable segment

IAS 36.130		Item Description
		For each material impairment loss: Material impairment loss is 5% or more of total turnover.
4	130.a	Events and circumstances that lead to the impairment loss
5	130.b	Amount of the impairment loss
6	130.d.i	Description of the CGU
7	130.d.ii-1	Amount of impairment losses by class of asset
8	130.d.ii-2	Amount of impairment losses by reportable segment
9	130.e	Basis used for the recoverable amount (fair value less costs to sell or value in use) *If not disclosed, leave item 10 and 11 empty, unless they are disclosed.*
10	130.f	Basis used to determine fair value less costs to sell
11	130.g	Discount rate(s) used to determine value in use

IAS 36.131		Item Description
		Aggregate impairment losses for which no information is disclosed in accordance with paragraph 130:
12	131.a	Main classes of assets affected by impairment losses *Any indication of the type of goodwill/asset is a pass.*
13	131.b	Main events and circumstances that led to the impairment losses

		Item Description
		If any portion of the goodwill acquired in a business combination during the period has not been allocated to CGU at the reporting date:
14	133-1	Amount of unallocated goodwill
15	133-2	Reason why the amount remains unallocated

		Item Description
		For each CGU with a carrying amount of goodwill which is significant in comparison with the entity's total carrying amount of goodwill: *If no allocation is disclosed, leave items 16 to 28 empty, unless they are disclosed. A significant carrying amount is 5% or more of total carrying amount of goodwill.*
16	134.a	Amount of goodwill allocated to the CGU
17	134.c	Basis used for recoverable amount (fair value less costs to sell or value in use) *If no basis is disclosed, leave items 18 to 28 empty, unless they are disclosed. Basis may be described in other terms, e.g. other terms for value in use 'going concern value', 'estimated commercial value', 'fair value of the business'. Any mention of discount or growth rates, assume value in use basis.* For units which recoverable amounts are based on value in use:
18	134.d.i	Description of each key assumption used for cash flow projection
19	134.d.ii-1	Description of management's approach to assign values to key assumptions
20	134.d.ii-2	Whether the values reflect past experience, external sources of information, or something else
21	134.d.iii-1	The period over which the cash flows were projected *If no forecasting period is disclosed, leave item 22 empty.*
22	134.d.iii-2	Justification for using a period greater than 5 years
23	134.d.iv-1	Growth rate(s) used *If growth rate is zero, code item 1, treat same as if multiple rates are disclosed.*
24	134.d.v	Discount rate(s) used
25	134.e	For units which recoverable amounts are based on fair value less costs to sell: Methodology used to determine fair value less cost to sell *If no methodology is disclosed, leave items 26 to 28 empty, unless they are disclosed.* If fair value less costs to sell is not determined using an observable market price for the unit:
26	134.e.i	Description of each key assumption used to determine fair value less costs to sell
27	134.e.ii-1	Description of management's approach to assign values to key assumptions
28	134.e.ii-2	Whether the values reflect past experience, external sources of information, or something else

		Item Description
		If some or all of the carrying amount of goodwill is allocated across multiple CGUs, and the amount so allocated to each unit is not significant in comparison with the entity's total carrying amount of goodwill:
29	135-1	Aggregate amount allocated to those CGUs *If no allocation is disclosed leave item empty. Relevant when: 1) CGU group named 'other', 'rest of world', or 'rest of Europe' or similar terms represent multiple CGUs, or 2) CGU with carrying amount less than 5% of goodwill unless specifically stated that the CGU has a significant carrying amount.*

Appendix D: List of firms

#	Firm	Year*	#	Firm	Year*
1	AALBERTS INDUSTRIES	56	49	INNO CONCEPTS	5-
2	ABN AMRO	56	50	KARDAN	56
3	ACCELL GROUP	56	51	KENDRION	56
4	AEGON	56	52	KPN	56
5	AHOLD	56	53	LAURUS	56
6	AKZO NOBEL	56	54	LBI	56
7	AMSTERDAM COMMODITIES	-6	55	LOGICACMG	56
8	ARCADIS	56	56	MACINTOSH RETAIL	-6
9	ASM	56	57	MITTAL STEEL	-6
10	ATHLON	5-	58	NEDSCHROEF	56
11	BALLAST NEDAM	56	59	NEWAYS	56
12	BAM GROEP	56	60	NUMICO	56
13	BE SEMICONDUCTOR	56	61	NUTRECO	56
14	BETER BED	56	62	OCTOPLUS	-6
15	BINCKBANK	-6	63	OPG GROEP	56
16	BLUE FOX ENTERPRISE	56	64	ORANJEWOUD	6-
17	BRILL	56	65	ORDINA	56
18	BRUNEL	56	66	PHARMING	-6
19	BUHRMANN	56	67	PHILIPS	56
20	CORIO	-6	68	RANDSTAD	56
21	CORUS	56	69	REED ELSEVIER	56
22	CRUCELL	-6	70	RODAMCO	56
23	CSM	56	71	SBM OFFSHORE	56
24	DOC DATA	-6	72	SCHUITEMA	56
25	DPA FLEX	5-	73	SHELL	56
26	DRAKA	5-	74	SIMAC	56
27	DSM	56	75	SLIGRO	56
28	EMBA	56	76	SNS REAAL	-6
29	ENDEMOL	-6	77	STERN	56
30	ERIKS	56	78	STORK	56
31	EXACT	56	79	TELE ATLAS	-6
32	FORNIX	-6	80	TELEGRAAF	56
33	FRANSMAAS	5-	81	TEN CATE	56
34	FUGRO	56	82	TKH GROUP	56
35	GALAPAGOS	56	83	TNT	56
36	GAMMA	56	84	UNILEVER	56
37	GETRONICS	56	85	UNIT 4 AGRESSO	56
38	GOUDA VUURVAST	-6	86	UNIVAR	56
39	GRONTMIJ	56	87	USG PEOPLE	56
40	HAGEMEYER	56	88	VAN DER MOOLEN	56
41	HAL TRUST	56	89	VAN LANSCHOT	-6
42	HEIJMANS	56	90	VEDIOR	56
43	HEINEKEN	56	91	VNU	5-
44	HITT	5-	92	VOPAK	56
45	HUNTERDOUGLAS	56	93	WAVIN	-6
46	ICT	-6	94	WEGENER	56
47	IMTECH	56	95	WESSANEN	56
48	ING	56	96	WOLTERS KLUWER	56

* 5 indicates 2005, 6 indicates 2006

Appendix E: Goodwill disclosure

The example of goodwill disclosure comes from the corporate annual report of Unit 4 Agresso (EY) for fiscal year 2005 (5.10.1 Intangible assets, pages 74-78). This firm is one of only a handful of firms in the sample which had perfect disclosure on goodwill, and appears to have followed the disclosure requirements for goodwill set out by IAS 36 to the letter.

5.10.1.1 Impairment test for cash-generating units in which goodwill is capitalized
The Group annually carries out impairment tests on capitalized goodwill, based on the relevant cash-generating unit. In principle, the period to be used for discounting cash flows is infinite. The recoverable value of various cashgenerating segments in which goodwill is capitalized is determined by measuring their operating value. For such calculations future cash flows based on current revenue from operations and (in general) a five-year forecast are used. Any residual value is calculated on the basis of an infinite cash flow that is determined by means of the projected cash flow in the fifth year. The individual growth percentages are derived from long term forecasts for the industry and the expectations of the management involved. A discount rate of 12.0% before tax is used to measure the cash value of the future cash flows (operating value) before tax. Below is a description of how the carrying amount of the goodwill units can be attributed to the cash-generating units. Per goodwill unit, that forms a significant part of the total goodwill item, the assumptions for determining the recoverable value are described.

(€ x 1,000)	Carrying amount goodwill at 31 December 2005	Impairment 2005
Agresso Holdings Inc. (including subsidiaries)	6,564	0
Agresso Spain S.L.	5,817	0
Agresso France SA	5,459	963
Amercom B.V.	4,362	0
Decade Financial Software B.V.	5,135	0
Foundation ICT Group B.V.	4,997	0
Micro Computer Associates Ltd. (including subsidiaries)	2,239	0
NOXS Germany GmbH	0	2,415
NOXS Europe B.V. (Risc Group)	6,793	0
Unit 4 Agresso Ireland Holdings Ltd. (including subsidiaries)	2,265	394
Other	8,126	117
	51,757	**3,889**

The accumulated carrying amount in the cash-generating units (including goodwill) remains below the recoverable value based on an operating value calculation, with the exception of the goodwill relating to shares in NOXS Germany GmbH (formerly Icon Systems GmbH) acquired in 2001 and the shares in Unit 4 Agresso Ireland Holdings Ltd. (formerly Priority Data Group) acquired in 2002. The impairment at Agresso France SA is the result of the sale of two software products acquired in 2003. However, future negative changes in the assumptions applied may cause the recoverable values to drop to such an extent that they fall below the carrying amount.

[*The report then continues to describe the assumptions used to determine the recoverable amount for each of the 10 CGUs of which the first one is shown below.*]

Cash-generating unit Agresso Holdings Inc. (including subsidiaries)
The recoverable value of Agresso Holdings Inc. is determined based on an operating value that is calculated using cash flow projections based on financial budgets approved by the management, covering a 5-year period, taking account of a residual value. In 5 years the cash flows grow on average by 25% per year. The residual value is calculated on the basis of an eternal cash flow that is determined by means of the projected cash flow in the fifth year.

Appendix F: Multivariate

Table 35: Disclosure - regression

	Disclosure A				Disclosure B			
		Standard				*Standard*		
Variable	*Coefficient*	*Error*	*T*	*Significance*	*Coefficient*	*Error*	*T*	*Significance*
*d*PWC	0.124	0.059	2.103	0.038**	0.121	0.062	1.970	0.051*
*d*EY	0.142	0.062	2.280	0.024**	0.132	0.065	2.020	0.046**
*d*KPMG	0.057	0.057	0.989	0.325	0.074	0.060	1.234	0.220
Assets	-0.004	0.001	-3.368	0.001***	-0.004	0.001	-3.118	0.002***
Sales	0.007	0.004	1.838	0.069*	0.006	0.004	1.699	0.092*
Goodwill_Intensity	0.042	0.165	0.254	0.800	0.153	0.172	0.890	0.375
*d*Oil&Gas	-0.729	0.159	-4.580	0.000***	-0.771	0.166	-4.629	0.000***
*d*BasicMaterials	-0.109	0.090	-1.220	0.225	-0.102	0.094	-1.087	0.279
*d*ConsumerGoods	-0.213	0.059	-3.610	0.000***	-0.232	0.062	-3.760	0.000***
*d*Healthcare	-0.012	0.122	-0.099	0.921	-0.038	0.128	-0.300	0.765
*d*ConsumerServices	0.010	0.057	0.181	0.857	-0.004	0.060	-0.061	0.951
*d*Telecommunications	-0.085	0.183	-0.463	0.644	-0.154	0.192	-0.805	0.422
*d*Financials	-0.071	0.076	-0.930	0.354	-0.106	0.079	-1.338	0.183
*d*Technology	0.099	0.061	1.623	0.107	0.130	0.064	2.027	0.045**
*d*ListingUS	-0.103	0.067	-1.538	0.127	-0.075	0.070	-1.074	0.285
*d*ListingFR	-0.364	0.185	-1.973	0.051*	-0.388	0.193	-2.009	0.047**
*d*ListingBE	0.390	0.160	2.441	0.016**	0.409	0.167	2.447	0.016**
*d*ListingUK	-0.015	0.081	-0.184	0.854	-0.043	0.084	-0.510	0.611
*d*ListingJA	0.001	0.220	0.006	0.995	0.010	0.230	0.041	0.967
*d*ListingCH	0.121	0.172	0.706	0.482	0.079	0.180	0.440	0.660
*d*ListingDE	0.169	0.101	1.678	0.096*	0.195	0.105	1.852	0.067*
*d*ListingSE	-0.350	0.160	-2.186	0.031**	-0.398	0.167	-2.383	0.019**
*d*ListingES	0.196	0.324	0.605	0.546	0.114	0.338	0.336	0.737
*d*AEX	0.231	0.071	3.260	0.001***	0.211	0.074	2.848	0.005***
*d*AMX	0.091	0.055	1.666	0.098*	0.084	0.057	1.461	0.147
*d*AScX	0.146	0.052	2.815	0.006***	0.129	0.054	2.382	0.019**
*d*Year	0.071	0.034	2.080	0.040**	0.072	0.036	1.997	0.048**
*d*CGU1	0.195	0.055	3.524	0.001***	0.173	0.058	2.982	0.003***
*d*Growth0	0.040	0.046	0.871	0.385	0.040	0.048	0.834	0.406
Intercept	0.405	0.057	7.066	0.000***	0.448	0.060	7.475	0.000***

Table 36: Disclosure 2006 - regression

Variable	Disclosure A				Disclosure B			
	Coefficient	Standard Error	T	Significance	Coefficient	Standard Error	T	Significance
dPWC	0.178	0.079	2.254	0.028**	0.149	0.083	1.798	0.078*
dEY	0.139	0.081	1.715	0.092*	0.123	0.085	1.436	0.157
dKPMG	0.016	0.076	0.205	0.838	0.019	0.079	0.235	0.815
Assets	-0.004	0.001	-3.495	0.001***	-0.004	0.001	-3.171	0.003***
Sales	0.005	0.005	1.076	0.287	0.004	0.005	0.863	0.392
Goodwill_Intensity	-0.075	0.226	-0.332	0.741	0.059	0.237	0.251	0.803
dOil&Gas	-0.730	0.218	-3.354	0.001***	-0.778	0.228	-3.409	0.001***
dBasicMaterials	0.020	0.117	0.169	0.866	0.023	0.123	0.186	0.853
dConsumerGoods	-0.175	0.076	-2.306	0.025**	-0.205	0.080	-2.566	0.013**
dHealthcare	-0.010	0.146	-0.066	0.948	-0.047	0.154	-0.304	0.762
dConsumerServices	0.043	0.080	0.545	0.588	0.017	0.084	0.200	0.842
dTelecommunications	-0.229	0.247	-0.926	0.359	-0.309	0.259	-1.192	0.238
dFinancials	-0.016	0.099	-0.159	0.874	-0.062	0.104	-0.600	0.551
dTechnology	0.122	0.082	1.482	0.144	0.128	0.086	1.484	0.144
dListingUS	-0.074	0.087	-0.855	0.397	-0.037	0.091	-0.400	0.690
dListingFR	-0.441	0.206	-2.137	0.037**	-0.468	0.217	-2.162	0.035**
dListingBE	0.370	0.200	1.845	0.071*	0.414	0.210	1.970	0.054*
dListingUK	0.046	0.111	0.416	0.679	0.024	0.117	0.206	0.837
dListingJA	-	-	-	-	-	-	-	-
dListingCH	0.249	0.244	1.019	0.313	0.186	0.256	0.728	0.470
dListingDE	0.144	0.121	1.195	0.237	0.169	0.127	1.336	0.187
dListingSE	-0.357	0.216	-1.650	0.105	-0.371	0.227	-1.634	0.108
dListingES	0.283	0.388	0.728	0.470	0.171	0.408	0.420	0.676
dAEX	0.253	0.097	2.604	0.012**	0.236	0.102	2.309	0.025**
dAMX	0.095	0.073	1.289	0.203	0.087	0.077	1.125	0.265
dAScX	0.194	0.071	2.717	0.009***	0.175	0.075	2.336	0.023**
dYear	-	-	-	-	-	-	-	-
dCGU1	0.212	0.091	2.340	0.023**	0.191	0.095	2.011	0.049**
dGrowth0	-0.010	0.063	-0.167	0.868	-0.017	0.066	-0.265	0.792
Intercept	0.464	0.075	6.172	0.000***	0.527	0.079	6.676	0.000***

Table 37: *n*Missing - regression

Variable	Coefficient	Standard Error	T	Significance
*d*PWC	-1.772	1.094	-1.619	0.108
*d*EY	-1.333	1.169	-1.141	0.256
*d*KPMG	-0.410	1.061	-0.387	0.700
Assets	0.062	0.021	2.890	0.004***
Sales	-0.110	0.022	-4.919	0.000***
LN(Goodwill_Intensity)	-0.714	0.302	-2.367	0.019**
*d*Oil&Gas	11.297	2.969	3.805	0.000***
*d*BasicMaterials	3.387	1.532	2.212	0.029**
*d*ConsumerGoods	3.667	1.105	3.318	0.001***
*d*Healthcare	-0.037	2.162	-0.017	0.986
*d*ConsumerServices	-0.330	1.034	-0.319	0.750
*d*Telecommunications	1.476	3.491	0.423	0.673
*d*Financials	1.451	1.353	1.072	0.285
*d*Technology	-0.678	1.181	-0.574	0.567
*d*ListingUS	2.408	1.124	2.142	0.034**
*d*ListingFR	5.446	3.538	1.539	0.126
*d*ListingBE	-3.889	3.067	-1.268	0.207
*d*ListingUK	1.766	1.507	1.172	0.243
*d*ListingJA	-4.714	4.155	-1.134	0.259
*d*ListingCH	-2.351	3.138	-0.749	0.455
*d*ListingDE	-3.749	1.846	-2.031	0.044**
*d*ListingHK	7.364	3.362	2.190	0.030**
*d*ListingSE	1.671	3.017	0.554	0.581
*d*ListingES	-10.097	5.857	-1.724	0.087*
*d*AEX	-1.393	1.173	1.188	0.237
*d*AMX	-1.114	0.990	-1.124	0.263
*d*AScX	-0.836	0.926	-0903	0.368
*d*Year	-1.135	0.632	-1.794	0.075*
Intercept	1.660	1.531	1.084	0.280

Table 38: Aggregation - regression

	Primary Segments				Secondary Segments			
Variable	Coefficient	Standard Error	T	Significance	Coefficient	Standard Error	T	Significance
dPWC	-0.151	0.244	-0.621	0.536	0.032	0.268	0.119	0.906
dEY	-0.005	0.271	-0.019	0.985	-0.064	0.284	-0.226	0.822
dKPMG	0.029	0.236	0.123	0.902	0.149	0.259	0.574	0.567
Assets	-0.005	0.004	-1.345	0.181	-	-	-	-
Sales	-0.039	0.017	-2.332	0.021**	-0.009	0.011	-0.820	0.414
LN(Goodwill_Intensity)	0.202	0.071	2.860	0.005***	0.155	0.074	2.112	0.037**
dOil&Gas	-0.652	0.715	-0.911	0.364	-1.353	0.788	-1.717	0.088*
dBasicMaterials	-0.571	0.388	-1.471	0.144	-0.456	0.429	-1.064	0.289
dConsumerGoods	0.038	0.268	0.142	0.887	0.101	0.295	0.343	0.732
dHealthcare	-0.889	0.502	-1.772	0.079*	-0.321	0.557	-0.577	0.565
dConsumerServices	-0.309	0.251	-1.230	0.221	0.381	0.273	1.394	0.166
dTelecommunications	-0.239	0.819	-0.291	0.771	0.538	0.897	0.600	0.550
dFinancials	-0.258	0.308	-0.838	0.403	0.131	0.332	0.394	0.694
dTechnology	0.454	0.262	1.734	0.086*	0.813	0.285	2.847	0.005***
dListingUS	0.812	0.257	3.159	0.002***	-0.065	0.279	-0.233	0.816
dListingFR	0.355	0.828	0.429	0.669	-0.590	0.838	-0.703	0.483
dListingBE	-0.396	0.707	-0.560	0.576	0.424	0.782	0.542	0.589
dListingUK	0.615	0.374	1.645	0.102	-0.722	0.361	-2.001	0.047**
dListingCH	1.999	0.742	2.694	0.008***	0.775	0.716	1.082	0.281
dListingDE	-0.102	0.478	-0.214	0.831	-0.128	0.476	-0.268	0.789
dListingSE	-1.242	0.686	-1.810	0.073*	0.391	0.764	0.512	0.610
dListingES	1.568	1.472	1.065	0.289	1.230	1.281	0.960	0.339
dAEX	0.245	0.300	0.815	0.416	1.028	0.312	3.301	0.001***
dAMX	0.339	0.228	1.487	0.140	0.255	0.250	1.021	0.309
dAScX	0.495	0.218	2.270	0.025**	0.340	0.241	1.401	0.161
dYear	0.184	0.149	1.231	0.221	0.188	0.164	1.149	0.252
Intercept	1.297	0.355	3.656	0.000***	0.821	0.370	2.220	0.028**

Table continues on next page

Table 38: Aggregation - regression (continued)

	Average Segments					Higher Segments			
Variable	Coefficient	Standard Error	T	Significance		Coefficient	Standard Error	T	Significance
dPWC	-0.182	0.184	-0.990	0.324		-0.261	0.161	-1.621	0.108
dEY	-0.081	0.194	-0.416	0.678		-0.113	0.170	-0.666	0.507
dKPMG	-0.072	0.177	-0.405	0.686		-0.121	0.156	-0.779	0.437
Assets	-	-	-	-		-	-	-	-
Sales	0.010	0.007	-1.348	0.180		-0.008	0.006	-1.297	0.197
LN(Goodwill_Intensity)	0.191	0.050	3.789	0.000***		0.156	0.044	3.529	0.001***
dOil&Gas	-0.576	0.540	-1.068	0.287		-0.400	0.473	-0.845	0.399
dBasicMaterials	-0.503	0.294	-1.713	0.089*		-0.374	0.257	-1.454	0.149
dConsumerGoods	-0.068	0.202	-0.334	0.739		-0.035	0.177	-0.197	0.844
dHealthcare	-0.765	0.381	-2.008	0.047**		-0.724	0.334	-2.166	0.032**
dConsumerServices	-0.059	0.187	-0.313	0.755		-0.041	0.164	-0.251	0.802
dTelecommunications	0.493	0.614	0.803	0.424		0.563	0.539	1.045	0.298
dFinancials	-0.115	0.228	-0.504	0.615		-0.077	0.200	-0.387	0.699
dTechnology	0.338	0.195	1.987	0.049		0.295	0.171	1.721	0.088*
dListingUS	0.297	0.191	1.553	0.123		0.316	0.168	1.880	0.062*
dListingFR	-0.035	0.574	-0.061	0.951		-0.046	0.503	-0.092	0.927
dListingBE	0.269	0.535	0.502	0.616		0.300	0.469	0.639	0.524
dListingUK	-0.238	0.247	-0.964	0.337		-0.266	0.217	-1.227	0.222
dListingCH	0.764	0.490	1.558	0.122		0.482	0.430	1.121	0.264
dListingDE	-0.079	0.326	-0.243	0.809		-0.019	0.286	-0.067	0.947
dListingSE	-0.831	0.523	-1.588	0.115		-0.733	0.459	-1.596	0.113
dListingES	0.175	0.877	0.200	0.842		-0.077	0.770	-0.100	0.921
dAEX	0.300	0.213	1.407	0.162		0.162	0.187	0.865	0.389
dAMX	0.366	0.171	2.137	0.035**		0.265	0.150	1.762	0.080*
dAScX	0.407	0.165	2.461	0.015**		0.315	0.145	2.170	0.032**
dYear	0.175	0.112	1.564	0.120		0.131	0.098	1.330	0.186
Intercept	1.167	0.253	4.608	0.000***		1.035	0.222	4.660	0.000***

Table 39: Allocation - regression

Variable	Total				2005			
	Coefficient	Standard Error	T	Significance	Coefficient	Standard Error	T	Significance
dPWC	0.081	0.108	0.747	0.456	0.180	0.173	1.041	0.303
dEY	0.123	0.110	1.119	0.265	0.052	0.185	0.281	0.780
dKPMG	0.173	0.104	1.663	0.099*	0.398	0.167	2.390	0.021**
LN(Assets)	-0.065	0.034	-1.903	0.059*	-0.093	0.059	-1.585	0.119
Sales	0.003	0.002	1.757	0.081*	0.003	0.003	1.067	0.291
LN(Goodwill_Intensity)	0.079	0.029	2.758	0.007***	0.126	0.045	2.779	0.008***
dOil&Gas	-0.779	0.286	-2.721	0.007***	-0.741	0.444	-1.667	0.102
dBasicMaterials	-0.287	0.151	-1.900	0.060*	-0.442	0.242	-1.827	0.074*
dConsumerGoods	-0.344	0.110	-3.119	0.002***	-0.256	0.185	-1.384	0.172
dHealthcare	-0.129	0.219	-0.588	0.557	-0.553	0.500	-1.107	0.274
dConsumerServices	0.045	0.101	0.449	0.654	0.125	0.157	0.796	0.430
dTelecommunications	0.333	0.340	0.978	0.330	0.453	0.530	0.855	0.397
dFinancials	-0.037	0.143	-0.256	0.799	-0.089	0.211	-0.421	0.676
dTechnology	0.037	0.120	0.309	0.758	0.013	0.194	0.067	0.947
dListingUS	-0.017	0.113	-0.148	0.883	-0.036	0.178	-0.200	0.842
dListingFR	0.074	0.322	0.228	0.820	0.627	0.400	1.565	0.124
dListingBE	-0.015	0.287	-0.054	0.957	-	-	-	-
dListingUK	-0.235	0.139	-1.699	0.092*	-0.236	0.218	-1.084	0.283
dListingJA	0.208	0.310	0.671	0.503	0.758	0.418	1.813	0.076*
dListingCH	-0.175	0.251	-0.698	0.487	0.018	0.403	0.044	0.965
dListingDE	-0.006	0.162	-0.038	0.970	0.021	0.281	0.073	0.942
dListingHK	0.209	0.333	0.627	0.532	0.420	0.520	0.807	0.423
dListingSE	-0.378	0.296	-1.277	0.204	-0.946	0.451	-2.095	0.041**
dListingES	0.816	0.512	1.592	0.114	-	-	-	-
dAEX	0.415	0.153	2.705	0.008***	0.395	0.253	1.559	0.125
dAMX	0.252	0.118	2.135	0.035**	0.221	0.186	1.186	0.241
dAScX	0.244	0.096	2.531	0.013**	0.227	0.158	1.438	0.157
dYear	0.151	0.062	2.455	0.015**	-	-	-	-
Intercept	0.645	0.159	4.046	0.000***	0.684	0.250	2.731	0.009***

Table 40: Discount rate, Growth rate, and Cash flow period - regression

Variable	Discount rate Coefficient	Std. Error	T	Significance	Growth rate Coefficient	Std. Error	T	Significance
dPWC	0.387	0.958	0.404	0.687	-0.423	0.892	-0.474	0.637
dEY	-0.012	1.010	-.0.012	0.990	-1.465	0.909	-1.613	0.112
dKPMG	-0.940	0.967	-0.972	0.333	-0.464	0.827	-0.561	0.577
Assets	-0.005	0.003	-1.533	0.128	0.003	0.013	0.265	0.791
Sales	-0.025	0.009	-2.745	0.007***	-	-	-	-
LN(Goodwill_Intensity)	-1.378	0.272	-5.064	0.000***	-0.170	0.299	-0.568	0.572
dBasicMaterials	-0.612	1.188	-0.515	0.608	0.406	0.987	0.411	0.682
dConsumerGoods	1.470	1.087	1.353	0.179	0.899	0.921	0.975	0.333
dHealthcare	6.546	1.350	4.850	0.000***	-1.805	1.513	-1.193	0.237
dConsumerServices	1.130	0.884	1.278	0.204	0.494	0.872	0.567	0.573
dTelecommunications	-0.204	2.106	-0.097	0.923	-	-	-	-
dFinancials	1.711	1.387	1.233	0.220	-0.928	1.219	-0.761	0.450
dTechnology	4.098	0.893	4.588	0.000***	0.586	0.730	0.803	0.425
dAEX	-	-	-	-	0.034	0.802	0.042	0.967
dAMX	-	-	-	-	0.088	0.776	0.114	0.910
dAScX	-	-	-	-	-0.343	0.592	-0.580	0.564
dYear	-	-	-	-	0.657	0.463	1.421	0.160
Intercept	6.668	1.101	6.055	0.000***	1.283	1.373	0.934	0.354

Variable	Cash flow period Coefficient	Std. Error	T	Significance
dPWC	0.414	0.749	0.553	0.582
dEY	0.418	0.830	0.503	0.616
dKPMG	0.286	0.763	0.375	0.709
Assets	0.012	0.042	0.292	0.771
Sales	0.100	0.049	2.048	0.044**
Goodwill_Intensity	-4.269	1.844	-2.315	0.023**
dBasicMaterials	0.630	0.986	0.640	0.524
dConsumerGoods	-0.517	0.828	-0.625	0.534
dHealthcare	2.064	1.350	-1.530	0.130
dConsumerServices	0.047	0.757	0.062	0.951
dFinancials	0.761	1.036	0.735	0.465
dTechnology	1.435	0.683	2.101	0.039**
dAEX	1.576	0.785	2.006	0.048**
dAMX	-0.332	0.669	-0.496	0.621
dAScX	-0.271	0.619	-0.438	0.663
dYear	0.057	0.432	0.132	0.895
Intercept	4.663	0.825	5.651	0.000***