Aalto University
School of Business

How is goodwill associated with acquisition premiums before and after IFRS?

-Evidence from U.K. listed acquisitions of control

Finance

Master's thesis

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School of Business

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Abstract of master's thesis

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Abstract

PURPOSE OF THE STUDY

This master's thesis examines whether the change from local U.K. GAAP to IFRS has any impact on acquisition premiums paid in the U.K. The purpose of the study is to identify critical changes in acquisition accounting and study whether related changes in future reported earnings are likely to impact premiums paid despite zero impact on the intrinsic target firm value.

DATA AND METHODOLOGY

The main sample consists of 178 acquisitions of control among firms listed in the U.K. between announcement dates of 1999 and 2012. Deal data is gathered from SDC, financial data from Worldscope and stock data from Datastream. The data is further complemented manually with CEO compensation, board stock holdings and purchase price allocation information from the annual reports of the acquirer for each transaction.

The effect of variables related to IFRS is investigated using OLS regression with and without year fixed effects. The Baseline model is built from scratch by combining relevant literature and statistical methods to maximize adjusted r-square. The dependent variable in cross-sectional regressions is acquisition premium. The main hypothesis suggests that goodwill has a negative correlation with the premium paid and that effect is decreased after the adoption of IFRS. In addition the impact of CEO bonuses, managerial discretion in avoiding goodwill write-offs and the recognition of acquired finite life intangibles to acquisition premium is studied.

FINDINGS OF THE STUDY

Before IFRS, goodwill variables correlate negatively and significantly with acquisition premiums. Although after the adoption of IFRS this association stays negative it is not significant anymore. Subsample analysis reveals that goodwill variables have significantly negative coefficients under U.K. GAAP only for transactions where CEOs have reported earnings related incentives. Goodwill recognised in business combinations is further significantly and positively correlated with acquisition premium for same transactions under IFRS. Results, however, do not support the view that organisationally complex firms could pay higher premiums after adopting IFRS due to increased managerial discretion in purchase price allocations. Results are relatively robust to an exhaustive number of control variables, alternative model specifications and variable transformations including Inverse Hyperbolic Sine transformations, as well as eliminations of statistically significant outliers.

Keywords IFRS, goodwill, CEO compensation, organisational complexity, acquisition premium

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TUTKIELMAN TARKOITUS

Tässä tutkielmassa tarkastellaan Britannian tilinpäätösstandardien vaihtumista kansainvälisiin tilinpäätösstandardeihin (IFRS) ja sen vaikutusta yrityskaupoista maksettavaan hintapreemioon. Tutkimuksen tarkoituksena on identifioida kriittiset muutokset yrityskauppojen kirjanpidossa ja tutkia onko niihin liittyvillä tulevaisuuden tuloksen muutoksilla mahdollisia vaikutuksia hintapreemioon vaikka kohdeyrityksen olennainen arvo ei muutu.

DATA JA MENETELMÄT

Tutkimuksen pääotos käsittää 178 omistuksen vaihdosta sisältävää yrityskauppaa Britanniassa listattujen yritysten kesken vuosilta 1999-2012. Yrityskauppatiedot on kerätty SDC:ltä, tilinpäätösdata Worldscopesta ja osakedata Datastreamista. Erikseen on käsin kerätty tiedot transaktioittain toimitusjohtajan palkkioista, hallituksen osakeomistuksista ja ostohinnan allokoinnista ostajayrityksen vuosikertomuksen perusteella.

IFRS:ään liittyvien muuttujien vaikutusta on tutkittu OLS-regressiomenetelmällä sekä yhdessä että ilman vuosimuuttujia. Baseline malli on rakennettu yhdistämällä relevantti kirjallisuus ja tilastolliset menetelmät korjatun R^2 –luvun maksimoimiseksi. Selitettävänä muuttujana on hintapreemio. Päähypoteesi esittää liikearvon korreloivan negatiivisesti hintapreemion kanssa ja että vaikutus on pienentynyt IFRS:ään siirtymisen jälkeen. Lisäksi tutkitaan toimitusjohtajan palkkioiden, hankittujen aineettomien oikeuksien identifioimisen sekä ostohinnan allokoinnissa olevan johdon harkintavallan vaikutusta hintapreemioon.

LÖYDÖKSET

Ennen IFRS:ää liikearvomuuttujat korreloivat negatiivisesti ja merkitsevästi hintapreemion kanssa. Vaikka IFRS:ään siirryttäessä tämä suhde pysyy negatiivisena, se ei ole enää merkitsevä. Osaotosanalyysi paljastaa liikearvomuuttujien kertoimien olevan merkitsevästi negatiivisia ennen IFRS:ää vain silloin kun ostajan toimitusjohtajalla on tulokseen perustuva kannustinjärjestelmä. Syntyvä liikearvo korreloi lisäksi merkitsevästi ja positiivisesti hintapreemion kanssa samoilla transaktioilla. Tulokset eivät kuitenkaan tue näkemystä, jonka mukaan organisatorisesti kompleksisemmat yritykset voisivat maksaa korkeampia hintapreemioita IFRS:ään siirtymisen jälkeen ostohinnan allokointiin liittyvän harkintavallan lisääntymisen johdosta. Tulokset pysyvät melko muuttumattomina huolimatta useista kontrollimuuttujista, vaihtoehtoisista malleista, muuttujatransformaatioista, jotka sisältävät käänteisen hyperbolisen sini transformaation sekä tilastollisten poikkeamien eliminoinneista.

Avainsanat IFRS, liikearvo, toimitusjohtajan palkkiot, yrityksen kompleksisuus, hintapreemio

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1 Introduction

1.1 Background

On June 6, 2002, the Council of Ministers of the European Union (EU) issued an official statement that required all public firms in the EU to adopt International Financial Reporting Standards (IFRS) for their consolidated accounts by 2005[1]. The mandatory adoption of IFRS aimed to harmonise financial reporting standards across the EU and increase the quality of reporting standards. However, at the firm level it also significantly changed how business combinations are accounted for by introducing IFRS 3. IFRS 3 effectively removed amortisation of acquired goodwill by replacing it with yearly impairment testing similar to SFAS 142 introduced in 2001 for U.S. firms. This removal of amortisation created an opportunity for firms to plan future impairments (see e.g. Ramanna and Watts, 2012) and increased subjectivity in allocating the cost of acquisitions in purchase price allocations (PPA) by introducing new intangible asset classes that would be recognised in business combinations.

Regarding impairment management, AbuGhazaleh, Al-Hares and Roberts (2011) find that managers in the United Kingdom (U.K.) exercise discretion in the reporting of goodwill impairments consistent with the International Accounting Standard Board's (IASB) objectives. Thus managers are conveying private information about future cash flows. While there is no strong evidence that goodwill impairment management in the U.K. is opportunistic, the findings of Detzen and Zülch (2012) with European data and Shalev, Zhang and Zhang (2013) with U.S. data, imply that managerial discretion in PPA has been used as an earnings management tool by managers with bonuses based on earnings.

Additionally, there is consensus among IFRS researchers that while IFRS does not have a first-order effect on firm valuation, market reactions to events suggesting adoption of IFRS have been positive (Armstrong et al. 2010). Similarly an acquisition of the firm can be described as an event where the acquirer applies a specific set of financial reporting standards to consolidate the target. According to Kallunki, Lantto and Sahlström (2008), the largest change in reporting standards, in terms of economic importance, has been the introduction of IFRS 3 concerning accounting for

[1] EU firms that (1) are listed in a non-EU exchange and use U.S. GAAP, (2) have only publicly traded debt or are listed on Alternative Investment Market (AIM) did not need to report under IFRS until 2007.

acquisitions and goodwill. Therefore, I wonder why, according to my knowledge, acquisition premiums have not been studied comprehensively from the perspective of changes in accounting for business combinations with any European control bid data?

My thesis, which studies IFRS related changes in acquisition accounting and acquisition premiums with U.K. control bids, is related to the agency theory of Jensen and Meckling (1976), as managers' motives play a role in how much they are willing to pay for certain acquisitions. In other words, I assume that when amortisation of goodwill decreases future reported earnings and thus CEOs' bonuses after acquisition, *ceteris paribus*, managers have an incentive to pay less for these acquisitions. Therefore, it is reasonable and interesting to study the impact of changes in future reported earnings on acquisition premiums due to the introduction of new reporting standards.

1.2 Academic and practical motivation

There are strong general level counter arguments against the idea that changes in accounting standards might have an actual effect on the firm's value or acquisition premiums. For example, the Financial Accounting Standard Board (FASB) published the following Statement of Financial Accounting Concepts No. 1 in 1978:

> *"Financial accounting is not designed to measure directly the value of a business enterprise, but the information it provides may be helpful to those who wish to estimate its value … Although financial reporting should provide basic information to aid them [investors, creditors, and others], they do their own evaluating, estimating, predicting, assessing, confirming, changing, or rejecting."*

Another example is presented by the theory of an equity value of the firm. Equity valuation models discount expected future cash flows to equity-holders. Although Watts and Zimmerman (1986) agree that accounting numbers do in fact affect such cash flows via contracts, taxes, agency costs, and in some cases, regulation, Zimmermann (2013) later points out that the vast proportion of the firm's expected cash flows to equity-holders are unaffected by accounting numbers. According to Zimmermann (2013) such cash flows derive from the firm's underlying real economics, including its business strategy, R&D pipeline, taxes, competition and regulation, technology, and so forth. Zimmermann's (2013) main argument is that external financial

reporting quality has at best a second-order effect on firm value of U.S. publicly traded firms, and that attempts to improve a firm's external reporting quality have a third-order effect on these firms' value. Zimmermann (2013) defines first-order effect as a large and significant effect. Furthermore, historically the evidence from several studies (e.g. French and Poterba, 1991; Speidell and Bavishi, 1992) indicate that accounting differences will fall short of explaining differences in regression estimation results.

However, recent evidence from Finland suggests that acquisition accounting does matter, at least in the case of goodwill and acquisition premiums. For example, in an academic survey of the Finnish listed firms, Huikku and Silvola (2012) find that one key reason for not writing-down goodwill is off-balance-sheet buffer created from cash flows generated in good years as the highest value for goodwill is always its book value. One of their interviewed CFOs wondered how it is possible by changing the internal organisation of the firm to either avoid or make possible the impairment of goodwill when the business itself has not changed. That might be one reason why some of the write-downs do not happen. Other reasons might be incorrect usage of Gordon's growth model and high terminal values. In addition to methodological issues, there is, according to Huikku and Silvola (2012) a possibility that the economic consequences (ability to pay dividends, equity ratio and debt covenants) of write-downs, the optimistic nature of the managers and the room for subjectivity can all act as motives for managers to either make the write-down or not.

Perhaps, the most interesting part of the Huikku and Silvola (2012) study is related to acquisition premiums. Interviewed members of the management team accentuated that removing the straight-line amortisation of goodwill has increased acquisition premiums in M&A transactions. Because there is no amortisation, EPS after the transaction is now higher than before IFRS was adopted, which in turn might justify higher premiums. Also the impairment of goodwill occurs generally when: A) acquisition has failed or B) management has changed. Both of these generally acceptable reasons for impairment are not usually quantified in the analysis of the deal value, because they are unpredictable by their nature.

The effect of IAS 36 impairment testing of goodwill has also arisen ongoing debate across magazines in Finland. In recent years the topic has been seen on the Finnish business magazine Kauppalehti (14.9.2012 and 14.12.2012) and in multiple issues of the Finnish auditing magazine

(Tilintarkastus-lehti, issues: 6/2010, 1-3/2011, and 1-3/2012). In Finland according to Kauppalehti (14.12.2012), the number of listed firms with a large goodwill impairment risk has doubled in the last three years from nine to 18. Kauppalehti defines a firm with goodwill impairment risk as a firm with over 5 % of goodwill from the balance sheet total and below 1 P/B figure. Both the media and the Finnish Financial Supervisory Authority (FIVA) have questioned why the number of write-downs of goodwill did not meet the expectations in 2009 even when the future outlook looked anything but promising (see FIVA market bulletin, 3/2010)[2].

1.3 Research questions

This research is conducted to provide information about IFRS introduced changes in accounting for acquisitions and acquisition premiums in the U.K. The U.K. from the EU is chosen for this study, for three key reasons. First, it provides the largest sample of acquisitions among listed firms. Second, according to AbuGhazaleh, Al-Hares and Roberts (2011) the absence of special transitional accounting treatments in the U.K. suggests that goodwill impairments are less likely to be affected by managerial incentives specific to the transition period, which increases the generalisability of results even during the transition period. Third, the U.K. is a common law country, where there exists very effective accounting enforcement and audit mechanisms in the IFRS period of my study (see e.g. Brown, Preiato and Tarca, 2014), which is the reason why it is possible for the potential benefits of the introduction of these changes to be attained (cf. Byard, Li and Yu, 2011; Brown, Preiato and Tarca, 2014). To provide information about the relation between IFRS and acquisition premiums, the research question of this thesis is formulated as a combination of three sub-questions:

1) *Did a goodwill related discount in premium for target firms exist in the U.K. before the introduction of IFRS?*
2) *If there was a goodwill related discount in premium before the introduction of IFRS in the U.K., has that discount in premium decreased after the introduction of IFRS?*
3) *What are the impacts of other factors such as CEO compensation, managerial discretion in purchase price allocations, and the recognition of finite life intangible assets on acquisition premium before and after the adoption of IFRS?*

[2] http://www.finanssivalvonta.fi/fi/Tiedotteet/Markkinat/Documents/Markkinat_3_2010.pdf

To study the sub-questions presented above, I will first examine the relation between goodwill and acquisition premiums before and after IFRS while taking into account the most important control variables used in literature. Then I will study whether the CEO bonus incentives have any impact on the coefficients of goodwill before and after adoption of IFRS. The idea is that the change in goodwill accounting has caused a decrease in the discount in acquisition premium because it is no longer a requirement to amortise goodwill. That effect should be higher, *ceteris paribus*, when the acquirer's CEO is enjoying accounting based bonuses as earnings related bonus is expected to increase. Also, I will employ proxy variables for managerial discretion to study their impact on the acquisition premium, namely number of segments, internal Herfindahl-Hirschman Index and unverifiable net assets for the combined firm after acquisition based on the study of Ramanna and Watts (2012). They study unverifiable fair value accounting and goodwill write-offs under SFAS 142 and provide evidence that non-impairment of goodwill is increasing in firm characteristics predicted to be associated with greater managerial discretion. Finally, I will study whether the recognition of finite life intangible assets according to IFRS is value relevant and conveys new information to the market. In other words, I expect that finite life intangible assets are positively correlated with acquisition premium.

From the methodological perspective, this thesis follows approximately the Bugeja and Loyeung (2011) study done on Australian firms, but focusing on U.K. firms and introducing a new and more comprehensive model with substantial increase in goodness of fit. Methodologies used include cross-sectional OLS regressions with year fixed effects. Additionally, I will test models for outliers and transform selected variables with Inverse Hyperbolic Sine transformation to increase the normality of regression residuals as measured with the Shapiro-Wilk test.

1.4 Contribution of this study

The main contribution of this paper to existing financial literature is that my results indicate that goodwill is associated with successful control bid premiums in the U.K. Before IFRS, two out of three goodwill measures correlate negatively and significantly with acquisition premiums. However, after the adoption of IFRS this discount in premium decreases, although not significantly, and becomes insignificant. Furthermore, I show that this relation between two measures of goodwill and acquisition premiums only hold when the acquirer's CEO has earnings based bonus targets and he has received bonuses in either of the two fiscal years prior to the

acquisition. Earnings targets are here defined to include earnings, operating profit, EPS and return on sales targets. Additionally, there is a weak level significance that the relation between the recognised amount of goodwill and acquisition premium is positive under IFRS for the same subsample of acquisitions. These are novel findings with any European data set and any data set regarding only control bids among listed firms.

My results are similar to the results of Bugeja and Loyeung (2011), except that IFRS does not have a significantly positive impact on the coefficient of any goodwill measure in full sample analysis. Bugeja and Loyeung (2011) paper is the only similar study with an Australian data set, but their unpublished paper lack two key features that are likely to have an impact on their results. First, their sample consists of takeover offers instead of successful acquisitions of control, which is an important distinction due to the fact that goodwill is recognised only in business combinations. Second, my analysis presents considerable evidence that their model, at least with my data set, suffers from omitted variable bias. For example, when I apply their model, the adjusted R-squared drops significantly from my model's 0.662 to 0.240, regression residuals violate the normality assumption and the amount of statistical outliers is doubled.

This study also makes four additional contributions to the existing literature. First, I use three different measures for goodwill; goodwill on the balance sheet of the target, the amount of goodwill recognised in the transaction and the goodwill approximation used by Bugeja and Loyeung (2011). My results show that all of those measures can influence acquisition premiums paid. Second, the results of this thesis help to understand how new accounting standards can impact on a acquirer's actions to pay higher or lower premiums for target firms despite the fact that the intrinsic value of the target remains unchanged. Third, this study adds to the small amount of accounting research that examines the relation between CEO bonuses and goodwill (e.g. Shalev, Zhang and Zhang, 2013; Detzen and Zülch, 2012). Fourth, I will introduce a new variable transformation method, which has rarely been used before in finance literature. The name of this method is Inverse Hyperbolic Sine transformation (IHS) and it is a statistically more advanced method in transforming variables with negative values or zeros than using the basic logarithmic transformations. The amount of goodwill recognised, the amount of goodwill approximated to be generated from acquisition of the target firm and the return on equity are good examples of variables with zero or negative values in this thesis.

1.5 Limitations of study

Despite the clear contribution of my thesis it has at least two key limitations. First, observed measures for goodwill are not perfect and each of them has unique limitations. This imperfection is the reason why I have employed three measures of goodwill so that the reader has as comprehensive picture about the reality as possible. Second, the small sample size due to strict sample selection criteria and availability of data causes another rather serious limitation, which, however, I have partly tackled with an exhaustive number of controls and robustness tests regarding statistical outliers and transformations to increase the normality of regression residuals.

Regarding different goodwill measures, the goodwill recognised in business combinations suffers from the endogeneity problem, which arises from the fact that an increase in the acquisition premium mechanically increases the amount recognised as goodwill and *vice versa*, which will increase the positive correlation between acquisition premiums and the recognised amounts of goodwill. This endogeneity problem makes it less likely to detect a discount in premium pre-IFRS and more likely to observe that IFRS has a positive impact on acquisition premiums post-IFRS. Regarding goodwill on the balance sheet of the target firm, it is rather rare to see it in the period before IFRS in the U.K. due to the fact that before 1999 all goodwill generated was written off against equity reserves instead of capitalisation. However, this measure correlates significantly at the 1% level with the actual goodwill to be generated in acquisitions without suffering from the endogeneity problem. It is worth noticing that goodwill in the balance sheet of the target firm is also part of the recognised goodwill, since its fair value in PPA is zero.

The last measure of goodwill, namely the amount approximated to be recognised in the transaction, is perhaps the most controversial proxy for true goodwill. First, it is perfectly correlated with the market-to-book ratio and thus it resembles the fair value of growth assets. Second, it is significantly and positively correlated with the recognised amount of goodwill, because it measures, for example, the going concern goodwill of the target. Third, by definition, it excludes the goodwill in the balance sheet of the target firm and thus is significantly and negatively correlated with it. Fourth, it also includes the intangible assets to be recognised in business combinations. These issues make approximation of goodwill the most inaccurate of the three goodwill measures used. Therefore, I will give it less weight than other measures.

The limitation of small sample size arises from the requirement that both the target and acquirer must be listed firms and the acquirer must consolidate the target as an acquisition after the transaction, i.e. I am studying only control bids. In addition there are 19 cases in which, the purchase price allocation (PPA) data in annual reports is not available. These cases are typically either cases in which A) the acquirer has acquired multiple acquisitions in the same fiscal year and the acquisition of the target has not been individually material[3] and the information regarding PPA could not be estimated according to the method presented in Subchapter 5.3 or cases in which B) the acquirer has been acquired soon after the acquisition. My analysis is therefore most applicable for acquisitions where the target firm has a material impact on the acquirer and for other transactions that meet the requirements of my sample. In fact, my analysis is likely to be less relevant outside my sample, where target firms are often smaller and therefore have less impact on the acquirer. They are also often less liquid and in most cases even private, which makes them less likely to use IFRS or demand payment in equity.

Additionally, there are external factors that are present in empirical studies, which prevent authors from making conclusions regarding causality of the relations studied and thus also my results need a vast amount of additional research before causality can be even mentioned.

1.6 Structure of the thesis

The rest of the paper is organised as follows. The second Chapter describes key acquisition accounting concepts under both IFRS and U.K. GAAP and introduces factors that influence interpretation of financial reporting standards. The third Chapter presents the main findings on studies regarding accounting and acquisition premiums, IFRS related studies, and discusses potential managerial motives related to the impact of reported earnings on acquisition premiums. The fourth Chapter introduces the hypotheses. The fifth Chapter describes the data and sample selection process. The sixth Chapter constructs variables. The seventh Chapter reviews important literature on the determinants of acquisition premium and constructs the variables used in this thesis. The eighth Chapter introduces the methodology employed. The findings from empirical analysis are shown in the ninth Chapter. The final Chapter concludes the paper and suggests future research topics.

[3] Under both FRS 6 and IFRS 3 only material transactions are required to be disclosed individually, otherwise the information should be given in aggregate.

2 Acquisition accounting under IFRS and U.K. GAAP

This thesis studies changes in financial reporting due to the introduction of IFRS and their influence on acquisition premiums. Therefore it is of the utmost importance to know how acquisition accounting was regulated according to U.K. GAAP and how it is accounted under IFRS. As IFRS is at the centre of my thesis, I will first go through acquisition accounting under IFRS in Subchapter 2.1, while Subchapter 2.2 presents acquisition accounting under U.K. GAAP. Aforementioned Subchapters cover issues such as purchase price allocation, goodwill and intangible assets as the key issues in acquisition accounting. Subchapter 2.3 highlights the most relevant changes in acquisition accounting and their estimated impact on reported earnings and acquisition premiums. The final Subchapter 2.4 discusses factors that influence financial reporting practices and interpretation of new IFRS standards specifically in the U.K. This essential information is used when hypotheses are formed and the results interpreted, because the results depend on a large amount of country specific factors and the differences between old and new standards. For example, in Australia the adoption of IFRS decreased the number of intangible assets to be recognised, but in the U.K. the effect was the reverse.

2.1 Acquisition accounting under IFRS

This subchapter presents IFRS standards related to acquisitions. This is important as political decisions made by standard setters and politicians tend to somewhat influence the real market situations. They can for example introduce new regulation creating barriers to existing business procedures or allow new business opportunities by improving current ones with deregulation. The both aforementioned situations are present in the introduction of IFRS as it removed some constraints (removal of the amortisation of goodwill, increased subjectivity) and introduced new ones (increased the number of disclosures required and the number of intangible asset classes required to be recognised). In addition, IFRS eliminate merger accounting by prohibiting the pooling of interest method. Section 2.1.1 describes relevant goodwill accounting related standards, Section 2.1.2 covers intangible accounting in acquisitions and Section 2.1.3 presents the purchase price allocation (PPA) process. To give a detailed view of acquisition accounting, I have used the book by Epstein and Mirza entitled Interpretation and Application of IFRS published in 2005 as a basis for these aforementioned Sections. Finally, Section 2.1.4 summarises the key changes in IFRS during my sample period and concludes this subchapter.

2.1.1 Goodwill accounting under IFRS

The main change in goodwill accounting under IFRS was the introduction of IFRS 3 (Business Combinations) on 1 April 2004, which removed the amortisation of goodwill. The removal of the amortisation of goodwill had the largest impact on firms' income statements among all the changes required to implement the mandatory adoption of IFRS (see e.g. Kallunki, Lantto and Sahlström, 2008). Currently, the only accounting procedure regarding goodwill is the impairment testing of goodwill. In this section I will cover annual impairment testing of goodwill and intangible assets according to IAS 36 revised version effective at 31 March 2004.

Goodwill arising from acquisitions must be recognised as an asset and should be reviewed at each balance sheet date to determine whether the asset has suffered any impairment. If goodwill is no longer deemed probable of being fully recovered through the profitable operations of the acquired business, it should be partially written down or fully written off. The impairment process for goodwill, however, is totally different from other assets as the direct evaluation of the recoverable amount of goodwill is not actually feasible. This difference comes from the fact that, unlike other intangible assets that are individually identifiable, goodwill is amorphous and cannot exist, from a financial reporting perspective, apart from the tangible and identifiable intangible assets with which it was acquired. Therefore, IAS 36 requires that goodwill be combined with other assets which together define a cash-generating unit, and that an evaluation of any potential impairment (if warranted by the facts and circumstances) is conducted on an aggregate basis. This is done by calculating and comparing the recoverable amount of each cash-generating unit with the goodwill allocated to that unit. If the recoverable amount is less than the carrying value, an impairment write-down must be made. An impairment loss is first absorbed by goodwill, and only when goodwill has been eliminated entirely, the carrying values of identifiable intangible and tangible assets can be adjusted accordingly. Any write-off of goodwill must be charged to expense and unlike other impaired assets it cannot be restored later as an asset. Acquired goodwill should not be mixed with the internally generated goodwill from existing operations before acquisition. However, it is important to point out that often especially for outsiders of the firm it is impossible to draw the exact line between internally generated goodwill, which should not be recognised, and acquired goodwill after the acquisition. Thus standard setters are concerned that in practice firms can use internally generated goodwill as a cushion against impairment of acquired goodwill (Epstein and Mirza, 2005). Another important thing according

to Epstein and Mirza (2005) is that in case of acquisitions less than 100%, the goodwill is recorded only for the price paid by the new parent firm in excess of the fair value of net identifiable assets attributable to the parent firm.

2.1.2 Intangible asset accounting under IFRS

Intangible asset accounting under IFRS is regulated by IAS 38 (effective at 31 March 2004). It stipulates that the cost of intangible asset acquired as part of a business combination is its fair value as at the date of acquisition. The fair value of the asset is based on the following hierarchy:

1. *Quoted market price in active market*
2. *The amount that the enterprise would have paid for the asset in an arm's length transaction at the date of acquisition*
3. *If the cost cannot be measured reliably or the asset cannot be recognised as an identifiable intangible asset, it is included in goodwill*

After initial measurement acquired intangible assets are measured with either a *cost model* or a *revaluation model*. In the cost model, after initial recognition, an intangible asset should be carried at its cost less any accumulated amortisation and any accumulated impairment losses, while in the revaluation model assets are written up to fair value. However, the standard restricts the revaluation of intangible assets to freely tradable intangible assets by supporting only the quoted market price in an active market as the basis of revaluation. Thus, revaluation will not be applied to intangible assets without active markets such as patents and trademarks. Also, if some of the intangible assets in a given asset class are subject to revaluation, all the assets in that class should be consistently accounted for unless fair value information ceases to be available.

It is important to notice that some assets can be classified as intangible assets, inventory or tangible assets depending on the use of the asset. For example software acquired for further sale is treated as inventory and software held for licensing or rental must be recognised as an intangible asset, while software purchased by an enterprise for its own use and which is integral to the hardware would be treated as a part of cost of the hardware and capitalised as property, plant, or equipment. Other software programs, which are not an integral part of the hardware and are used by the enterprise itself, should be recognised as intangible assets. A list of examples of

recognised intangible assets in my sample for U.K. GAAP and IFRS acquisitions can be seen in Table 8 in Subchapter 5.2, which presents descriptive statistics.

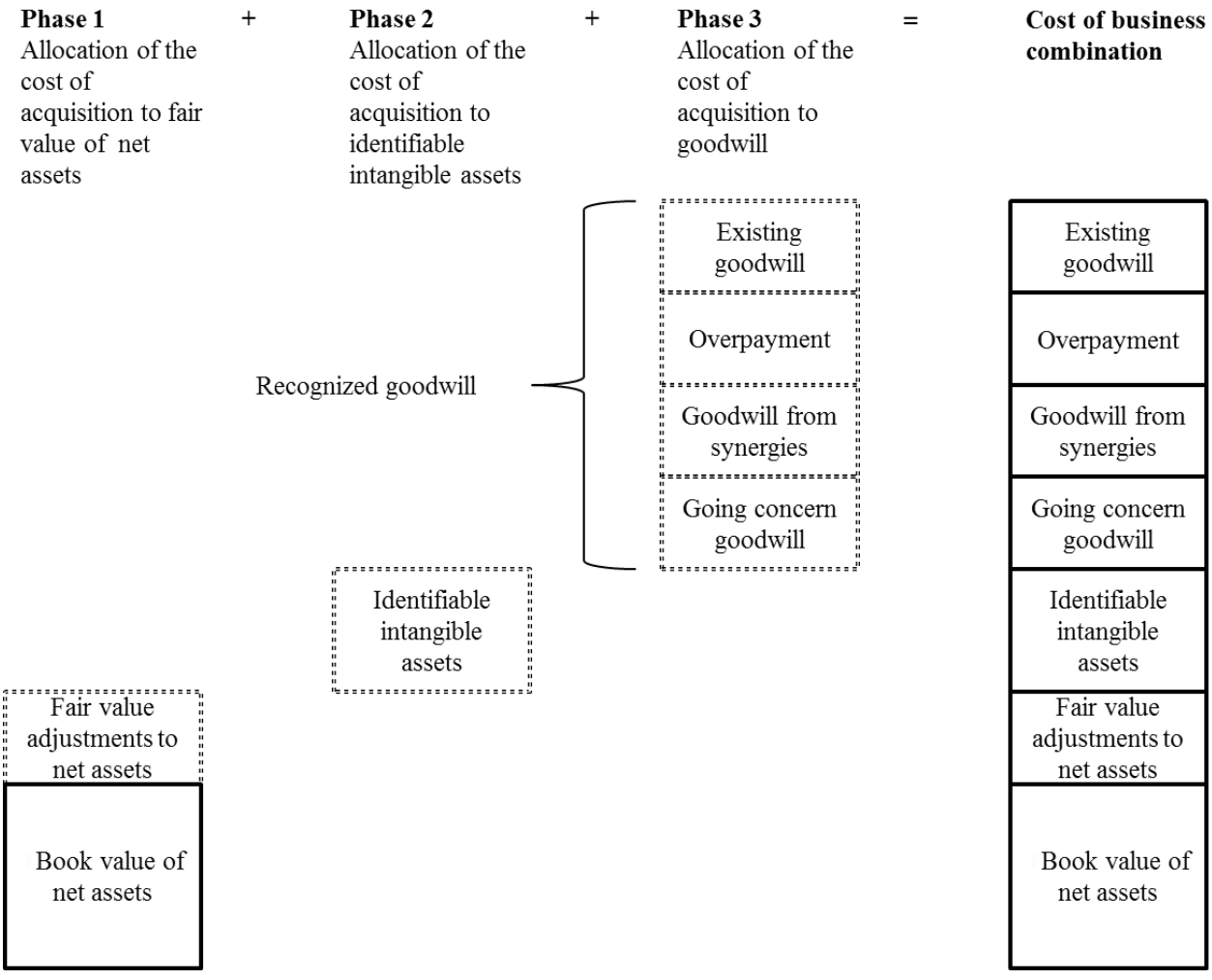
After recognition, intangible assets are divided into two groups according to the expected economic life of the assets: those with *finite life* and those with *indefinite life*. An entity shall assess whether the useful life of an intangible asset is finite or indefinite and, if finite, the length of that useful life. An intangible asset shall be regarded by the entity as having an indefinite useful life when, based on an analysis of all the relevant factors, there is no foreseeable limit to the period over which the asset is expected to generate net cash inflows for the entity. This distinction is important as intangible assets with a finite life must be amortised over their useful economic life, which has a negative impact on the reported earnings of the combined firm. The amortisation method used for these assets should reflect the pattern in which the economic benefits are consumed by the enterprise and it can be one of the same systematic and rational methods that are used to depreciate tangible fixed assets. IAS 38 seemingly permits straight-line, diminishing balance and units of production methods and if other than straight-line is used, it must accurately mirror the expiration of the asset's economic service potential. An intangible asset has an indefinite life if there is no foreseeable limit to the period during which the asset is expected to generate future cash flows. Indefinite life intangibles are only subject to annual impairment reviews.

IAS 36 controls the impairment of intangible assets. Indefinite life assets must be tested annually with impairment tests, as well as whenever there is an indication that the intangible may be impaired. The impairment process for intangibles, other than goodwill, is exactly the same as that used for long-lived tangible assets. Thus carrying amounts must be compared to the greater of net selling price or value in use, when there are indications that impairment has been suffered. Reversals of impairment losses under defined conditions are also recognised. The impact of impairment and reversals will be reflected in current period operating results, if the intangible assets in question are being accounted for in accordance with the cost method. With the revaluation method, impairments will normally be charged to stockholders' equity to the extent that revaluation surplus exists and only to the extent that the loss exceeds previously recognised valuation surplus will the impairment loss be reported as a charge against earnings.

2.1.3 Purchase price allocation under IFRS

According to IFRS 3 (effective at 2005), when the firm acquires majority interest from another firm it must allocate the cost of acquisition in a purchase price allocation process to all identifiable assets and liabilities valued at fair value at the effective date of the acquisition. The acquisition date is specified as a date when control of the net assets and operations of the acquired entity is effectively transferred to the acquirer. This definition is important as I only study acquisitions where the acquirer has acquired controlling interest of the target firm defined as percentage of shares acquired. In the purchase price allocation process, described in Figure 1 below, the cost of acquisition is allocated in three phases to following items: *net assets valued at fair value, identifiable intangible assets* and *goodwill*.

Figure 1 – Allocation of the cost of acquisition in business combinations



This figure illustrates the three phases of allocation of the cost of acquisition in purchase price allocation process under IFRS 3. Existing goodwill is actually included in the book value of net assets, but since its fair value is zero it goes directly to recognised goodwill. Other assets behaving similarly include deferred tax items. This presentation is for illustrative purposes only and those boxes are not in size of the economic importance.

In the *first phase* from the left of Figure 1, the book values of already recognised assets and liabilities are adjusted to a fair level and then summed up together (assets – liabilities). The cost of acquisition consists of the sum of fair values of all different forms of considerations transferred to target firm shareholders, amount of non-controlling interests (if any), fair value of previous equity interests (if any) and acquisition-related costs. Acquisition-related costs include transaction costs such as legal and accounting fees, investment banking charges and depending on the terms of the acquisition also certain contingent consideration. In the *second phase*, new intangible assets such as patents, brand names and computer software are recognised. IAS 38, Intangible Assets, stipulates the key criteria for determining whether the intangible assets are to be recognised or not. In short, the criteria consist of identifiability and control of the asset, the flow of future economic benefits and ability to reliably measure the cost of the asset.

However, when an intangible asset is acquired in a business combination, the identifiability criterion has the most significant role in enabling allocation to be made. This is probably due to the fact that the standard setter prefers that as many individual assets are recognised as possible, because the residual amount of unallocated acquisition cost is treated as goodwill, and it is less likely to be impaired than an identified asset, and provides less transparency to investors (Epstein & Mirza, 2005). Also, the criterion of control is straightforward as a consequence of the acquisition and the fair value assumption takes into account the probability of the future cash flow even with low probabilities. The future economic benefits can take the form of revenues from sale of products or services, cost savings, or other benefits resulting from the use of the intangible asset by the enterprise. The reliability in measuring the cost of the asset also plays a role because if the intangible asset cannot be measured reliably it is not recognised, but rather, is included in goodwill. While it reveals the fact that allocation of the cost of acquisition to goodwill has been made increasingly more difficult, in practice, according to evidence from Hamberg, Paananen and Novak (2011) with Swedish data, firms have been able to take advantage of the removal of the amortisation of goodwill and recognise even more goodwill in their balance sheets than ever before.

In *phase 3*, the excess purchase price over the fair value of the net assets (including intangibles) is then allocated to goodwill. Similarly, if the fair values of the net identifiable assets obtained

exceed the price paid, then negative goodwill exists. As described in Figure 1, goodwill includes going concern goodwill, synergy benefits, overpayment due to managerial hubris and assets with zero fair value such as existing goodwill on the balance sheet of the target. Other assets with zero fair value include for example deferred tax items. IFRS 3 further specifies that in the case of step acquisitions, the cost of the acquisitions is measured with reference to the cost and fair value data at each stage, thus leading to a situation where at the date of each respective exchange, goodwill or negative goodwill would have to be recognised and at the end added together. After acquisition subsequent changes in the fair value of the contingent consideration should lead to adjustment of the amount of goodwill recognised. However, I will use values only from the first annual report reporting purchase price allocation, because I am interested only in acquisitions leading to consolidation.

2.1.4 Revision of IFRS standards at 2009 – key changes

Regarding this thesis, the revision of IFRS standards made four important changes to the following issues regarding acquisition accounting: *step acquisitions, acquisition-related costs, contingent consideration* and *intangible assets*. Regarding step acquisitions, the requirement to measure at fair value every asset and liability at each step for the purposes of calculating a portion of goodwill has been removed. Instead, goodwill is measured as the difference at acquisition date between the fair value of any investment in the business held before the acquisition, the consideration transferred and the net assets acquired. Acquisition-related costs are to be recognised as expenses rather than included in goodwill. This change in accounting for acquisition-related costs has an impact on the denomination of finite life intangible asset and goodwill variables (excl. recognised amount of goodwill) and it also decreases equally (in absolute terms) the values for both the denominator and nominator of goodwill recognised variable. The Contingent consideration is now required to be recognised and measured at fair value at the acquisition date, while before it was only measured if it was likely to become payable and could be measured reliably. Also, subsequent changes in fair value under the revised version of IFRS 3 are recognised usually in profit or loss rather than by adjusting goodwill. At the same time IAS 38 was revised and the possibility of using lack of reliability in valuation as an exceptional reason for not recognising an intangible asset was removed. These revisions are effective for annual periods beginning on or after 1 July 2009.

2.2 Acquisition accounting under U.K. GAAP

In the U.K. before IFRS, accounting was regulated with national U.K. GAAP. Reporting standards issued to guide acquisition accounting include Financial Reporting Standard 6, Acquisitions and Mergers (FRS 6)[4] and Financial Reporting Standard 7, Fair Values in Acquisition Accounting (FRS 7)[5] issued by the Accounting Standards Board (ASB) in 1994. The other relevant standards regulating acquisitions were Financial Reporting Standard 10, Goodwill and Intangible assets (FRS 10) and Financial Reporting Standard 11, Impairment of fixed assets and goodwill (FRS 11) issued by the ASB in 1998. I will summarise the key issues from the aforementioned standards in Sections 2.2.1-2.2.3 in accordance with the webpage of the Financial Reporting Council, which is the U.K.'s independent regulator responsible for promoting high quality corporate governance and financial reporting.

In my thesis, I will exclude mergers and focus only on acquisitions due to the different treatment of mergers and acquisitions in terms of goodwill recognition under FRS 6. In addition, it will increase the comparability of my results, because IFRS prohibit the use of pooling of interest accounting. There will be an endogeneity issue due to joint determination of accounting method and acquisition premium under FRS 6, but it is likely to be rather small due to the strict criteria regarding when merger accounting can be applied (see FRS 6 for more information).

2.2.1 FRS 7: Fair values and goodwill in acquisition accounting

FRS 7 sets out the principles of accounting for a business combination under the acquisition method of accounting. The objective of the FRS 7 is to ensure that:

> *when a business entity is acquired by another, all the assets and liabilities that existed in the acquired entity at the date of acquisition are recorded at fair values reflecting their condition at that date; and that all changes to the acquired assets and liabilities, and the resulting gains and losses, that arise after control of the acquired entity has passed to the acquirer are reported as part of the post-acquisition financial performance of the acquiring group.*

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[4] http://www.frc.org.uk/Our-Work/Codes-Standards/Accounting-and-Reporting-Policy/Standards-in-Issue/FRS-6-Acquisitions-and-Mergers.aspx

[5] http://www.frc.org.uk/Our-Work/Codes-Standards/Accounting-and-Reporting-Policy/Standards-in-Issue/FRS-7-Fair-Values-in-Acquisition-Accounting.aspx

The positive or negative goodwill recognised in purchase price allocation is the difference between the aggregate of the acquired entity's fair values of identifiable assets and liabilities and the cost of that entity. This definition of goodwill seems to be in line with IFRS 3, but in fact there are differences especially in intangible asset accounting and in the definition of cost of acquisition. Fair value is the amount at which an asset or liability could be exchanged in an arm's length transaction between informed and willing parties, other than in a forced or liquidation sale. In practice, unless fair values can be estimated at market value, the fair values of non-monetary assets will normally be based on replacement cost, but should not exceed their recoverable amount as at the date of acquisition. The recoverable amount is defined as the greater of the net realizable value of an asset and, where appropriate, the value in use. The identifiable assets and liabilities should be capable of being disposed of or settled separately, without disposing of a business of the entity. The cost of acquisition is simply the amount of cash or cash equivalents paid and the fair value of other purchase consideration given by the acquirer plus non-controlling interests and previously owned tangible fixed assets together with the expenses of the acquisition. By this definition there are no large and significant differences when compared to IFRS standards[6]. Therefore we must look closer at how potentially large differences such as recognition of acquired intangible assets and goodwill amortisation are accounted for according to FRS 10 in the next Section 2.2.2.

2.2.2 FRS 10: Goodwill and intangible assets

FRS 10 regulates goodwill and intangible asset accounting in the U.K. after it became effective for accounting periods ending on or after 23 December 1998 for British firms not using IFRS or other international standards. The objective of FRS 10 is to ensure that:

a) *capitalised goodwill and intangible assets are charged in the profit and loss account in the periods in which they are depleted; and*
b) *sufficient information is disclosed in the financial statements to enable users to determine the impact of goodwill and intangible assets on the financial position and performance of the reporting entity*

[6]According to IAS 22, fair values of identifiable assets and liabilities acquired in an acquisition should be determined by reference to their intended use by the acquirer. Also, the revision of IFRS 3, effective at 1 July 2009, excludes acquisition expenses to be included in goodwill and the cost of acquisition.

The definition of intangibles under U.K. GAAP is significantly more limited than under IAS 38. The former only allows the recognition of intangibles that are controlled through custody or legal rights (e.g. trademarks, retail product rights and broadcasting licenses), while the latter also includes intangibles such as unpatented technology and trade secrets. Intangible assets are according to FRS 10 estimated based on its replacement cost, which will normally be the asset's estimated market value. Other techniques are allowed to estimate the fair value of intangible assets when market values are not observable, but the standard states that if the value of an identifiable intangible asset cannot be measured reliably it should be subsumed within the amount of the purchase price attributed to goodwill. Hence, in theory, the proportion of the cost of acquisition allocated to goodwill under FRS 6 and FRS 10 should be larger than according to IFRS 3 and *vice versa* for intangibles.

Under FRS 10 all intangible assets and goodwill are amortised over the useful economic life of an asset by using a straight-line method unless another method can be demonstrated to be more appropriate. For goodwill though, there is hardly any reason to use anything other than straight-line depreciation. The useful economic life of an intangible asset is the period over which the entity expects to derive economic benefit from that asset and for purchased goodwill it is the period over which the value of the underlying business acquired is expected to exceed the values of its identifiable net assets. The useful economic life for both intangible assets and goodwill can further be defined either to limited or indefinite useful economic lives. When the useful economic life is classified to be limited, then that asset is normally amortised over a maximum period of 20 years depending on the length of the useful economic life of an asset. This aforementioned presumption may be rebutted and a useful economic life regarded as a longer period or indefinite only if:

a) the durability of the acquired business or intangible asset can be demonstrated and justifies estimating the useful economic life to exceed 20 years; and

b) the goodwill or intangible asset is capable of continued measurement (so that annual impairment reviews will be feasible)

It is important to point out that in the U.K., there was a possibility before IFRS to not amortise goodwill when the useful economic life was regarded as an indefinite period. Therefore, I will

check for each acquisition under U.K. GAAP whether the acquirer will amortise goodwill in the following fiscal years or not and input this information in a dummy variable.

2.2.3 FRS 11: Impairment of fixed assets and goodwill

FRS 10 presented in the previous Section 2.2.2 and FRS 11 together regulate the impairment of goodwill. FRS 11 became effective for accounting periods ending on or after 23 December 1998 for British firms. The objective of FRS 11 is to ensure that:

a) *fixed assets and goodwill are recorded in the financial statements at no more than their recoverable amount;*
b) *any resulting impairment loss is measured and recognised on a consistent basis; and*
c) *sufficient information is disclosed in the financial statements to enable users to understand the impact of the impairment on the financial position and performance of the reporting entity.*

The impairment of goodwill and intangible assets that are amortised over a finite period not exceeding 20 years are reviewed for impairment at the end of the first full financial year following acquisition and when events or changes in circumstances indicate that the carrying values are not recoverable. Impairment must be based on expected future cash flows. Goodwill and intangible assets with longer periods are reviewed for impairment at the end of each reporting period. The first year impairment for goodwill is done in two stages following FRS 10. First, by comparing post-acquisition performance in the first year with pre-acquisition forecasts used to support the purchase price, possible impairment is identified. Second, if the initial review indicates that the post-acquisition performance has failed to meet pre-acquisition expectations or if any other previously unforeseen events or changes in circumstances indicate that the carrying values are not recoverable, then the firm must perform a full impairment review in accordance with the requirements of FRS 11 (Impairment of fixed assets and goodwill) introduced in 1998. According to FRS 11, the carrying amount of net assets in the income-generating units and the purchased goodwill is compared with the recoverable amount. If the carrying amount is higher, impairment should firstly be allocated to goodwill, secondly to any capitalised intangible asset in the unit and finally to the tangible assets in the unit on a pro rata or more appropriate basis. Recoverable amount is defined as the higher of the amount that could be obtained by selling the asset (net realisable value) and the amount that could be obtained through using the asset (value

in use). The impairment testing in subsequent years is also done following the regulation in FRS 11.

2.3 Summary of the key differences in accounting for business combinations

This subchapter briefly summarises Subchapters 2.1 and 2.2 by presenting the key standards in accounting for business combinations under U.K. GAAP and IFRS. Based on this information hypotheses are developed in Chapter 4 in combination with the information in Chapter 3 regarding empirical findings. These accounting differences are presented in Table 1 below.

Table 1 – Summary of the key differences in accounting for business combinations
This table presents the key differences in accounting for business combinations and their estimated impact on earnings and acquisition premiums under U.K. GAAP and IFRS.

Topic	U.K. GAAP	IFRS	Effect on earnings	Theoretical effect on acquisition premiums
Goodwill accounting	Generally amortized, but indefinite life can be assumed if the durability of the acquired business can be demonstrated and it justifies estimating the useful economic life that exceeds 20 years. Impairment only method is used for indefinite life goodwill.	Impairment only method.	Positive	Positive
Intangible asset recognition in PPA	Only intangible assets, which are controlled through legal rights or custody can be recognised. In addition FRS 10 stipulates that if the value of identifiable asset cannot be measured reliably (e.g. with observable market values) it should be subsumed within the amount of the purchase price attributed to goodwill.	The idea of IAS 38 is to recognise as many individual intangible assets as possible to increase transparency to investors. IAS 38 allows intangible assets to be valued with the amount representing price paid in arm's lenght transaction. Also, it only requires that acquirer controls the use of intangible asset as a result of its past actions and events.	Negative	Positive
Intangible asset accounting	Generally amortized, but indefinite life can be assumed if the durability of intangible asset can be demonstrated and it justifies estimating the useful economic life that exceeds 20 years. Impairment only method is used for indefinite life intangibles.	Intangible asset have an indefinite life when there is no foreseeable limit to the period over which the asset is expected to generate net cash inflows for the entity, otherwise useful life is finite. Finite life intangibles are amortized and indefinite life intangibles are only tested for impairment.	No effect	No effect
Acquisition expenses in PPA	Acquisition related costs are included in goodwill.	After 1 July 2009, acquisition related costs are expensed immediately.	Negative	No effect
Mergers	Under FRS 6, merger accounting was approved for “merger of equals” if five specific criterion was met. In these cases, pooling of interest method was used and thus no goodwill was recognised in transaction. Therefore these transactions do not meet the scope of my thesis.	IFRS 3 required all acquisitions to be accounted using purchase accounting and prohibited the use of pooling of interests method previously used for mergers.	Negative	Negative

The key conclusion from Table 1 is that the first two topics regarding goodwill accounting and recognition of intangible assets have the largest theoretical effect on acquisition premiums. The effect of goodwill accounting changes is positive, because goodwill is no longer being amortised,

while the effect of intangible asset recognition is more related to general value relevance of recognised intangible assets despite the negative impact on reported earnings. The negative impact on earnings is based on the larger amount of finite life intangibles to be recognised under IFRS (see Subchapter 5.2 for evidence based on my sample). In my thesis I will focus more on finite life intangibles, because the number of finite life intangibles is expected to increase after the adoption of IFRS. In addition their value is often more difficult for outsiders to observe than for example indefinite life brands.

2.4 Key factors influencing interpretation of IFRS in the U.K.

This subchapter will provide important background information regarding factors influencing accounting practices in the U.K. This is important because according to Ball (2001) an accounting system is: A) a complementary component of the country's overall institutional system and B) determined by firms' incentives for financial reporting. Factors in general associated with financial reporting quality include, but are not limited to, the legal system's effect on a country's financial system (La Porta et al., 1998), the tax system[7], ownership structure[8], the political system (Leuz and Oberholzer-Gee, 2006), capital structure (Sun, 2006), capital market development (Ali and Hwang, 2000) and the role of the accountancy profession (Troberg, 2007). Furthermore Soderstrom and Sun (2007) add in their paper that as a result of the interdependence between accounting standards and the country's institutional setting and firm's incentives, the economic consequences of changing accounting systems may vary across countries. Thus results for U.K. based data are more or less country specific due to a different level of accounting quality even across the users of IFRS in the EU.

As pointed out in the introduction, the U.K. has a highly developed set of legal institutions, legal enforcement systems and financial markets. In addition the U.K. has a long history with True and Fair View (TFV). TFV is a broad concept in which accounts are reported with the aim of providing unbiased information about activities that affect a company's intrinsic value (Ekholm and Troberg, 1998). The TFV concept was invented in the U.K. and spelled out for the first time in the 1948 Companies Act:

[7] See e.g. Guenther and Young (2000), and Haw et al., (2004)
[8] See e.g. Ball and Shivakumar (2005), Burgstahler, Hail and Leuz (2006), and Fan and Wong (2002)

> *True and fair view shall override all other requirements for the Companies Act as to matters to be included in a company's financial reports. This means that information not specifically required by law must be provided in order to give a true and fair view.*

Thus the TFV concept has been a part of English law and central to accounting and auditing practice in the U.K. for many decades, despite the fact that there has been no statutory definition of true and fair[9]. However, the introduction of IFRS was a large step towards conformity with GAAP and that has created a tension between the Financial Reporting Council (FRC) in the U.K. and the International Accounting Standards Board (IASB). This tension created by significant changes in accounting standards and company law, led some to question whether the views about TFV, expressed in legal Opinions written by Lord Hoffmann and Dame Mary Arden in 1983 and 1993, still remain applicable. In these circumstances the FRC commissioned a further legal opinion written by Martin Moore QC on October 3, 2013:

> *Directors must consider whether, taken in the round, the financial statements that they approve are appropriate. Similarly, auditors are required to exercise professional judgment before expressing an audit opinion. As a result, the Opinion confirms that it will not be sufficient for either directors or auditors to reach such conclusions solely because the financial statements were prepared in accordance with applicable accounting standards.*

This conflict is a great example of how IFRS influence financial reporting and how the use of IFRS is influenced by historical accounting practices in the U.K.

Another important factor shaping accounting in the U.K., in addition to TFV, is the fact that the U.K. is a market-oriented common law country. In market-oriented systems there are numerous diverse investors without direct access to company information and therefore investors are likely to rely heavily on financial reporting disclosures to obtain information to be used in valuation of securities and in the monitoring of management (see e.g. Berglöf, 1990; Mueller, Gernon and Meek, 1994). Therefore, U.K. firms are likely to interpret IFRS in a way that delivers as value relevant information as possible. My view is supported by Ali and Hwang (2000), who find that the value relevance of financial reporting is high for countries where the financial system is

[9] https://www.frc.org.uk/Our-Work/Codes-Standards/Accounting-and-Reporting-Policy/True-and-Fair.aspx

market-oriented; where private sector bodies are involved in the standard setting process; where accounting practices follow the British-American model, where tax rules have no great influence on financial accounting measurements; and where spending on auditing services is relatively high.

As Troberg (2007) notes, the common law system originated in England and is developed from case law. It is developed case by case and does not prescribe general rules that could be applied to several cases. Accounting rules, however, are not part of the law, but accounting regulation is in the hands of professional organisations in the private sector. Typically company law in these countries is kept to a minimum. Bartov, Goldberg and Kim (2005), describe that in common law countries (e.g. in the U.K.), accounting rules are determined largely by the disclosure needs of shareholders and prospective shareholders. The problem of asymmetric information between managers and shareholders is addressed through financial reporting and other means of timely public disclosure. In the common law environment, accounting standards are generally separated from tax laws and they evolve by becoming commonly accepted practice.

Studies by Francis, Khurana and Pereir (2003) and Hope (2003) find that common law countries (e.g. the U.K.) have stronger accounting standard enforcement mechanisms than code law countries (i.e., the rest of the EU). The international accounting literature further indicates that accounting quality is higher in countries with a common law origin[10], and enforcement mechanisms appear to influence the expected quality of financial reporting under IFRS[11]. Barth, Landsman and Lang (2008) also conclude that the potential benefits of the introduction of IFRS are difficult to attain without the existence of effective enforcement mechanisms (cf. Byard, Li and Yu, 2011; Brown, Preiato and Tarca, 2014).

By acknowledging the aforementioned issues, I know that my results are likely to apply strongly only to firms in the U.K. as it is reasonable to assume that all country related factors with respect to reporting quality stay the same in one country or change only gradually. Therefore, the results of this study are mainly influenced by a combination of the adoption of IFRS, changes in the general market situation and firm specific factors (e.g. ownership structure and capital structure).

[10] See e.g. Ali and Hwang (2000), Ball, Kothari and Robin (2000), and Leuz, Nanda and Wysocki (2003)
[11] See e.g. Ball, Kothari and Robin (2000), Ball (2006), Barth, Landsman and Lang (2008), Byard, Li and Yu (2011), Dao (2005), and Daske et al. (2008)

3 Theoretical background

In this chapter the theoretical grounding of my topic is presented. Subchapter 3.1 summarises what has already been researched about the association between accounting and acquisition premiums and lays the grounding for my thesis. Subchapter 3.2 presents relevant literature regarding the impact of mandatory adoption of IFRS. It specifically concentrates on intangible assets and acquisitions. Subchapter 3.3 ends this chapter by discussing the motives for managers to pay a higher or lower premium for some target firms after the adoption of IFRS.

3.1 Financial reporting and acquisition premiums

This subchapter presents current information about how financial reporting can influence the target firm value in the market for corporate control. Recall from Introduction Chapter the arguments of Zimmermann (2013) who state that external financial reporting quality has at best a second-order effect on firm value of U.S. publicly traded firms, and that attempts to improve a firm's external reporting quality have a third-order effect on these firms' value. Because firm's value at stock market is based mainly in its ability to generate future cash flows and/or pay dividends to shareholders it is reasonable assume that Zimmermann (2013) is correct. However, Zimmermann (2013) limits his arguments to firms' value in exchanges with rational investors and does not consider acquisitions, where the motives of the acquirer's management influence offer premiums. Therefore, it is not a coincidence that the evidence from studies regarding external financial reporting and acquisition premiums indicate an association between financial reporting and acquisition premiums. I will provide this evidence in more detail in this subchapter.

I will present the current information regarding the association between accounting and acquisition premiums in order of importance in Sections 3.1.1 and 3.1.2. Section 3.1.1 discusses the main evidence regarding the association between IFRS and acquisition premium. It presents findings from two studies authored by Bugeja and Louyeung (2011) and Bozos, Raitnaike and Alsharairi (2014). After that, Section 3.1.2 summarises the main findings from the U.S. regarding the relation between acquisition accounting choice and acquisition premiums.

3.1.1 The association between IFRS and acquisition premiums

The literature on the association between IFRS and acquisition premiums is scarce. According to my knowledge there are currently only two papers authored by Bozos, Ratnaike and Alsharairi

(2014) and Bugeja and Loyeung (2011). Bozos, Raitnaike and Alsharairi (2014) focus on European transactions where at least 20% of the target is acquired, while Bugeja and Loyeung (2011) study offer bids with Australian data. Of these two papers, the Bugeja and Loyeung (2011) paper is more important as it also focuses on the effect of changes in goodwill accounting, while the other paper study the overall influence of IFRS due to improvements in harmonisation of reporting standards and value relevance of accounting information.

In more detail, the study by Bugeja and Loyeung (2011) on Australian acquisitions, including both private and public bidders, examines the relation between goodwill accounting and acquisition premiums before and after the adoption of IFRS. They find that the correlation before IFRS is significantly negative, thus implying that bidding firms lower their acquisition premium when there is greater target firm goodwill. Furthermore, they find that the adoption of IFRS eliminates the negative relation. The authors further show that this change in the relation between acquisition premiums and goodwill post-IFRS only exist for bidding firms that have a CEO accounting based performance plan in place. They attribute this change in relation to the adoption of impairment only method in accounting for goodwill. In more detail, they explain that impairment only method removed the income decreasing effect of goodwill amortisation, which had direct personal financial consequence to CEOs with an accounting based performance plan in place. Such CEOs also received post-IFRS the most financial benefit from the change in accounting method from annual goodwill amortisation to impairment testing.

Bugeja and Loyeung's (2011) study, however, raise four critical issues that I am going to discuss here. First, they do not present any information about the industry distribution of their sample. Thus financial firms with different revenue recognition criteria may influence their results. Second, they remove 340 observations with negative goodwill and the size of these observations is substantial compared to their final sample of 380 observations after the removal of firms reporting with non-Australian GAAP and acquisitions with missing data. Third, the accounting based performance plan dummy is a noisy measure as firms can have a number of different accounting based targets, which are not further specified in Bugeja and Loyeung's (2011) study. Also, it do not incorporate information about how much in bonuses it is expected to be paid in the acquisition year. Fourth, they use only one goodwill variable, which is the approximation of goodwill to be generated on acquisition. This variable is in fact an approximation of the total

value allocated in the purchase price allocation process in all the three different phases. As described in Section 2.1.3, the first phase shows the allocation of the cost of acquisition to the value of net assets plus fair value adjustments of the net assets; the second phase represents the recognition of intangible assets and the third allocation of the rest of the cost of acquisition to the goodwill only if there is anything left to be allocated. Thus, especially under IFRS it is not a very precise proxy variable due to increased number of intangible assets to be recognised (see descriptive statistics in Subchapter 5.2). In conclusion, I think that it is important to study this topic in more detail in order to shed some light on these issues.

While Bozos, Ratnaike and Alsharairi (2014) do not focus on separate accounting changes and their effect, their study show how the adoption of IFRS affects merger premiums in the European Union with a sample of deals among listed firms from 2000 to 2011 (incl. the U.K.). They discover that merger premiums decrease for targets using IFRS and attribute this to the increases in quality, transparency and comparability of company reports due to harmonisation of accounting standards across Europe. They also find that this effect is stronger, when the target firms' accounting standards are further away from IFRS.

The most important difference between their study and this thesis is that they focus on the overall influence of changes in the target firms' value relevance of accounting information, while I focus solely on the correlation between changes in acquisition accounting and acquisition premiums from the perspective of the ultimate acquirer. Another important issue is that their study do not separate results for U.K. acquisitions and their sample also includes acquisitions of associated companies, while my sample is formed only from acquisitions of controlling interests. Finally, their IFRS dummy receives value one where the target has adopted IFRS, while it is the other way round in my study. These distinctions, therefore, make it impossible to compare their results with mine and thus I have not based any hypothesis on their findings.

3.1.2 U.S. studies regarding the association between accounting choice and acquisition premiums

In this section I will review the key literature regarding the association between accounting choice and acquisition premiums in U.S. The main hindrance with these studies is that they suffer from endogeneity problems as the accounting method choice and takeover premiums and jointly

determined (Bugeja and Loyeung, 2011). Before the adoption of SFAS 141 and SFAS 142 in 2001 acquirer could either use pooling-of-interest accounting for stock-for-stock financed acquisitions or purchase accounting. For other transactions only purchase accounting was allowed. Firms had clear incentive to favour pooling-of-interest accounting over purchase accounting. The main benefit of pooling-of-interest accounting was that acquirers could report lower total assets and higher net income relative to the purchase method by combining the book value of net assets together without recognising or amortising goodwill. Purchase accounting is similar with the accounting treatment under U.K. GAAP and thus the difference between purchase price and fair value of net assets is recorded as goodwill, which is amortised yearly.

Prior literature provides evidence that managers have incentives to finance acquisitions with common stock to qualify for the pooling-of-interest accounting and are willing to incur significant costs to achieve this goal, including paying higher acquisition premiums and accepting restrictions on stock repurchases (e.g. Lys and Vincent, 1995; Aboody, 2000; Ayers, Lefanowicz and Robinson, 2002; Weber, 2004). Robinson and Shane (1990) investigate whether the aforementioned benefits derived from accounting method are reflected in acquisition premiums for target firms. Their sample consists of 95 stock-for-stock acquisitions of which 59 are accounted for as poolings, and 36 accounted for as purchases. The results of Robinson and Shane (1990) show an association between acquisition accounting method and acquisition premiums for target firms. They report that acquisitions accounted for as poolings involved higher average acquisition premiums than acquisitions accounted for as purchases. However, it is important to point out that Robinson and Shane (1990) also remind reader that the benefits associated with accounting method are difficult to isolate, difficult to measure, and some may be obtained with either the purchase or the pooling method. The findings of Ayers, Lefanowicz and Robinson (2002) provide further support. They study a relatively homogeneous set of 523 U.S. non-taxable stock-for-stock combinations from 1990 through 1996 that could potentially qualify as either purchases or poolings. After controlling for economic differences across pooling and purchase transactions their analysis indicate that higher acquisition premiums are associated with the pooling method.

To summarise, information in Sections 3.1.1 and 3.1.2 suggests that there is an association between reporting standards and acquisition premiums. The current evidence shows that

association is either based on the improved value relevance of accounting information (Bozos, Ratnaike and Alsharairi, 2014) or to method used in accounting for business combinations (e.g. Robinson and Shane, 1990; Ayers, Lefanowicz and Robinson, 2002).

3.2 Relevant literature regarding to impact of mandatory adoption of IFRS

This subchapter shows relevant accounting literature findings on the impact of mandatory adoption of IFRS. First, Section 3.2.1 presents general findings about the impact of mandatory adoption of IFRS. Second, I will go through studies, which research the increased managerial discretion in goodwill accounting after the adoption of IFRS in Section 3.2.2. Third, I will cover studies focusing on IFRS and other intangible assets, in Section 3.2.3. Section 3.2.4 finalises this subchapter and shed a light on the connection between IFRS and M&A activity.

3.2.1 Current information about the overall impact of mandatory adoption of IFRS

This section aims to combine key findings from the extensive literature studying the impact of mandatory adoption of IFRS to give the reader a broad level understanding about the significance of IFRS. Firstly, IFRS/IAS provides more information (Ali and Hwang, 2000; Leuz and Verrecchia, 2000). Secondly, it is associated with improved analyst forecast accuracy and reduction in dispersion[12]. Thirdly, financial information under IFRS is more transparent and decision useful (Davis-Friday and Skaife, 2009) than financial information under national GAAPs. Furthermore, market reactions to events suggesting an increase in the likelihood of mandatory IFRS adoption are positive (Armstrong et al. 2010). Previously mentioned authors argue that these benefits of IFRS adoption could result from improved accounting quality/comparability. The findings of Brochet, Jagolinzer and Riedl (2013) support the view regarding improved comparability, when separately tested among U.K. firms. Results, however, regarding accounting quality and IFRS are somewhat contradictory. For example, Barth, Landsman and Lang (2008) find that voluntary adopters exhibit decreased income smoothing and increased timeliness of loss recognition after adoption, thus pointing to improved accounting quality. However, when Ahmed, Neel and Wang (2013) study the same proxies, they find that accounting quality decreased after mandatory IFRS adoption for IFRS adopters in strong

[12] See e.g. Glaum et al. (2013), Cotter, Tarca and Wee (2012), Jiao et al., (2012), Horton, Serafeim and Serafeim (2013), and Byard, Ying and Yu (2011)

enforcement countries and interpret that the difference between the results could be due to differences between voluntary and mandatory adopters.

However, it is important to notice that the benefits are likely to depend on the firm and country specific factors, of which U.K. specific factors that influence interpretation of IFRS are discussed in Subchapter 2.4. Regarding the impact of firm specific factors, Daske et al. (2013) examine liquidity and the cost of capital effects around voluntary and mandatory IAS/IFRS adoptions and focus on the firm-level heterogeneity in the economic consequences. They recognise that firms have considerable discretion in how they implement the new standards and classify firms into "label" and "serious" adopters using firm-level changes in reporting incentives, actual reporting behaviour, and the external reporting environment around the switch to IAS/IFRS. They find that, while on average liquidity or cost of capital often do not change around IAS/IFRS adoptions, "serious" adopters are associated with an increase in liquidity and a decline in cost of capital, whereas "label" adoptions are not. Thus their findings imply that caution must be exercised when interpreting capital-market effects around IAS/IFRS as they also reflect changes in reporting incentives or in firms' broader reporting strategies, and not just the standards. Due to the small sample size, my results are vulnerable to firm specific factors regarding the interpretation of IFRS, although this impact is mitigated by the fact that all firms from my sample are from a common law country (the U.K.), where there exist very effective accounting enforcement and audit mechanisms in the IFRS period of my study (see e.g. Brown, Preiato and Tarca, 2014)).

3.2.2 Studies related to managerial discretion in goodwill impairments under IFRS

Recall from Section 2.1.1 that IFRS 3 requires the testing of goodwill for impairment annually or more frequently if events or changes in circumstances indicate that the asset might be impaired. The intention of the impairment only approach is to provide users with more useful and value-relevant information regarding the underlying economic value of goodwill. However, this approach has been criticised by academics, practitioners, and dissenting IASB members because of the managerial discretion inherent in the process of testing goodwill for impairment, and the resulting blending of acquired goodwill and internally generated goodwill (Massoud and Rajborn, 2003; Watts, 2003). Thus managers can either use the discretion to convey their private information on future cash flows or opportunistically exploit unverifiable accounting discretion to extract rents from other contracting parties.

Motivated by the above debate, AbuGhazaleh, Al-Hares and Roberts (2011), examine managers' use of discretion by using a sample of 528 firm-year observations drawn from the top 500 U.K. listed firms for 2005 and 2006. In more detail, they investigate the extent to which proxies for economic impairment, managerial discretion, and effective corporate governance mechanisms explain the magnitude of goodwill impairment losses. They find that managers are actually exercising discretion in the reporting of goodwill impairments consistently with the IASB's objectives and thus they are conveying private information about future cash flows. Their conclusion is based on their results, which suggest that goodwill impairments 1) are more likely to be associated with recent CEO changes, income smoothing, "big bath" reporting behaviours and 2) strongly associated with effective governance mechanisms. Also consistently with IASB's objectives, Chalmers, Godfrey and Webster (2011) find that the association between firms' goodwill charges against income and the firms' investment opportunities was stronger during the IFRS regime than under systematic amortisation required by the Australian GAAP regime.

IFRS 3 has enabled managers to use discretion in determining goodwill impairments and when they decide to make impairment, current results suggest that it happens because firms need to convey value-relevant information regarding the underlying economic value of goodwill. However, the manager's decision to use managerial discretion and not impair goodwill in situations where the manager knows that in fact there has been decline in the economic value of goodwill under IFRS, has not been studied according to my knowledge. The reason for this is that for the outsiders of the firm it is not possible to observe managers' unbiased expectations regarding the future performance of a *cash-generating unit* that includes goodwill, which would be the ideal economic variable (Riedl, 2004). Previous researchers[13] have instead used empirical proxies to capture the economic impairment of *firm-wide* goodwill. However, AbuGhazaleh, Al-Hares and Roberts (2011) argue that the problem with these measures and especially the MTB ratio is that they can be noisy measures as firms that perform poorly at the firm level are able to avoid impairment if the cash-generating unit performs particularly well and *vice versa*. While the manager's decision to not make impairment under IFRS has not been studied, Jarva (2009) and Ramanna and Watts (2012) examine samples of non-impairing firms under SFAS 142, which also removed the amortisation of goodwill, to find out whether managers act opportunistically

[13] e.g. Francis, Hanna and Vincent (1996), Riedl (2004), Beatty and Weber (2006), Lapointe-Antunes, Cornier and Magnan (2008), Zang (2008), AbuGhazaleh, Al-Hares and Roberts (2011)

when avoiding the impairment of goodwill. Jarva (2009) fails to find convincing evidence that those non-impairment firms in his sample are opportunistically avoiding impairments. On the other hand, the results of Ramanna and Watts (2012) provide evidence that non-impairment of goodwill is increasing in firm characteristics predicted to be associated with greater managerial discretion (number of size of reporting units and unverifiable net assets in reporting units).

3.2.3 IFRS and intangibles other than goodwill

As covered in Sections 2.1.2 and 2.2.2, IAS 38 expanded the list of intangible assets to be recognised in business combinations in the U.K. The situation was similar in Norway, where Gjerde, Knivsflå and Sattem (2008) examine the impact of IFRS reconciliation adjustments to the value relevance of accounting figures compared to Norwegian GAAP from the restatement year 2004. Their most important finding related to my topic is that increased value relevance of the net operating income stems from different reporting of intangible assets. Thus they provide evidence that capitalizing intangible assets is more value relevant than expensing them as incurred or through goodwill amortisation. Oliveira, Rodrigues and Craig (2010), study the value relevance of the amounts for identifiable intangible assets and goodwill reported in the financial statements of all non-finance firms listed on the main market of the Portuguese Stock Exchange from 1998 to 2008. A distinctive change in accounting after adoption of IAS 38 and IFRS 3 was that listed firms in Portugal were no longer required to recognise some intangible assets (such as start-up costs and research expenditures) and were no longer required to amortise goodwill. They find that the IAS/IFRS had no impact on the value relevance of identifiable intangibles as a whole, but that when the subclasses of intangible assets are considered, they report evidence of an increase in the value relevance of goodwill, other intangible assets, and research and development expenditures.

The amortisation and capitalisation of finite life intangibles simultaneously with the impairment only procedure for goodwill has a negative effect on the managers' willingness to recognise finite life intangibles in business combinations. This effect and its impact on the bonuses of CEO has been studied by Detzen and Zülch (2012) with European data and Shalev, Zhang and Zhang (2013) with US data. Detzen and Zülch (2012) argue that the discretionary valuation of intangible assets, provided by the introduction of IFRS, translates into discretion regarding the recognition of goodwill, which is an item that is all the more interesting for managers due to its impairment only accounting treatment. The authors show that managers with increasing cash bonus intensity

recognise more goodwill. Shalev, Zhang and Zhang (2013) find that more goodwill is reported by acquirers, where CEO has earnings based targets in their bonuses under SFAS 141. These two pieces of research imply that managers use the discretion provided by the IFRS 3 opportunistically as an earnings management tool to avoid amortisation of finite life intangibles.

3.2.4 IFRS and M&A activity

Ashbaugh and Davis-Friday (2002) undertook probably the earliest study on high quality international financial reporting standards and M&A activity. They find that for firms cross-listed on the London Stock Exchange, adopting IFRS or U.S. GAAP increases the likelihood of the firms becoming M&A targets. According to Soderstrom and Sun (2007) this leads to two interpretations. One interpretation is that higher quality financial reporting allows outsiders to better identify acquisition targets, leading to more acquisitions of firms using IFRS or U.S GAAP. Another alternative, but not mutually exclusive, interpretation of these results is that firms that want to be acquired adopt more transparent accounting standards. Furthermore, Soderstrom and Sun (2007) argue that both interpretations suggest that a more transparent accounting environment facilitates merger and acquisition activity. The empirical tests of Davis-Friday and Skaife (2009) show that aforementioned issues are robust even after controlling for both firms' specific characteristics such as growth, performance, leverage, size, ownership structure and for other characteristics such as within-country, across-country and within-industry M&A transactions. Their results indicate that firms domiciled in countries with less expropriation risk and less M&A regulation are more likely to be targets. However, they do not find a statistically significant relation between the legal system and the likelihood of being a target.

3.3 Motives for managers to pay higher or lower premium for some target firms after adoption of IFRS

This subchapter aims to answer the question of why acquirers would be willing to either underestimate or overestimate the true intrinsic value of the target in certain transactions. First, I will discuss the role of incentive contracts in guiding managerial behaviour in Section 3.3.1. Second, I will cover two alternative hypotheses in Sections 3.3.2 and 3.3.3 that aim to help in understanding the connection between changes in reported earnings after acquisition and acquisition premium. Altogether, the purpose of this subchapter is to provide a theoretical link

between political changes in accounting standards due to the adoption of IFRS and the economic impact of those changes on acquisition premiums paid in transactions.

3.3.1 Information asymmetry and the role of management accounting bonuses

Information asymmetry is a problem between two contracting parties, where one party has more knowledge than the other party, for example the seller of the car has more information about the quality of the car than the buyer of the car (Akerlof, 1970). In the context of this thesis, information asymmetry between managers and shareholders plays a crucial role in terms of adverse actions taken by managers as a consequence of either agency motive or hubris. For example, assuming that shareholders know the same information that managers know, then for managers to pull off harmful actions would be difficult, but that is not the case in reality.

One solution to the information asymmetry problem is compensation contracts, which are made to provide incentives for managers to engage in voluntary disclosures (Healy and Palepu, 2001) and to align the interests of managers and shareholders, thus working as a mechanism for solving the manager-shareholder agency problem (Bebchuk and Fried, 2003). To promote managerial effort, compensation contracts typically include A) fixed compensation that does not depend on performance, B) equity-based compensation that depends on the performance of the firm's stock price (shares and options), and C) performance-based compensation that depends on firm performance as measured by accounting metrics (Frydman and Jenter, 2010). Accounting-based bonuses are of particular interest in this case because only some of them can be affected by the changes in accounting standards. Those that are affected by the amortisation of goodwill are earnings-based performance measures and financial ratios, while non-earnings-based performance measures such as cash flows or sales are not affected or are less affected.

The aforementioned issues have in fact two important implications regarding this thesis. First, managers prefer targets for acquisitions, which will increase the welfare of the management the most (Berkovitch and Narayanan, 1993). Second, the relative importance of accounting-based bonuses in a CEO's pay package is an important determinant of the proportion of the purchase price allocated to goodwill under fair value accounting (e.g. after IFRS), driven by the impact of tangible and identifiable intangible asset depreciation or amortisation to managers' post-acquisition bonuses (Shalev, Zhang and Zhang, 2013). As write-offs of goodwill impairment are infrequent (Ramanna and Watts, 2012), recording more goodwill generally leads to higher post-

acquisitions earnings. Even an increase in the likelihood of future impairment write-off is only expected to have a minimal impact on the bonuses. For example, Dechow, Huson and Sloan (1994), and Gaver and Gaver (1998) suggest that CEOs' cash pay is shielded from non-recurring losses such as goodwill impairment. However, impairment of goodwill will have a negative impact on the CEOs' equity-based pay due to negative market reactions (Li et al., 2011; Bens, Heltzer and Segal 2011). Therefore managers with a high relative importance of earnings based accounting bonuses in their compensation package are motivated to overstate the amount of goodwill recognised after the adoption of IFRS (Detze and Zülch, 2012). This is based on the assumption that bonus plans often include mechanical earnings-based formulas (e.g. Murphy, 1999), whereas other forms of compensation are less likely to increase with earnings inflation (Shalev, Zhang and Zhang, 2013). The findings of Bugeja and Loyeung (2011) with Australian data are also very important. They find out that only firms where CEO has accounting based bonuses in place pay a goodwill related discount in acquisition premium before introduction of IFRS and that same firms significantly increase their bids as a consequence of the adoption of IFRS. Furthermore, the relative importance of accounting-based pay is positively associated with the extent of earnings management (Larcker, Richardson and Tuna, 2007). The impact of accounting based bonuses on managers' behaviour related to mergers and acquisitions is further elaborated in following Sections 3.3.2 and 3.3.3, which presents two competing hypotheses: the management welfare hypothesis and the earnings dilution hypothesis.

3.3.2 Management welfare motive

Management welfare motive belongs to a group of motives for managers to engage in acquisitions under agency motives. Berkovitch and Narayanan (1993) point out that under agency motive acquirers identify targets that are most suited to increase the welfare of the acquirer's management. It is important to point out that management welfare can lead to either opportunistic behaviour of management or under efficient contracting to shareholder value-maximisation.

From all of the managers' incentives under agency motive only management welfare explains the reason why managers pay less money for targets with significant amount of goodwill in their balance sheet. This is because before IFRS, amortisations of goodwill were likely to decrease management's accounting based bonuses and after amortisation of goodwill was removed by the introduction of IFRS 3, there was no reason for managers not to favour targets generating large

amounts of goodwill assuming that write-downs could be avoided. That should in turn increase the premium paid for those firms as now the demand for firms with either large amount of goodwill in their balance sheet or generated on acquisition should be at least equal to other firms considering the preference of managers to overstate the amount of goodwill after adoption of fair value accounting as discussed in previous Section 3.3.1. However, all other reasons to engage in M&A are of course important and likely to impact on my results as, according to Berkovitch and Narayanan (1993), the synergy motive, the agency motive and the hubris motive are all likely to be present in all samples regarding M&A transactions. The next Section 3.3.3 discusses the earnings dilution hypothesis as another explanation for the potential behaviour of managers.

3.3.3 Earnings dilution motive

Both a competing and related hypothesis to the management welfare hypothesis is earnings dilution hypothesis. In short it means that managers prefer to avoid earnings dilution and it is also the single most important factor in determining whether to issue equity (Graham and Harvey, 2001). Even financial theory suggests that it is irrelevant in firm valuation (see Modigliani and Miller 1958; Brealey, Myers and Allen, 2007). Huang, Marquardt and Zhang (2014) find that managers increasingly try to avoid earnings dilution when their bonus compensation explicitly depends upon earnings per share performance, which is often the case. Their findings are robust after controlling for endogeneity in compensation contract design and behaviour explanations related to investor sentiment and clientele effects. Given their findings I assume that there is a similar effect in case of acquisitions, where the managers select targets, determine bid prices and leverage after acquisition to make sure that EPS for combined firms is not significantly lower than before the acquisition. A good example of target selection guided by earnings dilution is the acquisition of higher EPS targets to increase the EPS for one's own firm even in cases when there are no significant synergies. This hypothesis can explain why firms might pay more for targets after the introduction of IFRS. The reason for that is the increase in post-acquisition EPS figures as a consequence of the removal of the amortisation of goodwill, which is in line with the findings of Huikku and Silvola (2012). This impairment only approach also increases managers' EPS based bonuses and generally prevents further dilution of EPS caused previously by amortisation. Thus, I expect that managers with earnings based bonuses pay lower premiums for acquisitions that decrease reported earnings especially before the introduction of IFRS.

4 Hypotheses

The goal of the empirical study is to generate answers to the three research questions introduced in the first Chapter. After examining U.K. GAAP and IFRS accounting standards, the influence of changes in acquisition accounting standards and managers' incentives, I can now formulate research hypotheses to examine the association between IFRS and acquisition premiums in the U.K. In course of the analysis of the empirical study, I verify (i.e. validate or reject) these hypotheses and develop explicit answers for the three research questions. For these hypotheses I will use data from acquisitions among listed firms in the U.K. from 1999 to 2012.

First, I begin with an investigation of the existence of the goodwill related discount in acquisition premiums in the U.K. before the introduction of IFRS. Second, I analyse the impact of the introduction of IFRS on the goodwill related discount in acquisition premiums. Third, I test whether results apply only when acquirer's CEO has earnings based bonus incentives. Fourth, I study managerial discretion measured with initial flexibility in PPA and draw conclusions about its potential impact on acquisition premiums. Furthermore, I aim to shed some light on the value relevance of new standards in the context of acquisitions. In more detail I aim to test whether the recognition of finite life intangible assets seems to convey new information to the market by being positively correlated with the premium paid on acquisitions.

As explained in Section 2.2.2, under U.K. GAAP firms in general had to amortise accumulated goodwill over its useful economic life. The findings of Bugeja and Loyeung (2011) indicate that the amount of goodwill approximated to be generated on acquisition decreases the premium paid under accounting standards that amortise goodwill. Additionally, I will also measure goodwill with the amount of goodwill on the balance sheet of the target firm and the amount of goodwill recognised in business combinations. I will examine this relation between goodwill measures and acquisition premiums using the first hypothesis:

- *H1*: *There is a negative correlation between measures for goodwill and acquisition premium before the adoption of IFRS for listed firms in the U.K.*

If I can validate H1, then I will continue to the hypotheses for the research question 2.

The mandatory adoption of IFRS in 2005 changed the association between goodwill and acquisition premium by removing the amortisation of goodwill. Regarding this effect, Bugeja and Loyeung (2011) find that the association between goodwill and acquisition premium hold only for firms which use accounting based bonuses in CEO compensation and before 2005 there is no discount in premium for firms without accounting based bonus system in place. They state that the reason for this is that accounting based compensation creates a link between amortisation of goodwill and manager bonuses. However, in formulation of my Hypothesis 3, I lean towards the findings of Detzen and Zülch (2012) and Shalev, Zhang and Zhang (2013) regarding PPA under IFRS 3 and SFAS 142. The former find that CEOs whose cash bonus in the previous years before acquisition is between 150% and 200% recognise more goodwill, while the latter find that allocation to goodwill increases when acquirer's CEO has bonuses based on the increase in earnings. Based on these findings, I expect that the link between goodwill and acquisition premiums is strongest when the CEO of the acquirer can expect to receive bonuses (i.e. bonuses have been paid in either of the two years prior to acquisition) and bonus targets are based on earnings.

Alternatively, managers want to avoid unnecessary earnings dilution for various reasons such as other compensation contracts, debt covenants or ability to keep dividend pay-out ratio in check. For example, Graham and Harvey (2001) state that earnings dilution is the single most important factor in determining whether to issue equity or not. Therefore the existence of such a relation between goodwill and acquisition premiums may not only be limited to a case where a manager has an earnings based bonus system in place. To test the existence of the influence of IFRS on acquisition premium, I formulate the following hypotheses to answer research question 2:

- *H2: The mandatory adoption of IFRS decreases goodwill related discount in acquisition premium for transactions, where the acquirer has adopted IFRS standards.*
- *H3*: *Correlations tested with H1 and H2 regarding goodwill and acquisition premium, only hold when acquirer's CEO expects to receive bonuses based on reaching earnings related targets.*

Ramanna and Watts (2012) discover that initial flexibility in purchase price allocation is associated with the CEO's decision to make write-downs in goodwill. Thus, it is reasonable to argue that CEO's with higher initial flexibility can pay a higher premium for acquisitions as they

do not have to fear the negative impact of goodwill impairment in case of failure. However, because in this thesis higher initial flexibility is measured for example with the number of business segments, it means that those firms with more initial flexibility than others are conglomerates. For conglomerates, there has been historically diversification discount[14] in the market and therefore there is an increased pressure for conglomerate firms not to overpay. For all acquirers, the amount of unverifiable net assets on the balance sheet increases the subjectivity of the managers and information asymmetry between outsiders and insiders of the firm (Ramanna and Watts, 2012). Following Detzen and Zülch (2012), I measure all these variables for the combined firm after acquisition. I expect that this increased value in the option of whether to make or not to make impairment under IFRS standards translate to increase in premium in both cases. Therefore I introduce the next hypotheses for the research question 3:

H4: *For organisationally complex firms the impact of IFRS on acquisition premium is positive.*

H5: The amount of unverifiable net assets on the balance sheet of the combined firm after acquisition has a positive impact on the acquisition premium after adoption of IFRS.

Finally, I am going to shed light on the usefulness of the intangible assets to be recognised in business combinations. The literature[15] suggests that intangible assets are generally value relevant. If intangibles are not already incorporated in the value of the target firm, then the coefficient for intangible assets should be positive. I will here focus on finite life intangible assets, because they are much more common in my sample. However, I do not expect that IFRS per se impacts the coefficient of finite life intangible asset variable, because only the criteria for recognition have changed, but not the accounting for those assets, unless the assets recognised convey less value than assets recognised under U.K. GAAP. The differences in value relevance of finite life intangibles, however, cannot be studied reasonably due to small amount of finite life intangibles in the U.K. sample. Therefore my last hypothesis is as follows:

H6: Based on the value relevance of the recognition of intangible assets, I assume that the recognition of finite life intangible assets is positively correlated with acquisition premium.

[14] See e.g. Berger and Ofek (1995), Lang and Stulz (1994), Comment and Jarrell, 1993, and Servaes (1996)
[15] See e.g. Godfrey and Koh (2001), Ritter and Wells (2006) and Chalmers, Clinc and Godfrey (2008)

5 Data

To study the hypotheses presented in Chapter 4, I have collected my sample as thoroughly and in as detailed a way as possible. Therefore the data for this study is a combination of different pieces of data obtained from Worldscope, Datastream, SDC and different reports published by the acquirers in my sample. In the next Subchapter 5.1, I will discuss data and sample selection in more detail and define variables employed in my regression models. In Subchapter 5.2, I will present descriptive statistics relating to all the variables on which my empirical analysis is based. In Subchapter 5.3, I discuss in more detail the process of manually collecting data and in Subchapter 5.4, I report the process used to check potential errors in my sample. Finally in Subchapter 5.5, I conclude the chapter and present the limitations of data.

5.1 Data, sample selection and definition of variables

This subchapter presents information regarding data, sample selection process and defines the variables used in this thesis. Acquisition data for this thesis is gathered from the Thomson One Banker SDC Premium M&A database. To be included in my final sample, a transaction must have been completed; the first announcement date must lie between 1 January 1999 and 31 December 2012; the target must be a U.K. public firm; the acquirer must be either a public firm or a subsidiary of a public firm; the acquirer or target must not operate in the financial sector (SIC codes between 6000 and 6999, excluding firms operating in the real estate sector with SIC codes of 6798, 6552, 6531 and 6512); deal value is $1M or higher and the acquirer must consolidate the target firm's balance sheet after the transaction by using acquisition accounting. This last criterion eliminates 18 observations related to transactions accounted as mergers under FRS 6. As already mentioned in Subchapter 2.2 the strict criteria for merger accounting to be employed together with the small number of mergers within the U.K. GAAP period effectively indicates that endogeneity arising from the joint determination of acquisition method and acquisition premium is small. Furthermore missing data is handled listwise.

Following general practice in empirical research in accounting and finance[17], I have also excluded those transactions from my sample where either the target or the acquirer has negative equity. The reason for this is the disturbance of negative equity stocks especially for variables

[17] See e.g. Fama and French (1992), Vassalou and Xing (2004) and Griffin and Lemmon (2002)

such as leverage, market-to-book and return on equity, which are included in all of the regression models used in this thesis. In total, 15 observations were removed from the data of which 10 occurred before IFRS and five after the adoption of IFRS. My sample construction process is described in Table 2, which shows the number of observations obtained after a rigorous sample formation procedure. Originally reported accounting data came from Worldscope, stock market data from Datastream, while the information for purchase price allocation, accounting standards employed in consolidation, CEO compensation and acquirer's board of directors' ownership is hand-picked from annual reports, offer documents or listing documents.

Table 2 – M&A sample construction

This table presents sample selection and elimination processes used to construct the sample for Replica and Baseline models. *Requirements to collect sample were: 1) International M&A transactions between announcement dates of 1999 and 2012, 3) transaction must be completed, 3) target is a public firm, 4) acquirer is a public firm or a subsidiary of a public firm, 5) targets, acquirers and possible acquirers' ultimate parent are U.K. firms and 6) after transaction it is required for the acquirer to consolidate the target i.e. before acquisition acquirer owns less than 50% of the target, but after acquisition acquirer controls majority of the firm.

Transactions meeting above mentioned requirements*		363
Exclusions in order of occurrence:		
Transactions accounted as merger when consolidated by the acquirer	18	
Transaction accounted as a purchase of assets	1	
Joint acquisition	1	
Missing company identifiers, or identifiers are same for both target and acquirer (incl. reverse acquisitions)	14	
Transactions with deal value less than $1M	2	
Missing target stock price data	4	
Missing annual report data	19	
Missing financial data	6	
Incorrect information/does not meet sample requirements	9	
Financial firms (excl. REITs)	41	
Negative equity stocks	15	
Extremely influential outlier removed	1	(131)
Total available sample size		232
Missing data for each regression model:		
1) Replica model		(53)
Total sample size to estimate Replica model		**179**
2) Baseline model		(54)
Total sample size to estimate Baseline model		**178**

Taking the above-mentioned restrictions into account leaves an initial sample of 232 acquisitions. Observations where no complete set of data is available for each model are removed according to listwise deletion process, which decreases the number of observations to 179 for the Replica sample and 178 for the Baseline sample. The Replica model employs the variables used by Bugeja and Louyeung (2011) for comparative purposes and the Baseline model is built from scratch to maximise adjusted R-squared and F-test given the group of test variables used in the literature (in total 54 variables were tested). Due to different variables, samples are slightly more unequal than the difference of one observation in sample size suggests and therefore I will treat

them separately throughout my thesis. My final sample sizes are comparable with numbers reported in the literature: Renneboog and Zhao (2014) show that 545 acquisition announcements that involved public bidders and targets took place over the period from 1999 to 2012 (of which approximately 82% were completed). My sample requirements are more restrictive but include subsidiary acquirers because I require acquisitions to be completed and consolidated after the announcement. The consolidation requirement is important because only then must the acquirer recognise goodwill from the transaction according to both U.K. GAAP and IFRS.

Lastly, having the Herfindahl-Hirschman Index variable, based on the reported segment net sales figure for the combined firm after acquisition, adds other restrictions to those regression models that employ the variable in question. Net sales based HHI reflects the degree to which the net sales are concentrated in just a few of a company's business segments (calculation with examples is shown in Section 6.3.1). Following the approach used in diversification discount literature (e.g. Berger and Ofek, 1995; Schmid and Walter, 2009), I assume that net sales are usually completely allocated among the reported segments of a diversified acquirer and therefore, I require that the sum of segment net sales must be within 25% of total sales for the acquirer. This requirement drops 4 observations from models with the HHI variable in addition to 12 missing observations due to lack of segment sales and the number of segments data. Negative net sales figure for a segment is a sign of discontinued operations, and thus negative net sales segments are excluded when calculating HHI by transferring the negative values to other segments on a pro rata basis, which ensures that the sum of segment net sales should be equal to the total net sales for the acquirer. Discontinued segments for the acquirer can be for example unwanted segments acquired in acquisition, which are then sold separately. The definitions for all dependent variables, key independent variables and control variables are presented in Table 3 below.

Table 3 – Variable definitions
This table provides the definitions of variables used in Tables 9-16. Also the source for these variables is provided.

Variable	Definition	Source
Dependent variable		
Acquisition premium	The natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. Target share price is adjusted for splits and dividends.	SDC, Datastream
Key independent variables		
TGT Goodwill	The balance sheet value of goodwill for the target firm divided by the consideration paid	Worldscope, ARs, partially hand-collected
Goodwill approxima-tion	The target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity	Datastream, Worldscope

Recognised goodwill	The recognised balance sheet value of goodwill divided by the consideration paid	ARs, hand-collected
IFRS	A dummy variable that takes on the value of one if acquisition is accounted according to IFRS and is otherwise zero	ARs, hand-collected
Finite life intangibles	The recognised amount of finite life intangible assets divided by the consideration paid	ARs, hand-collected
VNA	The ratio of (cash + investments – debt – preferred equity) to (assets – liabilities), measured for the combined firm in fiscal year *t+1*	Worldscope
UNA	VNA*(-1)	Worldscope
ModUNA	$\lvert(1-\lvert \text{VNA} \rvert)\rvert$	Worldscope
Segment	The natural logarithm of the number of business segments for combined firm in fiscal year *t*+1	Worldscope
HHI	The Herfindahl-Hirschman ratio of business segment sales for combined firm in fiscal year *t*+1	Worldscope
Market information		
Runup -1 – 42	The target runup expressed as $(r_{-1}-r_{-42})/r_{-42}$, where r_i is the value of total return raw index on day *i*. Total return raw index is adjusted for stock splits and dividends.	Datastream
FTSE 100 P/E ratio	The P/E ratio for the FTSE 100 index 42 days before the announcement of the offer for the target firm	Datastream
Deal characteristics		
Multiple bidders	A dummy variable that takes on the value of one if there was a competing bid from a rival or a revised bid from the initial bidder and is otherwise zero	SDC
Friendly	A dummy variable that takes on the value of one if target management's response is friendly	SDC
Cash only	A dummy variable that takes on the value of one if payment method is cash only and is otherwise zero.	SDC
Share only	A dummy variable that takes on the value of one if payment method is share only and is otherwise zero.	SDC
Toehold %	The percentage of common, or common equivalent, shares outstanding held by the acquirer as of the announcement date.	SDC
Initial agreement	A dummy variable that takes on the value of one if initial reception by the target is agreed and is otherwise zero.	SDC
Target characteristics		
TGT MTB	The ratio of the target firm's market value of equity 42 days before original date announced to the average book value of equity in fiscal year *t*-1	Datastream, Worldscope
TGT Insider ownership %	The percentage of shares held by insiders of target firm at the end of the fiscal year *t*-1	Worldscope
TGT ROE	The ratio of the target firm's net income to the average book value of equity in fiscal year *t*-1	Worldscope
TGT Leverage	The ratio of the long-term debt of a target firm to its common equity (incl. liquidation preferred stock) at the end of the fiscal year t-1	Worldscope
TGT Size	The natural logarithm of target firm's total assets at the end of the fiscal year t-1	Worldscope
TGT FCF	The cash flow from operations less dividends, divided by total assets for target firm in fiscal year *t*-1	Worldscope
TGT Growth 1 year	The rate of growth of net sales or revenues for target firm in fiscal year *t*-1	Worldscope
Acquirer characteristics		
ACQ MTB	The ratio of the acquirer's market value of equity 42 days before original date announced to the average book value of equity in fiscal year *t*-1	Datastream, Worldscope
ACQ Insider ownership %	The percentage of shares held by insiders of acquirer at the end of the fiscal year *t-1*	Worldscope
ACQ ROE	The ratio of the acquirer's net income to the average book value of equity in fiscal year *t*-1	Worldscope
ACQ Leverage	The ratio of the long-term debt of a acquirer to its common equity (incl. liquidation preferred stock) at the end of the fiscal year *t*-1.	Worldscope
ACQ Size	The natural logarithm of acquirer's total assets at the end of the fiscal year *t*-1	Worldscope
ACQ FCF	The cash flow from operations less dividends, divided by total assets for acquirer in fiscal year *t*-1	Worldscope
ACQ Board ownership £	The value of the acquirer shares owned by the acquirer board of directors at the fiscal year end *t*-1	ARs, hand-collected

Panel A of Table 4 presents the number of acquisitions and summary statistics about deal valuations for both the Replica and Baseline samples for the entire period 1999-2012 and for each separate year in this period. The frequency distribution of the number of deals over the sample period follows a similar pattern for both Replica and Baseline acquisitions, with a peak of activity occurring at the beginning of the period in 1999 and decreasing thereafter. The frequency of the deals seems to pick up again in 2003. The deal value for an acquisition is equal to the total value of consideration paid by the acquirer, excluding fees and expenses. The mean and median deal values for acquisitions in the Baseline sample are a little higher than in the Replica sample, but the difference is not significant. However, it is worth noting that for both samples the mean deal value is approximately 3.5 times the size of a typical acquisition in my sample.

Panel B and Panel C of Table 4 report the rankings of the top 10 industries of targets and acquirers for the Replica and Baseline samples. In both samples, Business services industry (SIC Code 73) clearly dominates the industry composition with roughly 30 target and acquirer firms. Second largest acquirer industry is Engineering and Management services industry (SIC Code 87). It is also the largest target firm industry in the Replica sample but in the Baseline sample there are more target firms under General Building Contractors (SIC Code 15).

Table 4 – Deal values and industry decomposition of Replica and Baseline samples

Panel A reports summary statistics about the number and size of deal values for acquisitions of subsidiary of U.K. listed firms by U.K. listed firms between 1999 and 2012 for Replica sample and Baseline sample. Replica sample includes same variables that Bugeja and Louyeung (2011) has used for comparative purposes and Baseline sample is constructed to improve their model to fit better for U.K. data and give more robust results. The deal value is defined as the total value of consideration paid by the acquirer, excluding fees and expenses. The mean, median and total columns are reported in millions of dollars. Financial firms (SIC codes between 6000 and 6999) except real estate investment trusts (REITS, 6798 SIC code) and acquisitions with a deal value less than $1 million are excluded. Listed REITS are included in samples, because before Finance Act 2006 came effective at January 2007, they were mostly classified as property companies. Panel B reports the top 10 industries (two-digit SIC level) for the Replica and Baseline acquirers respectively. Panel C reports the same information than Panel B for target firms.

Panel A: summary statistics of the deal values for Replica sample and Baseline sample

	Replica sample				Baseline sample			
Year	N	Mean	Median	Sum	N	Mean	Median	Sum
1999	25	$384.16	$127.36	$9 603.94	36	$360.58	$126.08	$12 980.78
2000	17	$531.33	$203.74	$9 032.62	20	$459.93	$158.42	$9 198.61
2001	9	$202.25	$89.82	$1 820.23	12	$226.32	$101.56	$2 715.83
2002	9	$185.71	$27.66	$1 671.41	7	$231.97	$209.08	$1 623.79
2003	13	$568.39	$68.18	$7 389.07	12	$611.42	$114.13	$7 337.04
2004	14	$169.75	$90.54	$2 376.52	13	$181.46	$93.28	$2 358.96
2005	19	$306.84	$124.50	$5 829.99	17	$334.80	$138.67	$5 691.61
2006	15	$325.04	$69.52	$4 875.61	12	$380.31	$93.75	$4 563.73
2007	17	$761.96	$69.23	$12 953.34	15	$859.98	$128.68	$12 899.63
2008	8	$480.95	$107.35	$3 847.59	7	$540.81	$152.81	$3 785.70
2009	14	$237.43	$40.13	$3 324.08	10	$272.95	$51.89	$2 729.48
2010	8	$871.45	$176.68	$6 971.57	7	$995.13	$283.04	$6 965.88
2011	7	$183.14	$109.33	$1 281.97	6	$160.83	$105.75	$965.01
2012	4	$265.78	$215.62	$1 063.12	4	$265.78	$215.62	$1 063.12
Total	179	$402.46	$112.19	$72 041.07	178	$420.67	$120.36	$74 879.17

Panel: B: industry decomposition of Replica and Baseline sample acquirers

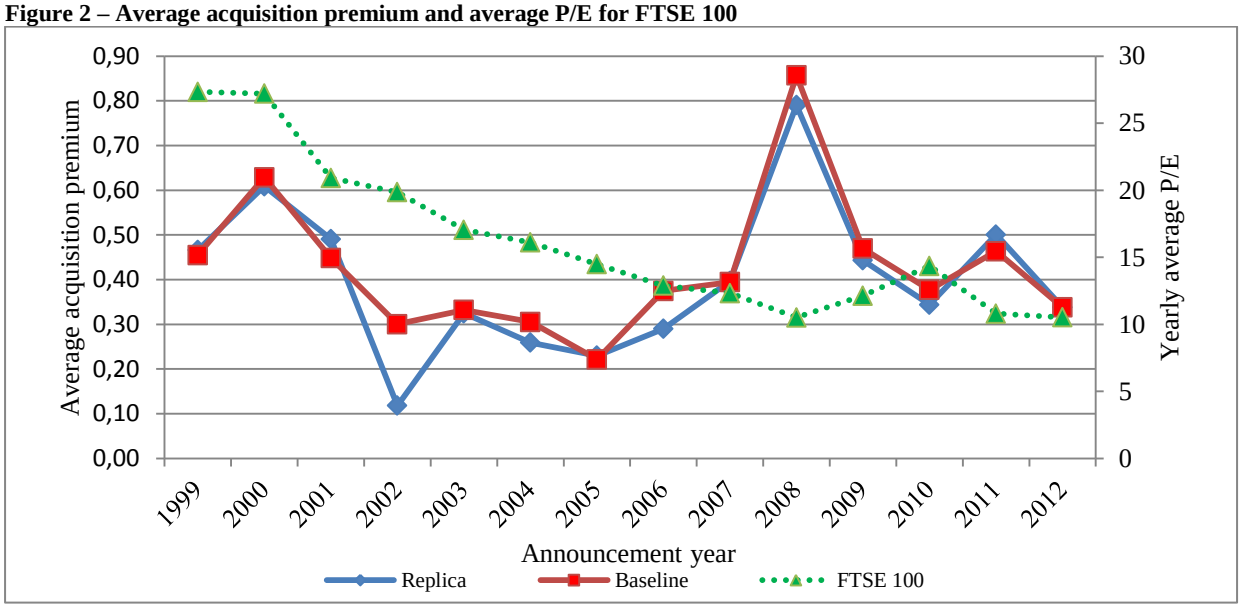
Replica sample			Baseline sample		
Industry	SIC Code	N	Industry	SIC Code	N
Business Services	73	27	Business Services	73	28
Engineering & Management Services	87	16	Engineering & Management Services	87	14
General Building Contractors	15	14	General Building Contractors	15	13
Food & Kindred Products	20	11	Food & Kindred Products	20	11
Communication	48	11	Communication	48	11
Chemical & Allied Products	28	9	Printing & Publishing	27	9
Printing & Publishing	27	8	Real Estate	65	8
Real Estate	65	8	Real estate investment trusts	67	8
Oil & Gas Extraction	13	7	Chemical & Allied Products	28	7
Eating & Drinking Places	58	7	Eating & Drinking Places	58	7

Panel: C: industry decomposition of Replica and Baseline sample target firms

Replica sample			Baseline sample		
Industry	SIC Code	N	Industry	SIC Code	N
Business Services	73	29	Business Services	73	31
Engineering & Management Services	87	12	General Building Contractors	15	10
General Building Contractors	15	10	Real Estate	65	10
Chemical & Allied Products	28	10	Food & Kindred Products	20	9
Communication	48	9	Eating & Drinking Places	58	9
Real Estate	65	9	Engineering & Management Services	87	9
Food & Kindred Products	20	8	Chemical & Allied Products	28	8
Eating & Drinking Places	58	8	Communication	48	8
Oil & Gas Extraction	13	7	Printing & Publishing	27	6
Special Trade Contractors	17	5	Special Trade Contractors	17	5

Figure 2 on the following page depicts the mean premium paid for both the Replica and Baseline samples together with the mean FTSE 100 P/E ratio for each separate year in the sample period from 1999 to 2012. FTSE 100 P/E yearly averages are calculated from the daily P/E figures for the constituents of the FTSE 100 index, which are taken from Datastream.

Figure 2 – Average acquisition premium and average P/E for FTSE 100



This figure illustrates the variation in average acquisition premium for both Replica and Baseline samples. Yearly average P/E figures for FTSE 100 index are calculated from daily FTSE 100 P/E figures, which are taken from Datastream. In Datastream P/E figures are derived by dividing total market value by the total earnings, thus providing an earnings-weighted average of the P/Es of the constituents of FTSE 100 index. The horizontal axes correspond to average premium per year and yearly average for P/E figures, and the vertical axis corresponds to years.

What seems to be the most striking result is that the shapes of the distribution for mean premium in both samples tend to correlate positively with the FTSE 100 P/E ratio before year 2005, which is exactly the same year when IFRS was adopted by listed firms in the EU. In 2006, however, positive correlation changes to negative correlation with FTSE 100 P/E ratios and stays negative through the rest of the sample period. In fact the result holds even when calculating pairwise correlations for FTSE 100 P/E, estimated 42 days before announcement date, and the acquisition premium calculated without logarithm. The correlation between variables is significant and positive at the 1% level in the U.K. GAAP Sample, but negative, though without significance, for the IFRS sample. The financial crisis of 2008 can explain both the peak in average premium and the trough in the FTSE 100 P/E ratio as stock prices crashed, but there was not an equally drastic negative effect on the earnings of the firms, thus leading to both higher premiums compared to previous stock performance and lower P/E ratios. For other years though, IFRS may offer a possible, but not a complete explanation. IFRS increased the amount of reported earnings by removing amortisation of goodwill without impacting on the cash flows of the firm, which together led to a decrease in P/E ratios. It is also worth pointing out that IFRS somewhat decreased the aforementioned effect by decreasing earnings and increasing P/E ratios with amortisation of finite life intangibles. These intangibles are typically appreciated by the acquirer

and probably not fully reflected in the market value of the company as they are only recognised on the balance sheet of the acquirer in the purchase price allocation process.

5.2 Descriptive statistics

This subchapter presents the descriptive statistics for both Replica and Baseline samples. Table 5 reports the summary statistics for all deal, firm and market specific variables that I construct for the Replica sample and Table 6 reports the same information for the Baseline sample. The accounting values reported belong to the fiscal year prior to the announcement of the transaction (see variable definitions in Table 3 for more information). The mean and median for the initial offer premium percentage, measured as the final offer price minus the target share price 42 days before the original acquisition announcement divided by the target share price 42 days before the original acquisition announcement date, are somewhat larger in the Baseline sample than in the Replica sample pre-IFRS and *vice versa* for the goodwill on the balance sheet of the target firm. In the Baseline sample the goodwill on the balance sheet of the target firm standardised with the consideration paid is 2.36 times larger post-IFRS than its value pre-IFRS for the same sample, but at a nearly similar size to the post-IFRS value in the Replica sample. The difference in means could have some impact on the results between the models for the TGT Goodwill variable. Otherwise, there are no interesting differences among the variables used in both models, which could explain potential differences in the results between the two models.

The most important finding from Table 5 is that the distribution for TGT Goodwill after IFRS differs significantly at the 1% level from the pre-IFRS figures due to a larger number of zero values. Regarding control variables it can be seen that the acquirer's size, measured as total assets, of the typical firm after adoption of IFRS is 5.7 times larger than the typical firm size before IFRS[18]. Differences for means and distributions of ACQ size are statistically significant at the 1% level according to two-sample t-test and Wilcoxon rank-sum test (WRS). At the 5% significance level, the variable TGT insider ownership percentage is higher pre-IFRS in terms of means. Similarly in the IFRS sample acquirers have a larger amount of free cash flow to spend on acquisitions thus offering an opportunity to pay higher premiums than pre-IFRS. The mean for the acquirer's free cash-flow variable measured as the cash-flow from operations less dividends, divided by total assets is 1.57 times larger post-IFRS.

[18] In Tables 5 and 6, variable size is measured with a natural log transformation as this form is used in regressions.

Table 6, which describes the Baseline sample, shows some additional differences between IFRS and U.K. GAAP samples. For example, the typical and average CEO bonuses as a percentage of salary in the IFRS sample period have more than doubled when compared to U.K. GAAP sample period. This is in line with the general growth of CEO compensation and competition for the most talented leaders among firms. Even more dramatic has been the change in the case of finite life intangible assets, where the standardised size is 24 times larger post-IFRS than pre-IFRS. Furthermore, a typical transaction now involves the recognition of finite life intangibles, which was not the case under U.K. GAAP and thus the shape of the distribution has also changed significantly at the 1% level.

In the case of the control variables, the P/E ratio for the FTSE 100 index, measured 42 days before announcement, and acquirer's board of directors' ownership percentage have nearly halved in terms of means and medians from the U.K. GAAP sample period to the IFRS sample period. For both variables the shape of the distribution is significantly different in the IFRS sample than in the U.K. GAAP sample. P/E ratio is an overall estimation of market level valuations and when market level valuations are at a high (low) level, typically also the number of acquisitions paid with cash is lower (higher) and *vice versa.* My sample supports this hypothesis, since the amount of share only transactions stays at the same level pre- and post-IFRS, while the amount of cash only transactions are 2.26 times more common in the IFRS sample than in the U.K. GAAP sample as shown in Table 6. As in the Replica sample, the mean ACQ Size in The Baseline sample has significantly increased together with a change in the shape of the distribution as indicated by WRS. The size of this increase in the average acquirer's total assets is 151%. All abovementioned changes in means are statistically significant at the 1% level. Other significant changes in means at the 5% level are a 63% increase in average target firm total assets (size) and a decrease in HHI with a 5% statistically significant change in the shape of the HHI variable's distribution.

Table 5 – Summary statistics and univariate tests for variables in Replica model

This table provides summary statistics and reports the results of the univariate tests on variables used in the Replica model studied by Bugeja and Loyeung (2011) with announcement dates from Jan 1 1999 to Dec 2012 for 179 acquisitions among listed firms in the U.K. The dependent variable is Initial offer premium %, which is calculated as the final offer price minus target share price 42 days before original acquisition announcement date divided by the target share price 42 days before original acquisition announcement date. TGT Goodwill is the balance sheet value of goodwill for the target firm before acquisition divided by the consideration paid, Goodwill approximation is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity and Recognised goodwill is the recognised balance sheet value of goodwill divided by the consideration paid. IFRS is an indicator variable denoting acquisitions accounted according to IFRS. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent significance levels at the 1%, 5%, and 10% levels of the two sample t-tests for the difference in means and the Wilcoxon rank-sum test for the difference in distributions for variables across the samples of U.K. GAAP and IFRS acquisitions, respectively. In case of binary variables a $\chi 2$-test is used to test statistical difference before and after the adoption of IFRS. In situations, where $\chi 2$-test is not valid, Fisher's Exact test was used. Results of $\chi 2$-tests are then marked to difference in means column. Differences in distributions for binary variables cannot be tested and thus those are excluded from the table.

	N	Mean	Median	St. dev.	Min.	Max.	Pre-IFRS mean	Post-IFRS mean	Pre-IFRS median	Post-IFRS median	Difference in means	Difference in medians
Dependent variable												
Initial offer premium %	179	0.29	0.31	0.31	-1.14	1.27	0.27	0.31	0.31	0.31	-0.04	-0.01
Key independent variables												
TGT Goodwill	179	0.19	0.01	0.41	-0.06	2.77	0.16	0.23	0.00	0.04	-0.07	-0.04***
Goodwill approximation	179	1.41	0.48	3.38	-0.95	21.78	1.34	1.50	0.46	0.49	-0.16	-0.03
Recognised goodwill	179	0.58	0.57	0.55	-1.09	4.26	0.57	0.59	0.60	0.52	-0.02	0.09
IFRS	179	0.45	0.00	0.50	0.00	1.00						
Deal characteristics												
Multiple bidders	179	0.07	0.00	0.26	0.00	1.00	0.10	0.04	0.00	0.00	0.06	
Friendly	179	0.94	1.00	0.24	0.00	1.00	0.95	0.93	1.00	1.00	0.02	
Cash only	179	0.30	0.00	0.46	0.00	1.00	0.19	0.43	0.00	0.00	-0.23***	
Toehold %	179	0.03	0.00	0.08	0.00	0.35	0.03	0.03	0.00	0.00	0.01	0.00
Target characteristics												
TGT MTB	179	2.41	1.48	3.38	0.05	22.78	2.34	2.50	1.46	1.49	-0.16	-0.03
TGT Insider ownership %	179	0.31	0.31	0.21	0.00	0.82	0.34	0.28	0.33	0.27	0.06**	0.06*
TGT ROE	179	0.03	0.09	0.37	-3.42	1.46	-0.01	0.09	0.09	0.08	-0.09*	0.01
TGT Leverage	179	0.32	0.09	0.59	0.00	4.35	0.32	0.33	0.10	0.08	-0.02	0.02
TGT Size	179	18.58	18.49	1.58	15.01	22.65	18.43	18.77	18.35	18.65	-0.34	-0.30
TGT FCF	179	0.06	0.08	0.17	-1.53	0.40	0.06	0.07	0.10	0.07	-0.01	0.03
Acquirer characteristics												
ACQ MTB	179	5.95	2.56	14.59	0.35	143.62	5.45	6.58	2.46	2.91	-1.12	-0.45
ACQ Insider ownership %	179	0.19	0.14	0.19	0.00	0.82	0.22	0.16	0.18	0.11	0.06*	0.07**
ACQ ROE	179	0.13	0.12	0.58	-1.93	6.29	0.08	0.20	0.10	0.13	-0.13	-0.03
ACQ Leverage	179	0.70	0.26	3.26	0.00	42.85	0.41	1.06	0.26	0.26	-0.65	0.00
ACQ Size	179	20.03	19.82	2.37	14.49	26.27	19.61	20.53	19.32	21.06	-0.92***	-1.74***
ACQ FCF	179	0.08	0.09	0.13	-0.60	0.51	0.07	0.11	0.08	0.10	-0.04**	-0.02*

Table 6 – Summary statistics and univariate tests for variables in Baseline models

This table provides summary statistics and reports the results of the univariate tests on variables used in Baseline models with announcement dates from Jan 1 1999 to Dec 2012 for acquisitions among listed firms in the U.K. The dependent variable is *Initial offer premium %*, which is calculated as the final offer price minus target share price 42 days before original acquisition announcement date divided by the target share price 42 days before original acquisition announcement date. *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid, *Goodwill approximation* is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity and *Recognised goodwill* is the recognised balance sheet value of goodwill divided by the consideration paid. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. *Finite life intangibles* is the recognised amount of finite life intangible assets divided by the consideration paid. *CEO Bonus %* is the percentage of total bonus earned to total salary paid for the two previous fiscal years or for the previous fiscal year if FY-2 fiscal year information is missing and *Earnings based bonuses* is an indicator variable denoting acquisitions where acquirer's CEO's bonuses are based on earnings or earnings multiples. *UNA* is a measure of unverifiable net assets, *Segment* is the natural logarithm of the number of business segments and *HHI* is the Herfindahl-Hirschman ratio of business segment sales. All three variables are estimated for the combined firm after effective date of the transaction. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent significance levels at the 1%, 5%, and 10% levels of the two sample t-tests for the difference in means and the Wilcoxon rank-sum test for the difference in distributions for variables across the samples of U.K. GAAP and IFRS acquisitions, respectively. In case of binary variables a $\chi 2$-test is used to test statistical difference before and after the adoption of IFRS. Results of $\chi 2$-tests are marked to difference in means column. When $\chi 2$-test was not valid, Fisher's Exact test was used. Differences in distributions for binary variables cannot be tested and thus those are excluded from the table.

	N	Mean	Median	St. dev.	Min.	Max.	Pre-IFRS mean	Post-IFRS mean	Pre-IFRS median	Post-IFRS median	Difference in means	Difference in medians
Dependent variable												
Initial offer premium %	178	0.32	0.35	0.27	-0.80	1.27	0.31	0.33	0.35	0.33	-0.02	0.02
Key independent variables												
TGT Goodwill	178	0.17	0.00	0.38	-0.06	2.77	0.11	0.26	0.00	0.06	-0.15**	-0.06***
Goodwill approximation	178	1.61	0.51	3.76	-0.95	21.78	1.58	1.66	0.45	0.65	-0.08	-0.20
Recognised goodwill	178	0.63	0.60	0.60	-1.09	4.26	0.61	0.65	0.67	0.54	-0.04	0.12
IFRS	178	0.39	0.00	0.49	0.00	1.00						
Finite life intangibles	178	0.10	0.00	0.21	0.00	1.16	0.01	0.24	0.00	0.17	-0.23***	-0.17***
CEO Bonus %	177	0.58	0.39	0.73	0.00	4.40	0.39	0.87	0.27	0.65	-0.47***	-0.38***
Earnings based bonuses	132	0.83	1.00	0.37	0.00	1.00	0.89	0.76	1.00	1.00	0.13*	
UNA	161	-0.22	0.13	5.96	-72.67	7.05	0.41	-1.26	0.13	0.12	1.67	0.01
Segment	167	0.89	1.10	0.62	0.00	2.20	0.82	1.00	1.10	1.10	-0.18*	0.00*
HHI	165	0.63	0.56	0.28	0.13	1.00	0.67	0.58	0.64	0.50	0.09**	0.14**
Market information												
Runup -1 -42	178	0.20	0.16	0.30	-0.61	1.65	0.20	0.20	0.17	0.15	-0.01	0.02
FTSE 100	178	18.72	17.00	6.53	7.36	31.46	22.60	12.58	23.75	12.64	10.03***	11.11***
Deal characteristics												
Multiple bidders	178	0.08	0.00	0.28	0.00	1.00	0.11	0.04	0.00	0.00	0.07	
Friendly	178	0.94	1.00	0.23	0.00	1.00	0.96	0.91	1.00	1.00	0.05	
Share only	178	0.17	0.00	0.38	0.00	1.00	0.16	0.19	0.00	0.00	-0.03	
Toehold %	178	0.03	0.00	0.08	0.00	0.35	0.03	0.03	0.00	0.00	0.00	0.00
Initial agreement	178	0.89	1.00	0.32	0.00	1.00	0.92	0.84	1.00	1.00	0.08	
Target characteristics												
TGT MTB	178	2.61	1.51	3.76	0.05	22.78	2.58	2.66	1.45	1.65	-0.08	-0.20
TGT ROE	178	0.05	0.10	0.49	-4.15	1.46	0.00	0.12	0.10	0.09	-0.12*	0.01
TGT Size	178	18.65	18.56	1.58	15.01	22.65	18.46	18.95	18.32	18.80	-0.49**	-0.48*
TGT FCF	178	0.08	0.09	0.17	-1.53	0.50	0.07	0.09	0.10	0.07	-0.02	0.03
TGT Growth 1 year	178	0.16	0.07	0.49	-0.56	4.44	0.15	0.18	0.05	0.12	-0.04	-0.07
Acquirer characteristics												
ACQ Insider ownership %	178	0.20	0.14	0.20	0.00	0.82	0.23	0.14	0.19	0.10	0.09***	0.08***
ACQ ROE	178	0.15	0.12	0.58	-1.93	6.29	0.09	0.24	0.11	0.15	-0.15*	-0.04
ACQ Leverage	178	0.70	0.24	3.27	0.00	42.85	0.41	1.16	0.24	0.27	-0.76	-0.03
ACQ Size	178	20.16	19.94	2.33	14.49	26.27	19.78	20.76	19.50	21.32	-0.98***	-1.82***
ACQ FCF	178	0.09	0.09	0.12	-0.60	0.51	0.08	0.12	0.09	0.11	-0.04**	-0.02
ACQ Board ownership £	178	15.10	15.00	2.15	8.02	20.92	15.06	15.18	14.94	15.14	-0.12	-0.20

Table 7 presents Pearson's pairwise correlations between the key variables. Pearson's pairwise correlations between other variables can be found from Table 19 in Appendix A. Table 7 shows that the premium variable is significant at the 1% level and negatively correlated with the target's goodwill in the group of key variables. The premium variable is further highly significantly correlated with Runup (+), FTSE 100 (+), Share only (-), target's ROE (+), TGT FCF (+) and ACQ Board ownership £ (+). The Target firm goodwill variable is highly significantly correlated with Recognised goodwill (+), Finite life intangibles (+), FTSE 100 P/E ratio (-), share only (+) and acquirer's size (-). The amount of goodwill approximated is highly correlated with Recognised goodwill (+), TGT ROE (+), TGT Leverage (+), TGT FCF (+) and ACQ MTB (+). The amount of goodwill recognised is further significantly correlated with Segment (+), HHI (-) and TGT MTB (+). The IFRS variable is also significantly correlated with Finite life intangibles (+), Segment (+), HHI (-), CEO bonus percentage (+), FTSE 100 (-), Cash only (+), acquirer's insider ownership percentage (-) and size (+). Furthermore, organisational complexity (Segment and HHI) for the combined firm after acquisition is strongly and positively correlated with cash payment, but strongly and negatively correlated with share payment. In addition there is a strong and negative correlation between CEO bonus percentage and target's insider ownership, but strong and positive correlation between CEO bonus percentage and target's size. This result implies that CEOs with high bonuses try to avoid targets with high insider ownership, but tend to acquire larger targets. Following general findings in corporate finance literature, the CEO bonus percentage is also positively correlated with acquirer characteristics such as ROE, leverage, size and board ownership. The presence of earnings based bonuses is positively and highly significantly correlated with FTSE 100 P/E ratio, TGT FCF and ACQ FCF, while negative correlation is present with TGT Growth 1 year and ACQ Insider ownership percentage variables. Table 7 shows that the segment variable and HHI variable are extremely correlated with each other, which is the reason why those variables are not used in the same regression models. This issue is also present in the case of goodwill approximation and target's MTB, which is the numerator in the former variable and thus the target's MTB is excluded from some of the models.

Regarding correlations between control variables, as shown in Table 19 in Appendix A, common deflators in financial data causes some very high correlations between variables. For example, the correlation between ACQ MTB and ACQ ROE is 0.92 and the correlation between ACQ ROE and ACQ Leverage is 0.82. However, due to exclusion of common deflators between dependent variables and independent variables I do not have to be concerned much about Pearson's (1897) spurious correlation problem. However, to be certain that correlations are not causing problems, I will test each regression coefficient with Variance Inflator Factor (VIF), which is defined in Appendix B.

Table 7 – Pairwise correlation coefficients for main variables

This table presents pairwise correlation coefficients for main variables, which can be seen from the columns. Rest of the correlation coefficients can be found from Table 19 in Appendix A. Asterisks ***, **, * represent significance levels at the 1%, 5%, and 10% levels.

	Premium	TGT Goodwill	Goodwill approxi-mation	Recogni-sed goodwill	IFRS	Finite life intangibles	UNA	Segment	HHI	CEO bonus %	Earnings based bonuses
Premium	1.00										
TGT Goodwill	-0.26***	1.00									
Goodwill approximation	0.02	-0.15**	1.00								
Recognised goodwill	-0.01	0.27***	0.18***	1.00							
IFRS	-0.01	0.13**	-0.01	-0.03	1.00						
Finite life intangibles	-0.05	0.28***	0.03	0.01	0.52***	1.00					
UNA	-0.16**	0.04	-0.01	0.05	-0.06	-0.03	1.00				
Segment	0.07	0.08	0.00	0.25***	0.18***	0.05	-0.10	1.00			
HHI	-0.01	-0.08	-0.01	-0.28***	-0.18***	-0.08	0.09	-0.87***	1.00		
CEO bonus %	0.05	-0.05	0.04	-0.01	0.25***	0.03	-0.06	0.14**	-0.13	1.00	
Earnings based bonuses	0.13	-0.13	0.12	0.11	-0.17*	-0.06	-0.18**	0.20**	-0.09	0.02	1.00
Runup -1 -42	0.74***	-0.15**	0.03	0.05	-0.06	-0.07	-0.06	-0.01	0.02	0.00	0.09
FTSE 100 P/E ratio	0.16**	-0.26***	0.10	0.02	-0.74***	-0.40***	-0.03	-0.08	0.11	-0.23***	0.24***
Multiple bidders	0.04	-0.07	0.08	0.03	-0.10	-0.05	-0.02	0.07	-0.08	-0.02	0.14
Friendly	0.11	-0.02	-0.02	0.02	-0.05	-0.08	-0.30***	0.04	0.04	-0.03	-0.03
Cash only	0.01	0.00	0.01	-0.07	0.28***	0.10	-0.05	0.23***	-0.20***	0.15**	-0.04
Share only	-0.25***	0.18***	-0.09	-0.02	0.02	0.11	0.13	-0.26***	0.28***	-0.13**	-0.17*
Toehold %	-0.04	-0.01	0.06	-0.15**	0.01	-0.04	-0.02	-0.12	0.04	-0.01	-0.13
Initial agreement	0.03	-0.04	0.00	0.01	-0.04	0.00	0.02	-0.01	0.05	-0.10	-0.04
TGT MTB	0.02	-0.15**	1.00***	0.18***	-0.01	0.03	-0.01	0.00	-0.01	0.04	0.12
TGT Insider ownership %	-0.10	0.01	-0.10	0.04	-0.13	-0.03	0.12	-0.01	0.02	-0.27***	-0.02
TGT ROE	0.21***	-0.10	0.27***	-0.04	0.08	0.04	-0.02	0.170**	-0.14**	0.10	0.21**
TGT Leverage	0.05	-0.06	0.18***	-0.06	0.04	0.10	-0.02	0.06	-0.13	0.04	0.06
TGT Size	0.02	-0.06	-0.10	-0.07	0.10	-0.05	0.00	0.18***	-0.17**	0.29***	0.12
TGT FCF	0.19***	-0.09	0.28***	0.02	0.00	-0.01	-0.04	0.18***	-0.18**	0.15**	0.33***
TGT Growth 1 year	-0.08	0.05	0.08	-0.14**	0.03	0.02	-0.20***	-0.08	0.00	0.04	-0.30***
ACQ MTB	0.05	0.04	0.31***	0.14**	0.09	0.00	-0.01	0.10	0.00	0.14**	0.08
ACQ Insider ownership %	-0.06	0.12	-0.03	0.00	-0.17***	-0.08	0.15**	-0.10	0.18***	-0.17***	-0.26***
ACQ ROE	0.08	-0.05	0.08	0.04	0.11	0.00	0.02	0.18**	-0.05	0.23***	0.15*
ACQ Leverage	-0.01	-0.04	-0.01	0.02	0.10	-0.01	-0.01	0.15**	-0.06	0.20***	0.07
ACQ Size	0.17**	-0.22***	0.04	0.01	0.20***	0.01	-0.07	0.41***	-0.36***	0.43***	0.20**
ACQ FCF	-0.11	-0.01	0.06	0.02	0.06	0.03	0.00	0.04	-0.03	0.07	0.23***
ACQ Board ownership £	0.18***	-0.06	0.11	0.08	0.03	-0.09	-0.03	0.10	-0.13	0.28***	0.02

Table 8 elaborates the differences between finite life intangible assets recognised in business combinations for U.K. GAAP transactions and IFRS transactions. In more detail, Table 8 shows finite life intangible asset classes recognised together with their recognised values. Recognised values are presented in total and on an average per transaction basis.

Table 8 – Finite life intangible assets recognised in business combinations
This table shows examples about finite life intangible asset classes recognised in business combination under U.K. GAAP and IFRS. Also total and average values for finite life intangible assets are recognised for whole sample, Baseline sample and Replica sample are presented.

Classification	U.K. GAAP examples	IFRS examples
Technology related	Deferred development expenditure	Computer software
	Patented technologies	Patented and unpatented technologies
		Intellectual property
		Databases
		Capitalized development costs
		Trade secrets, know-how
Contract related	Broadcasting licenses, retail product rights	Licenses, product rights, concessions
		Marketing and distribution rights, publishing rights
		Commercial agreements
		Intellectual property rights
		Service concession arrangements
		Property advisory agreements
		Management agreements
		Concents
Customer related	Customer contracts and relationships	Customer contracts and relationships
		Order book
Marketing related	Trademarks	Trademarks, trade names
	Internet domain names	Internet domain names
		Managed email lists
		Marketing information
Art related	Programme and film libraries	
Total value (million pounds):		
Whole sample	85.92 (n=149)	6015.73 (n=96)
Baseline sample	5.16 (n=109)	4680.05 (n=67)
Replica sample	5.14 (n=99)	4741.41 (n=78)
Average value per transaction (million pounds):		
Whole sample	0.58	62.66
Baseline sample	0.05	69.85
Replica sample	0.05	60.79

From Table 8 it can be seen that both the number of separable finite life intangible asset classes and average recognised values per transaction have increased dramatically after the adoption of IFRS. This is not a surprising result considering the possibility of also recognising assets other than those which are controlled through legal rights or custody under IFRS (see Sections 2.1.2 and 2.2.2 for more information). The customer related intangible asset recognised under U.K. GAAP in Table 8 is an exception regarding a single business combination which occurred in 2006 before the adoption of IFRS for an acquirer that was listed on the Alternative Investment Market (AIM).

5.3 Handpicked data from the annual reports of the acquirer

Handpicked data includes data disclosed in purchase price allocations (PPA), information regarding a company CEO's/executive chairman's compensation data and the value of directors' shareholdings in the acquiring firm. From PPA, I have separately identified book values of all intangible assets and all net assets for target firm, fair value of net assets, consideration paid for the acquisition, minority interest, previous fixed investments of the target, goodwill recognised and other intangible assets. Other intangible assets hand-picked from annual reports are divided according to their accounting treatment in three different groups: *indefinite life intangible assets*, *finite life intangible assets* and *in-process development costs*. In-process development costs have been separated from finite life intangible assets, because they are not amortised until the product has been commercialised. These assets are typical among pharmaceutical firms in the U.K. Intangible assets related to extractive industries such as exploration and evaluation assets and mineral rights have been excluded from intangible assets due to the fact that their valuation in business combinations is rather similar in IFRS compared to UK GAAP and the key difference lies in initial classification as an intangible asset instead of a fixed tangible assets under UK GAAP. Under IFRS, after the existence of commercial reserves have been determined, acquired intangible exploration and evaluation assets are then transferred to properties, plant and equipment and depreciated to reflect the consumption of those assets, which is *de facto* similar to the accounting treatment under UK GAAP. Compensation data consists of bonuses and salaries paid to the CEO/chairman and how the firm has tied bonuses or options to performance of the firm. However, all firms have not disclosed remuneration in detail and there are a few cases in which only aggregated emoluments of the directors are shown in the notes of the annual report.

In general the quality of manually handpicked information is rather good. However, there is a minor limitation concerning the disclosure of the fair value of the net assets acquired during the period of this study, which complicates the observation of the goodwill element in acquisitions. In this case, inadequate disclosure is luckily not widespread, but the level of disclosure varies systematically through time, which is the reason not to, in addition to maximisation of sample size, follow the conventional expedient of excluding non-disclosing firms from the sample. Instead, I use other available data to form the estimates for the recognised amount of goodwill. A fully disclosing acquirer will report both the acquired net assets at fair value and the acquired

goodwill. If they have disclosed the fair value of net assets but not the goodwill, then the value of goodwill can be deducted if I also know the fair value of the consideration. However, it is much more common for acquirers who made multiple acquisitions within a year to disclose the fair value of net assets acquired, and the goodwill in total rather than for each acquisition. Where the acquirer disclosed no data about the acquired net assets, the acquisition was excluded from the sample. However, consistent with the focus of this study, when the acquirer discloses net assets in total I retain the acquisition in sample, and prorate the acquired net assets and goodwill, so long as the fair value of the consideration is separately identified for the sample acquisition and for acquisitions in total, and on the basis that all the acquirer's acquisitions in the year are roughly in the same industry. However, it is not reasonable to estimate other intangible assets by using the same method because those are more likely to have larger variations also within the industry. For example it is quite common for some firms in the same industry to have a significantly larger patent portfolio than others. The only exception was a situation where all intangible assets comprise only customer relationships and this applied to a few cases. In total 10 acquisitions in my initial sample (232 obs.) partially disclosed in this way. 2009 was a turning point in disclosure and since then all acquisitions have fully disclosed information regarding PPA.

5.4 Error checking and enhancements in the reliability of data

The reliability of the data was enhanced through a rigorous error checking procedure, where the most important pieces of information were double checked manually. To improve the reliability of financial accounting data and share price data all company identificators for targets and acquirers were individually matched with the name of the firm as presented in SDC, the country of incorporation and the years of information available at Thomson One Banker database. This process was achieved by employing the used firm identificators (e.g. either Datastream or Sedol code) in Thomson One Banker and then comparing the information shown there with the information collected from SDC. If the identificator tested failed to comply with the requirement, another identificator given by SDC was then tested. If there were no identificators given by SDC or the identificators did not match with the other data, then new identificators were looked for from Thomson One Banker and added to the data where applicable to make the sample more comprehensive. As already shown in Table 2 in Subchapter 5.1, in total 9 observations were

removed from the data due to inability to comply with the requirements of my data. These are cases where the target firm or the acquirer was incorporated in a different nation than the U.K. or delisted before the announcement of the acquisition. The handpicked information was studied for anomalies such as extremely high or low observations, which were then investigated and corrected if an error was observed. In addition, the sum of the fair value of net assets (including the previous investment and minority interest) and goodwill recognised minus minority interest and previous fixed investment were required to match with the total consideration paid in the fiscal year, because the consideration paid must be allocated in PPA according to accounting standards employed.

5.5 Limitations of data

The main limitation is the small sample size due to the nature of the research questions studied in this thesis, which requires that both target and acquirer must be listed firms and the acquirer must consolidate the target as an acquisition after the transaction. In addition there are 19 cases in which the purchase price allocation (PPA) data in annual reports is not available. These cases are typically either cases in which A) the acquirer has acquired multiple acquisitions in the same fiscal year and the acquisition of the target has not been individually material[19] and the information regarding PPA could not be estimated according to the method presented in Subchapter 5.3 or cases in which B) the acquirer has been acquired before it was required to present annual reports or interim reports for the fiscal period of the acquisition. My analysis is therefore most applicable for acquisitions where the target firm has a material impact on the acquirer and for other transactions that meet the requirements of my sample. In fact, my analysis is likely to be less relevant outside my sample, where target firms outside the sample are often smaller and therefore have less impact on the acquirer. They are also often less liquid or even private, which makes them less likely to present high quality accounting information or demand payment in equity.

[19] Under both FRS 6 and IFRS 3 only material transactions are required to be disclosed individually, otherwise the information should be given in aggregate.

6 Variable construction

This chapter provide the literature and theoretical reasoning behind the key dependent and independent variables used in this thesis. Subchapters 6.1-6.3 cover topics such as acquisition premium, calculation of goodwill and finite life intangibles and the variables used to estimate managerial discretion in impairment management. The final Subchapter 6.4 presents other determinants of acquisition premium, which are used as control variables in my study.

6.1 Defining acquisition premium in M&A transactions

Acquisition premium is the key dependent variable in my regression analysis. In many papers[20] the premium offered to shareholders is used as a proxy for shareholder wealth effects. I will calculate the premium following the recent literature[21] as the natural logarithm of the final price offered by the acquirer divided by the share price before the first announcement: Premium= ln (final price offered / pre-acquisition share price). This specification of acquisition premium is useful, because it impounds the informational value of any announcement made during the acquisition process such as bidder competition and the identification of the acquiring party (Renneboog, Simons and Wright, 2007). Furthermore, the use of logarithmic transformation increases significantly the normality of the dependent variable and regression residuals as measured with the Shapiro-Wilk test, which is especially important when sample size is small.

In prior literature there are several definitions for 'final price offered' and the 'pre-acquisition share price'. As the final price, I will take the final offer price of the winning bid as e.g. Harlow and Howe (1993) do, and Renneboog, Simons and Wright (2007). An alternative, but less often used definition for 'final price offered' is final traded price of the shares in the market before the delisting. Some papers (e.g. Halpern, Kieschnick and Rotenberg, 1999; Lehn and Poulsen, 1989) believe that the final traded price best reflects the market value of a bid comprising securities. However, due to various reasons such as the use of loan notes and the form of acceptances (especially in the U.K.), true assessment of the final bid might not be observable from stock market data (Renneboog, Simons and Wright, 2007).

[20] See e.g. Kaplan (1989), Lehn and Poulsen (1989), and Halpern, Kieschnick and Rotenberg (1999)
[21] See e.g. Renneboog, Simons and Wright (2007), Betton, Eckbo and Thorburn (2008), and Dionne, La Haye, Bergerès, 2010

Renneboog, Simons and Wright (2007) posit that the challenge with the benchmark 'pre-acquisition price' comes from the selection of the date. The reason for this is that there is a share price-up in the period preceding the first announcement of acquisition interest. This period is estimated to begin 42 days prior to the event date with the largest *runup* occurring after -21 day before announcement (Schwert, 1996). I will select the benchmark target share price on the 42nd trading day before the initial announcement. While trading day -42 is accepted in the literature[22], I will follow the recent study made by Mulherin and Simsir (2015) and use 'Original Date Announced' (ODA) instead of generally used 'Announcement Date' (DA) to capture the price impact of all merger related news. Thus acquisition premium takes the following form:

$$Takeover\ premium = \ln\left(\frac{Final\ Price\ Offered}{Target\ Price\ 42\ days\ prior\ to\ original\ date\ announced}\right) \quad (1)$$

In SDC the ODA is defined as following: "*The date when the target company is first publicly disclosed as a possible acquisition candidate. Date originally announced (DAO) is used for the calculation of stock premiums. When multiple bidders exist, the DAO is recorded in the following cases:*

(1) If acquirer changes from 'Seeking Buyer' or 'Undisclosed Acquirer' to an actual entity.
(2) Competing bids are announced.
(3) Competing stakes are announced.
(4) A defensive transaction is announced."

In SDC the Date Announced is defined as following: "*The date one or more parties involved in the transaction makes the first public disclosure of common or unilateral intent to pursue the transaction (no formal agreement is required). Among other things, Date Announced is determined by the disclosure of discussions between parties, disclosure of a unilateral approach made by a potential bidder, and the disclosure of a signed Memorandum of Understanding (MOU) or other agreement."*

The problems of using DA as the event date are reported by Mulherin and Simsir (2015) with U.S. data and Arslan and Simsir (2013) with Turkish data. For U.S transactions with DA between 01.01.2000 and 31.12.2010, Mulherin and Simsir (2015) show that about 20 % of the deal

[22] See e.g. Schwert (1996), Betton, Eckbo and Thorburn (2008), and Dionne, La Haye, Bergerès (2010)

announcement dates provided in SDC are preceded by merger rumours, failed transactions, and unsolicited offers made by bidders to the target firms and that using DA as the event date instead of ODA leads to 9.1% lower estimated acquisition premiums. They attribute this difference in premiums to inability to capture the price impact of the news released around ODA. Furthermore, the problem could be even more severe with non-U.S. data as Arslan and Simsir (2013) find out with Turkish data with DA between 1 January 2005 and 31 December 2011 that in 78 deals out of 105 deals where the target is a public firm, the target firms experience merger-related events, such as merger rumours and search for buyer types of announcement before DA. They also find a 10% estimated difference in bid premiums between benchmark prices calculated before DA and benchmark prices calculated before ODA. The findings presented above are statistically significant at the 1 % level in both studies. DA is still used to get the latest financial data.

6.2 Calculation of goodwill and finite life intangibles

Goodwill and finite life intangible assets are my key independent variables together with variables used as a proxy for managerial discretion regarding impairment management in Subchapter 6.3. I will calculate the goodwill variable in three different ways such as using the *recognised* amount of goodwill by the acquirer on acquisition, *acquired* goodwill by the target firm and finally an *approximation* of goodwill to be generated 42 days before the original announcement date. The recognised amount of goodwill is collected manually from the annual reports released by the acquirer after the acquisition. The data for acquired goodwill by the target firm is taken directly from Worldscope and further complemented with annual reports of the target. Both disclosed measures of goodwill are further standardised by dividing them by the total consideration paid and reported by the acquirer to increase the comparison among acquisitions of different size. Detzen and Zülch (2012) also use the same denominator in their study regarding the influence of CEO bonuses on the amount allocated to goodwill in purchase price allocation. Consistent with studies about pooling of interest[23], I will also approximate the generated amount of goodwill instead of using the actual amount of goodwill. This approximation is calculated by first taking the difference between the target firm market capitalisation measured 42 days before the original date announced and the book value of equity and second divided by the book value of equity.

[23] See e.g. Nathan (1988), Ayers, Lefanowicz and Robinson (2002), and Bugeja and Loyeung (2011)

The main reason for using three different methods to calculate goodwill is the problems associated with each of the methods. For example, there is an endogeneity problem with the recognised amount of goodwill on acquisition. That endogeneity comes from the fact that the higher acquisition premium mechanically increases the amount recorded as goodwill and *vice versa*, which increases the correlation between the acquisition premium and the recognised amount of goodwill. Regarding the goodwill on the balance sheet of the target, not all targets have recognised goodwill in their balance sheet and even if they have, the amount of goodwill might not be material in many cases. This is a larger problem for earlier years in my sample, because before the adoption of FRS 10 goodwill was written-off directly to reserves. However, it is also part of the recognised goodwill, since its fair value in PPA is zero. Finally, approximation of goodwill is the most controversial proxy for true goodwill. First, it is perfectly correlated with market-to-book ratio, thus it resembles the fair value of growth assets. Second, it is significantly and positively correlated with the recognised amount of goodwill, because it measures, for example, the going concern goodwill of the target. Third, by its definition it excludes the goodwill on the balance sheet of the target firm and thus is significantly and negatively correlated with it. Fourth, it also includes part of the intangible assets to be recognised in business combinations. These issues make approximated goodwill the most inaccurate of the three goodwill measures used. Therefore, I will give it less weight than other measures.

The finite life intangible asset variable follows the construction of the amount of goodwill recognised in PPA and the acquired goodwill by the target firm and thus the amount of finite life intangible assets recognised is also divided by the total consideration paid by the acquirer. The impact of finite life intangibles is two-fold. First, finite life intangibles are required to be amortised according to both U.K. GAAP and IFRS and thus their recognition will lead to a reduction in reported earnings. Second, finite life intangibles are actually valuable assets for the acquirer and in many cases they are the reason to acquire the target. Therefore, in theory, the impact of finite life intangibles should be similar under both IFRS and U.K. GAAP, but that under IFRS there should be more firms that have acquired finite life intangibles due to a much larger amount of assets being required to be recognised under IFRS compared to much stricter requirements under U.K. GAAP. For more information about criteria for recognition of intangible assets under IFRS, see Section 2.1.2 and for similar information under U.K. GAAP see Section 2.2.2.

6.3 The proxy variables for managerial discretion in the impairment procedure under IFRS

Ramanna (2008) and Ramanna and Watts (2012) examine managerial discretion around goodwill impairments and identify three main proxies for management's ability to engage in impairment management: the number and size of reporting units, reporting-units' fair-value-to-book-value ratio and unverifiability of net assets. Also, Detzen and Zülch (2012) use these variables in their study regarding PPA under IFRS with European data. Here, I will use the term cash generating units (CGU) instead of reporting units as CGU is also used in IFRS 3 and IAS 35. Sections 6.3.1–6.3.2 discuss the aforementioned factors that influence a firm's ability to manage impairment. I will exclude the use of fair-value-to-book-value ratio, because those values for CGUs are not reported and I will use target and acquirer specific MTB ratios as my control variables. However, in addition to having the possibility of engaging in impairment management, managers also need motives to do so. While the motives for the firms to engage in impairment management[24] itself is outside the scope of this thesis, the motives for the acquirer's willingness to pay higher or lower premiums for target firms are discussed in Subchapter 3.2.

6.3.1 Number and size of cash generating units

Cash-generating units may have an impact on the likelihood of an impairment loss being recognised (Beatty and Weber, 2006). Schneider (2001) argues that firms with more than one cash-generating unit are expected to carry out more impairment tests and thus may report higher goodwill impairment losses because an existing loss in one unit cannot be netted against a profit in another unit. On the other hand, AbuGhazaleh, Al-Hares and Roberts (2011) present an alternative hypothesis, which states that managers of firms with multiple cash-generating units also have more flexibility to use their write-off discretion to overstate goodwill impairments (take a bath or smooth reported income) by allocating the greater part of goodwill to cash-generating units that are expected to decrease in value. Alternatively, this discretion can be used to understate or avoid goodwill impairments by allocating the greater part of goodwill to cash-generating units that are expected to increase in value and hence lower the probability of recognising goodwill impairment losses. To refine this idea further, I assume that CGU based

[24] See Ramanna and Watts (2012) for further information on private information, contracting, reputation and valuation motives of impairment management.

variables can be used as an approximation of the true value of the option to use managerial discretion opportunistically as allowed by the increased subjectivity with the introduction of IFRS.

Following Ramanna and Watts (2012), I will use two different measures of managerial discretion in avoiding the possible goodwill impairment: *the natural logarithm of the number of business segments* and the internal *Herfindahl-Hirschman Index* (HHI). For both variables data is obtained from Thomson Worldscope in the form of sales reported in up to 10 different business segments. For the number of segments variable, I will check all 10 segments for each combined firm after acquisition and calculate manually the number of segments with sales information. If some firms do not have segmental disclosure, they are excluded from my analysis employing either of the two variables.

The Herfindahl-Hirschman Index of business segments is used by Ramanna and Watts (2012) as proxy for the management's ability to allocate acquired goodwill arbitrarily across CGUs and understate or overstate future impairments. Business segments are used because there is only private data available regarding CGUs, while data on business segments is publicly reported. HHI is calculated as follows:

$$HHI = \sum_{i=1}^{n} (s_i{}^2) \qquad (2)$$

where *n* is the number of business segments in the firm and s_i is the ratio of the i^{th} business segments' sales to total firm sales. Thus, it is an index of segment concentration within a firm and ranges with available information from 0.1 to one. A situation where it gets a value close to 0.1 is the most meaningful from my study's view point, because then there are 10 equally sized segments within the firm and therefore greater flexibility and complexity of the firm associated with more and larger reporting units (and *vice versa* with HHI values close to one). In the case presented above, the internal HHI is calculated as 10*0.1^2=0.1. I want to test if that greater flexibility manifests itself in increased acquisition premiums after IFRS took place and removed amortisation of goodwill. In short, the idea is that before IFRS the complexity of the firm did not offer as many benefits regarding unverifiable assets and their amortisation, because amortisation could not be avoided. Depreciation could only be postponed and now the complexity of the firm

can be used as a tool for manager's opportunism e.g. by hiding large declines in value of acquired assets and thus effectively avoiding write-offs in goodwill. As presented in Subchapter 5.1, segments with negative sales are excluded as discontinued operations and HHI is calculated in those cases by inputting negative sales to other segment sales on a pro rata basis. Also following diversification discount literature (e.g. Berger and Ofek, 1995; Schmid and Walter, 2009), I exclude cases in which the sum of segment sales differs by more than 25% of total firm level net sales.

Based on the findings of Ramanna and Watts (2012) and the increased subjectivity in goodwill management, I expect that the adoption of IFRS will have a positive influence on the coefficient of the natural logarithm of the number of segments and *vice versa* for the HHI variable. In other words, I assume that firms with greater flexibility in PPA can pay larger premium post-IFRS than pre-IFRS due to their greater ability to exploit increased subjectivity provided by the IFRS.

6.3.2 Unverifiable net assets in reporting units

The more there are unverifiable net assets (UNAs) the more likely it is expected for managers to manage goodwill impairment losses (Ramanna and Watts, 2012). I assume that this increased opportunity to manage goodwill impairment losses is beneficial to managers and thus they can pay higher premiums post-IFRS, when impairment management has a large role. Following Ramanna and Watts (2012), I compute a ratio of [Cash + Investments – Debt – Preferred Equity] to [Assets – Liabilities]. In that ratio the numerator is a proxy for that component of net assets whose fair values are likely to be more verifiable (Richardson et al., 2005). By its nature this ratio is intended to capture the verifiability of net assets (VNA) as all the components in the numerator are easy to verify, thus excluding items which can be called unverifiable assets. That means effectively that when the ratio decreases, subjectivity in estimating the fair value of goodwill is expected to increase, which in turn I expect to lead potentially to higher target premiums. To get UNA, I will simply multiply VNA by -1. Mathematically it is easier and more efficient to solve UNA this way than calculate separately each of the unverifiable assets found on the balance sheet. UNA is calculated post-acquisition for the combined firm.

Similarly to Ramanna and Watts (2007) in their unpublished draft I find the modification of UNA interesting and useful especially in cases where the VNA ratio exceeds 1. While it initially implies that the firm has a lower ability to manage fair value goodwill estimates, it might be that

the result ensues because of fewer verifiable liabilities compared to total liabilities. It follows that by overstating (understating) unverifiable liabilities, firms can understate (overstate) their non-goodwill net assets and thus overstate (understate) goodwill. As a solution ModUNA is the absolute distance between VNA and one and in mathematical form ｜(1-｜VNA｜)｜. In this form it can provide a more accurate measure of the verifiability of net assets than normal UNA in these specific cases (Ramanna and Watts, 2007). It must be noted that this measure of UNA was originally incorporated in their working paper but not in their 2012 published version.

6.4 Determinants of acquisition premium

In this subchapter, I will discuss the most important determinants of acquisition premium covered in academic research. The determinants presented here are later on used in the Methodology Chapter as control variables for my regression equations. Evidence for these variables is abundant in literature, but I will mainly follow Bugeja and Loyeung (2011) as they have done the closest study to mine. However, when applicable I will add other views from literature to give as comprehensive a view on this topic as possible. Following Bugeja and Loyeung (2011), I will present evidence for all 16 control variables used in their study and 5 new additions to their model. Here, I will divide the determinants of acquisition premium into four groups: deal specific determinants of acquisition premium, ownership related determinants of acquisition premium, firm specific financial characteristics and variables related to stock market information. Sections 6.4.1-6.4.4 discuss the aforementioned determinants of acquisition premium. Key dependent and independent variables used in this thesis are covered in the previous Subchapters 6.1-6.3.

6.4.1 Deal specific determinants of acquisition premium

Deal specific determinants of acquisition premium such as *multiple bidders*, *the hostility or friendliness of acquisition* and *the form of payment* used in the Bugeja and Loyeung (2011) study are based on the findings in earlier literature. In addition to those, I will use *the initial agreement* variable in my own Baseline model. First, acquisition premiums are expected to be higher when there are competing bidders for a target firm (e.g. Flanagan and O'Shaughnessy, 2003; Henry, 2005). The reason for higher premiums is that when there are multiple bidders, acquisition is much like an auction even if the target initially negotiates a merger agreement (Eckbo, 2009). In the single bidder setting the situation leads to negotiations between two parties with different strength in bargaining powers. However, when there are multiple bidders the bargaining power of

the seller is greater, since the seller can play one bidder against another and generate higher premium for their stock (Mansfield, 1990; Porter, 1980). Furthermore, according to the "winner's curse" phenomenon[25] the winner's curse arises when firms are bidding on an asset and each bidder has a unique estimate of the true value of the asset. To avoid losing the target to another bidder, bidding firms will be tempted to bid close to their reservation prices. The reservation price of the winner can, however, be an overestimation due to error in valuation. Second, the evidence in previous studies regarding acquisition hostility indicate that hostility leads in higher premiums[26]. This is because the acquisition premium can reflect all or some of the following issues: a breakdown over negotiations, disagreement over the redeployment of assets after the acquisition or the disciplinary role of the market for corporate control. Third, according to prior research[27], acquisition premiums are typically higher when cash consideration is offered as payment to target shareholders because cash payment is immediately taxable. Otherwise, target shareholders would be indifferent to the use of cash and non-taxable forms of payment (capital gains tax theory). However, there is some evidence that capital gains tax does not drive the higher premium for cash deals. For example, Franks, Harris and Mayer (1988) with U.K. data, show that acquisition premiums in the U.K. were greater in cash deals even before the introduction of capital gains taxes. Furthermore Eckbo and Langohr (1989) show that the larger total premium in all-cash offers carries over to minority buyouts which convey if any bidder tax benefits (as two firms are already consolidated). Also, the Shleifer-Vishny model (2003), posits that bidders engage in cash acquisitions only when the target is undervalued and in stock acquisitions when target is undervalued in relation to bidder, thus supporting the view about higher premiums for cash acquisitions as the value at the beginning is undervalued compared to fundamentals. Other hypotheses include deal-financing costs under asymmetric information regarding valuations of target and bidder (related to Shleifer-Vishny model), agency and corporate control motives, and behavioural arguments (Eckbo, 2009). My last deal-specific variable is initial acceptance (agreement) from the board of directors of the target. The results in multiple studies regarding initial acceptance and its connection with acquisition premium are mixed. For example, Walkling and Long (1984) examine cash tender offers in the U.S. and find no evidence that targets resist acquisitions that offer lower bid premiums, while for Australian acquisitions, Eddey and Casey

[25] See e.g. Barney (1988), Capen, Clapp and Campbell (1971), Roll (1986), and Varaiya (1988)
[26] See e.g. Bugeja and Walter (1995), Franks and Mayer (1996), and Holl and Kyriazis (1996)
[27] See e.g. Huang and Walkling (1987), Kaufman (1988), and Bugeja and Da Silva Rosa (2010)

(1989) find accept recommendations to be correlated with higher bid premium offers. Also, Henry (2005) reports that there is no difference in the magnitude of bid premiums offered in acquisitions that are supported or rejected by target firm directors.

6.4.2 Ownership related determinants of acquisition premium

The ownership structures of the target and acquirer firms are expected to be associated with acquisition premiums. These ownership structures are measured with *toehold percentage, target firm insider ownership, acquirer insider ownership* and *the value of the acquirer's board of directors ownership in the acquirer* variables. Prior literature (e.g. Stulz, 1988 and Stulz, Walkling and Song, 1990) argues that a higher toehold stake of the bidder in the target improves the bidder's bargaining position as they need to acquire fewer shares and lower the premium paid. In the multiple bidders setting, the expected acquisition premium decreases in light of the difference between the toeholds of the winner and competitors (Bulow, Huang and Klemperer, 1999; Dasgupta and Tsui, 2003). Similarly, the bargaining position of the target firm will also be influenced by the ownership in the target held by the insiders of the target firm managers and thus in these cases manager ownership is expected to be positively associated with acquisition premiums (Bugeja and Loyeung, 2011). However, some authors such as Manne (1965), Fama (1980), Denis and McConnel (2003) argue that acquisitions are in some cases motivated to solve agency conflicts in the target firm, especially when the difference between actual value of the firm and potential value is sufficiently negative due to a large enough failure in internal control mechanisms. If that is the case, then acquisition premiums will be highest at lower levels of insider's ownership in target. Actually, the latter view is supported for example by the findings of Bugeja and Loyeung (2011) with Australian data and Renneboog, Simons and Wright (2007) with U.K. data. Also, total percentage of share ownership of bidder's insiders in bidding firm is expected to influence acquisition premiums. The Idea is that when the bidders are subject to agency problems, the more severe the agency problems are the more the bidder is going to overpay for the target (Bugeja and Loyeung, 2011). Therefore, I am expecting a negative relation between this proxy variable for agency problems and acquisition premiums. Firth's (1997) results support that view, when he finds a positive relation between acquisition returns and the equity of the acquiring firm's directors. However, greater inside shareholdings can also entrench

management by making it more difficult to transfer control and remove a manager[28]. It is worth noting that instead of management ownership percentage used in many of the studies mentioned, I use insider ownership percentage from Worldscope (closely held shares) following Marosi and Massoud (2008). In addition to insider ownership, I use also the value of the acquirer's board of directors' equity holdings in the acquirer to estimate the strength of the alignment between the interests of the directors and shareholders.

6.4.3 Firm specific financial determinants of acquisition premium

The target firm's financial characteristics are expected to influence the premium paid on acquisitions. The findings in the previous literature are quite intuitive as they suggest the following target financial characteristics: *firm performance (ROE), leverage ratio, size of the firm, free cash flow, market-to-book ratio* and *sales growth* are expected to impact on the premium paid. If a acquirer can extract greater performance improvements from underperforming firms, premiums would be expected to negatively relate to the target firm return on equity (Bugeja and Loyeung, 2011). The evidence in literature, however, seems to present mixed results. For example, Goergen and Renneboog (2004), find in European data between the years 1993-2000 that there is some (weak) evidence that the target's performance (measured by the return on equity) is positively related to the merger or acquisition premium. Regarding the influence of the size of the target, there are contradicting hypotheses presented in the literature. First, acquirers tend to pay too much for larger acquisitions either due to managerial hubris[29] or due to particularly high private benefits[30]. Second, the acquirers can offer a lower premium in large deals for several reasons as follows: 1) the high value at stake can result in more accurate valuations or can make managers and their boards more hesitant to offer hefty premiums (Alexandridis et al. 2013), 2) the complexity of integrating large firms can make expected synergies more uncertain and therefore lead to a lower premium (Alexandridis et al. 2013), 3) there are fewer potential buyers for large firms (Gorton, Kahl and Rosen, 2009), reducing the "winner's curse" problem and leading to a lower acquisition premium and 4) large firms tend to be subject to lower managerial ownership (Demsetz and Lehn, 1985) and thus may accept a lower premium (Bauguess, Moeller, Schlingemann and Zutter, 2009). Alexandridis et al. (2013)

[28] See e.g. Stulz (1988) Mikkelson and Partch (1989), and Denis, Denis and Sarin (1997)
[29] See e.g. Roll (1986) Hayward and Hambrick (1997), and Malmendier and Tate (2008)
[30] See e.g. Morck, Shleifer and Vishny (1990), Loderer and Martin (1990), Grinstein and Hribar (2004), and Harford and Li (2007)

show a robust negative relation between offer premium and target size, which indicates that acquirers tend to pay less for large firms. Here, I will measure size with the natural logarithm of total assets following Bugeja and Loyeung (2011) and Comment and Schwert (1995). Also, following Jensen's (1986) free cash flow theory, the bidder is likely to pay a higher premium for a target with lower leverage and higher cash flows. His theory is consistent with the evidence gathered by Lehn and Poulson (1989). Furthermore, highly levered firms have typically a more concentrated ownership structure and the more disperse the ownership base is the easier it is for the acquirer to acquire its stake from the target (Israel, 1991 and Israel, 1992). The target's past growth might have two opposite effects on the acquisition premium. First, poorly performing targets interest buyers because there are potential gains from replacing the current managers. If that is the case then the relation between the past performance of the target and the premium paid is negative. Schwert (2000) analyzes that relation and obtains a negative but insignificant coefficient. Second, poor performance is often associated with fragile financial health, which is likely to hinder the bargaining power of the target. The relation between past sales growth and the premium is thus expected to be positive. Like Dionne, La Haye and Bergéres (2010), and Bange and Mazzeo (2004), I measure sales growth by subtracting previous year's total sales from the latest available fiscal year's total sales and dividing that with previous year's total sales. Sales growth is used because the empirical evidence provided by Lakonishok, Shleifer and Vishny (1994) shows that sales are a less volatile variable than either cash flow or earnings. In addition to sales growth, I will also test whether growth opportunities are relevant to acquisition premium by using raw Tobin's Q type of measure (market-to-book ratio). By using that valuation ratio with French data, Belze (2005) finds that it positively impacts on the likelihood of acquisition. Comment and Schwert (1995) obtain a lower premium with this ratio because some bidders are attracted to firms that the market undervalues. However, the impact on premium is ambiguous in literature. A negative relation is expected if a low ratio illustrates the undervaluation of the target, whereas a positive relation should be seen if a low ratio signals restricted investment opportunities (Dionne, La Haye and Bergéres, 2010).

The acquirer's financial characteristics that are likely to have an influence on the premium paid in acquisitions are *market-to-book ratio*, *ROE*, *leverage ratio*, *size of the acquirer* and *acquirer's free cash flow*. Acquirer's market-to-book ratio is added to the model to take into account the findings of Rau and Vermaelen (1998). They find that glamour acquirers pay higher premiums in

tender offers and experience poorer performance subsequent to a merger. However, Gondhalekar, Sant and Ferris (2004) find opposite results between an acquirer's investment opportunities and the premium paid. The market-to-book ratio is calculated similar to the targets and measured as the market capitalisation of the acquirer 42 days prior to original acquisition announcement date divided by the book value of equity. The size of the acquirer can be considered as a proxy for managerial hubris (Roll, 1986; Malmendier and Tate, 2008), as larger acquirers tend to overpay in acquisitions (Moeller, Schlingemann and Stulz, 2004). Thus a positive sign is expected for this variable. Bugeja and Loyeung (2011) use bidder's ROE as a control variable, but they do not find significant impact between it and acquisition premiums nor do they explain the reason for its existence in their model. However, it must be remembered that high profitability can imply greater management abilities and if those can be transferred to a less profitable target firm, then synergies from acquisition are higher (Beitel, Schiereck, Wahrenburg, 2004; Louis, 2004). Furthermore, Azofra, Días and Gutiérrez (2009) present evidence regarding the relation between acquisition premium and bidder's returns with European data from bank mergers and acquisitions. They find that premiums have a positive influence on bidders' returns thus supporting the view that higher synergies are the reason for higher premiums, but that influence is negative when premiums are too high as a consequence of overpayment[31]. An acquirer's leverage and free cash flow are important as, according to Jensen (1986), acquirers with high free cash flow and low leverage are more likely to undertake value destroying acquisitions. Furthermore, if leverage is high, the creditors of the firm will probably prevent the acquirer from paying an overly high premium (Gondhalekar, Sant and Ferris, 2004). I therefore predict a positive sign for free cash flow and negative for leverage.

6.4.4 Stock market information related determinants of acquisition premium

In addition to deal, ownership and financial information, the information from stock market is highly likely to influence acquisition premiums paid in acquisitions. Therefore, I will use a target firm *runup* variable to capture target firm recent stock performance and *P/E ratio of FTSE 100 Index* to capture market-wide investor sentiment. Target firm runup is the most important control variable included in my regressions. Runup can be considered as an empirical proxy for total acquisition synergies (Betton, Eckbo and Thorburn, 2009). Betton, Eckbo and Thorburn (2009),

[31] See for example Bradley, Desai and Kim (1987), Antoniou, Arbor and Zhao (2007) for synergy hypothesis and Varaiya (1988), Sirower (1997), Schwert (2003) for overpayment hypothesis.

calculate the runup as the natural logarithm of the ratio of the share price of the target on the day before the announcement to the share price 42 days before the announcement adjusted for stock splits and dividends. The authors concluded that an increase of $1.00 of runup creates an average initial premium increase of $0.80. I will deviate little from their definition to 1) avoid using unnecessary logarithms[32], 2) use the original announcement date (ODA) instead of the announcement date (see Subchapter 6.1 about reasons to prefer ODA) and 3) calculate simple returns by taking the runup period stock return data from Thomson Reuters Datastream in the form of "total returns raw", which is an index-like measure of total returns that include the return on stock as change in value as well as dividends, but excludes the effect of stock splits. Simple returns are as useful for my purposes as logarithmic returns although the latter are more commonly used in academic research, because I do not have time series analysis and thus returns do not need to be time additive as logarithmic returns are. Therefore, my runup is calculated as follows:

$$Runup = \frac{r_{-1} - r_{-42}}{r_{-42}} \tag{3}$$

where r_{-1} is the value of total return raw index on the day before announcement and r_{-42} is the value for the same index 42 days before the original announcement date.

Consistent with the findings presented above, I will expect that the positive runup of the share price of the target will increase the premium paid to the target and vice versa for negative runup. Following Chatterjee, John and Yan (2012) with acquisition premium data and Baker and Wurgler (2006) with stock return data, I will use the P/E ratio of the relevant stock index to measure market-wide sentiment's impact on the acquisition premium. As my sample is based on U.K. data it is natural to choose the FTSE 100 Index instead of the S&P 500 Index. I will use the P/E figure 42 days before the announcement date because, based on the literature regarding runups (see e.g. Schwert, 1996; Dionne, La Haye, Bergerès, 2010; Betton et al., 2014), it is the last date before there is any indication in the market about the forthcoming offer bid by the ultimate acquirer.

[32] The histogram of the runup variable was studied and there was no significant indication about the usefulness of logarithmic transformation as measured with the absence of heavy right tail or large deviations of the normality of regression residuals caused by the runup variable.

7 Methodology

In this chapter I will, first of all, describe the cross-sectional regression methodologies used in my research in Subchapter 7.1. Secondly, I will present empirical methodology used to validate my results in Subchapter 7.2. Methodologies used to validate my results include eliminations of outliers, application of the Shapiro-Wilk test to test the normality of regression residuals and Inverse Hyperbolic Sine (IHS) transformation.

7.1 Regression methodology

This subchapter elaborates the regression methodology that I will use in this study in more detail. Section 7.1.1 presents a pooled cross section methodology with fixed effects and compares its qualities, benefits and hindrances to panel data methodology. Sections 7.1.2-7.1.4 discuss different cross-sectional regression models and focus on presenting the differences between various cross-sectional regression models used in this thesis.

7.1.1 Pooled cross section methodology with year fixed effects

My data can be characterised as pooled cross section (PCS) data and thus I need to consider potential problems and hindrances related specifically to my data. I will shortly first describe pooled cross section data methodology with time fixed effects and then I will elaborate the key benefits and hindrances when compared to balanced panel data methodology. A pooled cross section methodology is used since I have data from multiple cross-sectional elements across multiple years for the U.K. GAAP and IFRS sub samples. My data differs from panel data by having a different sample of firms in each year, while panel data keeps the same entities, selected in the sample at the beginning of the time period, and measures some specific quantity about them over time. Assuming temporal stability between the relations studied in this thesis may not be a feasible assumption and therefore my model will include time indicator variables to capture structural change over time. Therefore, I will use the time fixed effects regression method. In my case, the year is the smallest possible and generally used time period in academic research, which will control for the abnormal changes in average acquisition premiums that differ from normal situations. Econometrically, the setup I have is described in the following equation:

$$\gamma_{it} = \alpha + \beta_1 x_{it} + \sum_{t=1}^{T-1} \beta_t d_t + u_{it}, \quad u_{it} \sim \mathrm{N}(0, \Sigma) \qquad i = 1,2,\ldots,N\,;\, t = 1,2\ldots,T \tag{4}$$

where γ_{it} is the dependent variable, a is the intercept term, β_1 is a *k* x 1 vector of parameters to be estimated on the explanatory variables, and x_{it} is a time-variant 1 x *k* regressor matrix. Following similar logic, term $\beta_t d_t$ describes the parameters and observations for the time fixed effects with β_t being the coefficients to be estimated and d_t dummy variables employed. To avoid the dummy variable trap and perfect multicollinearity, I will exclude one year dummy. The results for excluded year dummy are then reflected in the coefficient of the intercept, α.

The key benefit of pooled cross sections data compared to panel data is that it generally does not suffer from autocorrelation, because observations, or in my case target firms, for each year are independent of each other. I will nevertheless check whether there is any autocorrelation because of the same acquirers acquiring multiple targets during my time period. I will use Durbin-Watson test statistics for this purpose and interpret whether test statistics that significantly differ from 2 imply that there are potential problems with serial correlation. Due to lack of serial correlation, statistical analysis of PCS data is simpler than for panel data.

The main drawback of pooled cross sections compared to panel data is that PCS require a more exhaustive amount of control variables to control for unit specific characteristics, while in panel data the usage of the same units throughout the period controls automatically for that issue. Therefore the potential problem in terms of omitted variable bias is larger in the case of PCS data. The panel data also takes care of the problem of individual heterogeneity, which is a consequence of unobservable variables that specifically affect the dependent variable. To tackle these issues, I have added a considerable amount of control variables to maximise the adjusted R-squared and F-test in my models and thus decreased the impact of potentially omitted or unobservable variables. In addition, I will run robustness tests according to information presented in Subchapter 7.2.

7.1.2 Model building method

I will build my main model by employing a combination of forward/backward regressions with separate variable testing. The variables included in this testing procedure are based on the literature, but only literature regarding variables in final models is presented in Chapter 6 regarding variable construction. Variables are selected in the final model based on the increases in adjusted R-squared and F-test values. In addition to statistical goodness of fit, serious

consideration is given to power of the regression analysis. Therefore in cases where the adjusted R-squared and F-test would suggest inclusion of another variable, but that introduction would drastically decrease the available sample size the variable is left out. For example the analyst dispersion variable is excluded from my analysis due to a drop in sample size. The following Sections 7.1.3-7.1.4 present the final models based on the model building techniques discussed here.

7.1.3 Replica and Baseline OLS regression models for acquisition premiums

In this subchapter, I will discuss the cross-sectional regression models used in my analysis, which aim to answer the three research questions presented in the Introduction Chapter. The first model shown here is a direct replication of the similar study done by Bugeja and Loyeung (2011), but instead of Australian acquisition offers it is applied to acquisitions of control among U.K. listed firms. The second model (the Baseline model) incorporates more information from the literature with the objective of making the model more robust to omitted variable bias and thus it increases the validity of t-tests and accuracy of coefficients by introducing new control variables. From the Baseline model the target firm insider ownership variable is excluded due to lack of data to keep the power of my results sufficiently high. The Baseline model, however, includes new key variable in the shape of finite life intangibles, which aim to study the relation between acquisition premium and the recognition of those assets in business combinations. The interaction between IFRS and finite life intangibles is excluded from the Baseline model due to a lack of observations of finite life intangible assets recognised in business combinations under U.K. GAAP (see descriptive statistics in Subchapter 5.2.). The detailed description of both models and the extension models to the Baseline model can be seen from Table 9 in Section 7.1.4, which presents extensions to the Baseline model.

Here is the model designed to test the association between acquisition premiums and IFRS related variables:

$$Premium_i = \beta_0 + \beta_1 Goodwill_{ki} + \beta_2 IFRS_i + \beta_3 Goodwill_{ki} * IFRS_i + \beta_4 Intangible_i(only\ used\ in\ baseline\ model) + \sum_{j=5}^{y} \beta_j(Deal\ specific\ determinants\ of\ takeover\ premiums) + \sum_{j=z}^{a} \beta_j(Ownership\ variables) + \sum_{j=b}^{c} \beta_j(Target\ financial\ characteristics) + \sum_{j=d}^{e} \beta_j(Bidder\ financial\ characteristics) + \sum_{j=f}^{g} \beta_j(Other\ control\ variables\ used\ only\ in\ baseline\ mode\ ) + \varepsilon_i \quad (5.1)$$

Main variables in model are:

$Goodwill_{ki}$ = The amount of goodwill estimated by method *k* for each transaction *i*. Variable used in regression is one of the following three variables: goodwill on the balance sheet of the target firm, goodwill recognised in business combinations and approximation of goodwill.

$IFRS_i$ = Dummy variable for IFRS, which has value 0 before the adoption of IFRS and value 1 if the acquirer consolidates the target according to IFRS for each transaction *i*

$Intangible_i$ = The partition of total consideration allocated to finite life intangible assets for each transaction *i*

$Goodwill_{ki}$*$IFRS_i$ = Interaction variable used to describe the impact of IFRS on the coefficient of $Goodwill_{ki}$ for each transaction *i*

For more detailed definitions of variables see Table 3. Most of the models studied include 1-year dummy variables. The values for those dummies or control variables are not tabulated in the context of regressions unless specified otherwise.

7.1.4 Extensions to Baseline OLS regression models for acquisition premiums

Here I will present Baseline model extensions, which incorporates three different variables used as a proxy for managerial discretion in purchase price allocations: *Segment*, *HHI* and *UNA*. These three variables are measured for the combined firm after consolidation. All of these variables are used in separate regressions to both maximise the power of my results by increasing sample size and also to prevent the multicollinearity problem between Segment and HHI variables. The Baseline model with managerial discretion extension is presented below:

$$
\begin{aligned}
Premium_i = {} & \beta_0 + \beta_1 Goodwill_{ki} + \beta_2 IFRS_i + \beta_3 Goodwill_{ki} * IFRS_i + \beta_4 Intangible_i \\
& + \beta_5 ManagerialDiscretion_{ki} + \beta_6 ManagerialDiscretion_{ki} * IFRS_i \\
& + \sum_{j=10}^{y} \beta_j (Deal\ specific\ determinants\ of\ takeover\ premiums) \\
& + \sum_{j=z}^{a} \beta_j (Ownership\ variables) + \sum_{j=b}^{c} \beta_j (Target\ financial\ characteristics) \\
& + \sum_{j=d}^{e} \beta_j (Bidder\ financial\ characteristics) \\
& + \sum_{j=f}^{g} \beta_j (Other\ control\ variables) + \quad \varepsilon_i \qquad (5.2)
\end{aligned}
$$

Managerial discretion is proxied with the following three variables based on the findings of Ramanna and Watts (2012):

$Segment_{ki}$ = The natural logarithm of the number of business segments for each transaction *i*

HHI_i = Calculated complexity of the combined firm after transaction, measured with the business segment sales based Herfindahl-Hirschman Index for each transaction *i*

UNA_i = Unverifiable net assets for each transaction *i*

Other main variables are described shortly in the previous Section 7.1.3 presenting Replica and Baseline models. For detailed descriptions of the variables used in regressions see Table 3 for more information. The following Table 9 summarises the key differences between the cross-sectional acquisition premium models used in this thesis.

Table 9 – Variable differences in cross-sectional regression models
This table describes the differences between the Bugeja and Loyeung (2011) Replica model and different Baseline model versions. Subsample analyses describe the model used for separate subsamples according to accounting treatment and the existence of reported earnings based bonus incentives. X denotes cases, when variable in question belongs to a model in same row. All other variables are same in all models.

		Finite life intangibles	Share only	Cash only	TGT Leverage	ACQ Leverage	TGT Insider ownership %	Runup
Regression models	Replica			X	X	X	X	
	Baseline	X	X			X		X
	Subsample analyses	X	X					X
	UNA	X	X			X		X
	Segment	X	X			X		X
	HHI	X	X			X		X

		FTSE 100 P/E	ACQ Board owner-ship £	TGT Growth 1 year	Initial agreement	UNA*	Segment*	HHI*
Regression models	Replica							
	Baseline	X	X	X	X			
	Subsample analyses		X		X			
	UNA	X	X	X	X	X		
	Segment	X	X	X	X		X	
	HHI	X	X	X	X			X

*Includes interaction term with IFRS indicator variable.

From Table 9, we can see that Cash only variable has changed to Share only variable in Baseline models and that TGT Leverage variable has been excluded from the model. The reason for those changes is those variables' insignificance. The reason for dropping the TGT Insider ownership percentage variable is its negative effect on the sample size. Similar to subsample analyses FTSE 100 P/E and ACQ Leverage variables are dropped due to multicollinearity and TGT Growth 1 year due to its negative effect on the sample size. The reasons for adding new variables in Baseline models are based on their significant impact on the goodness of fit. Theoretical foundations for all variables are presented in Chapter 6.

7.2 Sensitivity and robustness analyses

To ensure the robustness and validity of the results, I invoke two different test procedures, namely elimination of significant outliers and Inverse Hyperbolic Sine (IHS) transformation for selected models. Due to lack of winsorisation, the data set used includes few outlier observations. Therefore, I will first eliminate the highly influential outlier(s) according to the procedure described in Section 7.2.1 and run all my models without that/those outlier(s) to increase the robustness of my results. For other statistically significant, but less influential outliers, I will follow the procedure outlined in Section 7.2.2 and then rerun my regression models. After that, in Section 8.4.1, I will compare the adjusted results with the original results.

I will also apply IHS transformation in a separate analysis to further increase the normality of regression residuals. If that assumption is not satisfied then the p-values for t-tests for small sample sizes are not valid. However, normality is not required to obtain unbiased estimates of the regression coefficients. Thus, I will use models with transformation only to check p-values for t-tests, where there is evidence that the normality assumption is violated. IHS transformation also allows for negative values unlike logarithmic transformations. In addition, I run the Shapiro-Wilk test to ascertain whether the transformations employed are sufficient in terms of the normality assumption and in case of heteroskedasticity I will use the HC3 robust adjustment procedure for small sample sizes to standardise all regression residuals. Section 7.2.3 discusses the Shapiro-Wilk test in more detail and Section 7.2.4 covers IHS transformation, which uses the Shapiro-Wilk test in parameter estimation procedure.

7.2.1 Eliminating extremely influential outliers

I will study each regression model for the influence of the outliers. Similar to Section 7.2.2, I will use studentized residuals to identify outliers and then check for the Cook's Distance to estimate their influence on coefficients of my regressions. If I am able to find severe outliers (studentized residuals >3) with an extremely high influence for all my models (Cook's D > 0.5), I am then going to study them more closely. Following the arguments of Bollen and Jackman (1990), I will remove an outlier only if it is both a statistically influential outlier and outlier in terms of its different characteristics compared to the rest of the sample. I am going through offer documents and annual reports for the effective year of the suspicious acquisitions to find out information about characteristics not incorporated in my models or other transactions

7.2.2 Statistical outliers

After elimination of extremely influential outliers, I will investigate the data employed in the regression for statistical outliers by evaluating the studentized residuals associated with variables. According to Belsley, Kuh and Welsch (1980) and Fox (1991) the studentized residuals computed from a regression equation with an absolute value of greater than 2 could raise concerns, while studentized residuals with an absolute value of greater than 3 are considered to be statistical outliers. I will further study the impact of those outliers with Cook's Distance, which is an overall measure of influence. The lowest value that Cook's D can assume is zero, and the higher the Cook's D is, the more influential the point is. I therefore re-estimated regression

models after deleting observations with studentized residuals with an absolute value greater than 3 and Cook's D greater than 4/n, which can be assumed as a cut-off point according to Bollen and Jackson (1990). Eliminating outliers is especially important for small sample sizes where a few strong outliers might have a large impact on estimated coefficients. I will show the summary of the results from elimination of other outliers in section 8.4.1.

7.2.3 Shapiro-Wilk test for the normality of regression residuals

The Shapiro-Wilk test used to test normality of the regression residuals and variables is the most important statistics test in addition to adjusted r-squared for regressions. Other statistics used and their explanation can be found in Appendix B. These include the Durbin-Watson Statistics (DWS) and variance inflation factor (VIF). DWS is used to check for potential problems with autocorrelation even though those problems are likely to be limited due to the fact that pooled cross sections data is not as vulnerable to serial correlation as panel data. VIF is used to measure harm inflicted by collinearity on the precision of estimated individual coefficients.

The importance of normality of residuals is undeniable since it is an underlying assumption under linear regression analysis and t-tests. However, technically normality is necessary only for hypothesis tests (i.e. p-values for t-tests and F-test) to be valid, because estimation of coefficients only requires that the errors are identically and independently distributed. When regression residuals violate the normality assumption, interpretation and inferences regarding the significance of the results are invalid, even in aforementioned cases the coefficients are valid. This normality assumption is of particular interest in my thesis, because my sample sizes are less than 200 for every model specification. For large samples, it is not a problem, because then the error term is actually the sum of a large number of independent error terms. Even if the individual error terms are not normally distributed, by the central limit theorem their sum may be assumed to be normally distributed. Based on the literature[34] testing different normality tests for variables, I have chosen the Shapiro-Wilk test for the normality of regression residuals. Evidence shows that the Shapiro-Wilk is the most powerful normality test for all types of distribution and sample sizes. In addition to regression residuals, the Shapiro-Wilk test is also used in combination with histograms to test the normality of the dependent variable. This information is then used to decide whether to make log/IHS transformation. In addition, the Shapiro-Wilk test is used in the

[34] Se e.g. Mendes and Pala (2003), Keskin, 2006, and Razali and Wah (2011)

estimation of theta parameter for the IHS transformation function in the next Section 7.2.4 The following algorithm describes the Shapiro-Wilk test (W):

$$W = \frac{(\sum_{i=1}^{n} a_i y_i)^2}{\sum_{i}^{n}(y_i - \bar{y}_i)^2} \quad (6)$$

where

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

$$a_1^2 = a_n^2 = \frac{((n+1)/2)^T}{\sqrt{2}(n/2+1)^T}$$

$$a_1 = -\sqrt{a_1^2}, a_n = \sqrt{a_n^2}$$

$$a_i = (2/c)m_i, i = 2, \dots, n-1$$

$$m_i = \Phi^{-1}\left(\frac{i-\alpha}{n-2\alpha+1}\right), where\ \Phi\ is\ the\ cdf\ of\ a\ standard\ normal\ distribution$$

$$\alpha = 0.314195 + 0.063336\beta - 0.010895\beta^2$$

$$\beta = \log_{10} n$$

$$c^2 = 4\sum_{i=1}^{n-1} \frac{m_i^2}{(1-2a_i^2)}$$

Based on the computed W statistics, the significance is calculated by linearly interpolating within the range of simulated critical values given in Shapiro and Wilk (1965). W statistics are reported within the result tables of this thesis.

7.2.4 Inverse hyperbolic sine transformation

The purpose of the IHS transformation is to reduce skewness and kurtosis of regression residuals by transforming selected variables employed in regression models. This is important, because violation of the normality of regression residuals assumption makes the use of t-tests invalid for hypothesis testing process. IHS transformation is rather similar to logarithmic transformations as it uses the arsinh function with scaling parameter theta, θ. The key benefit of the arsinh function compared to logarithmic transformations is that it is defined also for zeros and negative values. This transformation has been commonly used with wealth data due to a long and thick right hand tail, a nontrivial number of wealth holdings in the multi-million dollar range and a substantial

fraction of the population with no wealth at all[35]. However, it can be used with different kinds of data sets. For example, Kale, Reis and Venkateswaran (2009) use IHS as an alternative way to handle negative gaps with compensation gap data. Therefore, I will apply IHS transformation as an alternative way to handle negative and zero values in addition to using nontransformed data. Univariate Inverse Hyperbolic Sine function is defined according to Johnson (1949) and Burbidge, Magee and Robb (1988) as follows:

$$\theta^{-1} sinh^{-1}(\theta x) = \theta^{-1} \ln\left(\theta x + (\theta^2 x^2 + 1)^{\frac{1}{2}}\right) \quad (6)$$

Where

θ is a scaling parameter and x nontransformed variable.

IHS as a symmetric and monotone function is linear around the origin and approximates the logarithm in its right tail. For large values of x the IHS function is simply a vertical displacement of the logarithm: $\ln\left(\theta x + (\theta^2 x^2 + 1)^{\frac{1}{2}}\right) \approx ln2\theta + lnx$. The scaling parameter θ governs the proportion of the function's domain in which it is essentially linear and the proportion in which it approximates the logarithm. As θ approaches zero, the IHS transformation is linear for a larger proportion of its domain. To see this relation another way, note that the derivate of IHS(x) is $1/\sqrt{\theta^2 x^2 + 1}$. If x is large relative to θ, this derivative approximates the derivative of the log, $1/x$ for most positive (or negative) values of x. If x is small relative to θ, the derivative is approximately one and the function is linear for most of its domain. (Pence, 2006)

Another transformation that is defined for positive and negative values, and nests both the linear and logarithmic transformation, is the Box-Cox transformation. However, in this case IHS is preferable because the Box-Cox transformation is not defined at zero. In my sample there are multiple zeros for the *Recognised goodwill* variable for example.

To estimate the optimal θ for the purpose of increasing normality of the variables, I will employ a rather simple, but sufficiently accurate method, which relies upon maximisation of the p-value of Shapiro-Wilk test statistics. In literature, IHS transformation has been generally applied to either the dependent variable by using the log-likelihood function presented by Burbidge, Magee and Robb (1988) or by using the simplified arsinh function with $\theta = 1$ or some other tested value

[35] see e.g. Burbidge, Magee and Robb (1988), Pence (2006), Gale and Pence (2006), Dynan, Mian and Pence (2012), and Maynard and Qiu (2009)

used in previous studies. In the case of the independent variables, I could not find any study, which had studied the log-likelihood function for independent variables. The benefit of setting $\theta = 1$ in previous studies has been that for example in case of the net worth studies, the coefficients have been able to be interpreted similarly to the coefficients of logarithmic transformation for net worth values as small as $100 (see e.g. Maynard and Qiu, 2009; Cobb-Clark and Hildebrand, 2006). However, in my case I am only interested in normalising independent variables to improve the normality of regression residuals sufficiently to make valid conclusions regarding the hypotheses presented in Chapter 4. As normality of regression residuals impact only p-values of t-statistics, I can use the coefficients of nontransformed variables to estimate the effect size for variables. Therefore, I find using Shapiro-Wilk's p-value optimisation procedure regarding θ that maximises independent variables' normality the most useful for my purposes. In short I will input IHS transformation in equation (8) to equation (6) in place of y and run an optimisation procedure regarding the maximisation of the p-value of the Shapiro-Wilk test, which is calculated by linearly interpolating the W-statistics within the range of simulated critical values given by Shapiro and Wilk (1965). A script used to estimate θ with SPSS R integration plug-in can be found from the Appendix D.

For an additional sanity check, I examined transformed variables used in regression for potential increases in variable specific standard errors and decreases in adjusted r-squared. If transformed variables failed to meet those criteria I used IHS transformation with lower θ value in case of large θ values and higher θ value in case of small θ values. I found out that reasonable lower and upper boundaries for θ values are 0.1 and 50, when standard errors are small before applying IHS transformation. While my analysis somewhat ignores the joint distribution of independent variables and changes in variance, the above mentioned procedure produces reasonably efficient results as witnessed from Table 22 in Appendix F. Values for adjusted r-squared are, however, lower than for models employing θ=1. Despite this shortcoming, my results are superior, in terms of improvement in normality of regression residuals, to untabulated results gained by simply using arsinh function with θ=1.

8 Findings

In this chapter, I will present the findings of my thesis for the Baseline model and Replica model in Subchapters 8.1 and 8.2. These models are discussed thoroughly in Section 7.1.3. After the main findings, Subchapter 8.3 discusses the elimination of one substantially different outlier from both initial samples. The following Subchapter 8.4 shows the result of the robustness tests employed and finally Subchapter 8.5 concludes this chapter by presenting additional analyses.

8.1 Baseline results

This subchapter presents findings for Baseline models. As later shown in Subchapter 8.2, which presents findings for the Replica model, my model is superior to the Replica model in terms of statistical goodness of fit and the normality of regression residuals. Thus, it is reasonable to focus on more important results first. In addition, I will compare my results with Bugeja and Loyeung (2011) and highlight the differences. However, despite the similarity in topic, my results are not fully comparable with the Bugeja and Loyeung (2011) study due to the fact that their study focus on Australian takeover announcement offers instead of fully completed acquisition of control in the U.K. Also, I make comparisons to other studies where appropriate. Section 8.1.1 presents basic results for goodwill variables and finite life intangibles for the full sample and for the U.K. GAAP and IFRS subsamples. Section 8.1.2 discusses the influence of CEO bonuses and Section 8.1.3 shows the results regarding the proxy variables for managerial discretion in PPA.

8.1.1 Statistical fit and the association between goodwill and acquisition premiums

Table 10 presents the cross-sectional regression results for the Baseline model in which the dependent variable is acquisition premium measured as the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. Following Betton, Eckbo and Thorburn (2008) I will use the terms initial offer price or initial offer premium instead for the nontransformed acquisition premium to make the distinction between those two clearer. The Initial offer premium is measured as the final offer price minus target share price 42 days before original acquisition announcement date divided by the target share price 42 days before original acquisition announcement date. Year fixed effects are added to models from (3) to (4) to make sure that yearly variation is not causing regression results in models (1) and (2).

Table 10 – Goodwill, finite life intangible assets and acquisition premium, Baseline results

This table presents the results of the OLS regression for Baseline results with announcement dates from Jan 1 1999 to Dec 2012 for 178 acquisitions among listed firms in the U.K. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. In models from (1) to (2) *TGT Goodwill* and *Goodwill approximation* (*Goodwill*$_k$) are studied without year fixed effects, which are added on to models from (3) to (4). *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid and *Goodwill approximation* is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. *Finite life intangibles* is the recognised amount of finite life intangible assets divided by the consideration paid. Variable *TGT MTB* is excluded from models with *Goodwill approximation* due to high correlation and variable *FTSE 100 P/E ratio* is excluded from models with year fixed effects due to high multicollinearity with year dummies as indicated by high VIF ratio (>10). See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

	Dependent Variable = Acquisition Premium			
Independent Variables	(1)	(2)	(3)	(4)
TGT Goodwill	-0.191**		-0.195**	
	(-2.34)		(-2.25)	
Goodwill approximation		-0.010		-0.013*
		(-1.52)		(-1.91)
IFRS	0.024	0.066	-0.038	-0.012
	(0.46)	(1.30)	(-0.66)	(-0.18)
TGT Goodwill*IFRS	0.112		0.094	
	(1.16)		(0.86)	
Goodwill approximation*IFRS		0.001		0.002
		(0.14)		(0.18)
Finite life intangibles	0.117	0.069	0.106	0.062
	(1.17)	(0.63)	(0.91)	(0.49)
Runup -1-42	0.600***	0.625***	0.604***	0.628***
	(11.32)	(12.15)	(10.41)	(10.90)
FTSE 100 P/E ratio	0.004	0.007*		
	(0.97)	(1.92)		
Multiple bidders	0.046	0.063	0.048	0.069
	(0.78)	(1.04)	(0.81)	(1.14)
Friendly	0.024	0.001	0.005	-0.029
	(0.30)	(0.01)	(0.05)	(-0.34)
Share only	-0.019	-0.036	-0.013	-0.028
	(-0.44)	(-0.80)	(-0.29)	(-0.61)
Toehold %	-0.072	-0.081	-0.003	-0.052
	(-0.37)	(-0.39)	(-0.05)	(-0.21)
Initial agreement	-0.009	0.007	0.019	0.043
	(-0.19)	(0.15)	(0.34)	(0.78)
TGT MTB	-0.012**		-0.014***	
	(-2.37)		(-2.74)	
TGT ROE	0.139***	0.133***	0.135***	0.124***
	(4.14)	(3.71)	(3.86)	(2.59)
TGT Size	-0.030**	-0.032**	-0.023	-0.026*
	(-2.17)	(-2.28)	(-1.52)	(-1.68)
TGT FCF	-0.044	-0.043	-0.017	-0.010
	(-0.28)	(-0.34)	(-0.09)	(-0.07)
TGT Growth 1 year	-0.053	-0.053	-0.067	-0.065
	(-1.22)	(-1.02)	(-1.18)	(-1.07)
ACQ Insider ownership %	0.061	0.042	0.060	0.041
	(0.72)	(0.51)	(0.70)	(0.50)
ACQ ROE	-0.085	-0.079	-0.085	-0.079
	(-1.33)	(-1.15)	(-1.28)	(-1.10)
ACQ Leverage	0.008	0.008	0.007	0.006
	(0.44)	(0.35)	(0.28)	(0.21)
ACQ Size	0.010	0.014	0.008	0.014
	(0.94)	(1.35)	(0.69)	(1.15)
ACQ Board ownership £	0.016**	0.016**	0.013*	0.013*
	(2.32)	(2.20)	(1.80)	(1.66)
ACQ FCF	0.298	0.251	0.327*	0.268
	(1.47)	(1.22)	(1.66)	(1.31)
Constant	0.235	0.096	0.254	0.206
	(1.18)	(0.46)	(1.18)	(0.91)
Year fixed effects	no	no	yes	yes
Number of acquisitions	178	178	178	178
Adjusted R^2	0.682	0.660	0.688	0.662
Shapiro-Wilk test	0.988	0.993	0.983**	0.991
Durbin-Watson statistics	2.321	2.351	2.535	2.507

Starting with the indicators of statistical fit, the model evidently possesses good level explanatory power with the adjusted R^2s ranging from 0.660 to 0.688. In addition, regression residuals deviate

from OLS regression normality assumption at 10% level only in the case of the model (3) in Table 10. The data also provide partial support for Hypothesis 1 in that TGT Goodwill measure for goodwill is statistically significantly correlated to the acquisition premium pre-IFRS at the 5% significance level. However, the data does not provide support to Hypothesis 2 or to the findings of Bugeja and Loyeung (2011) regarding the positive impact of IFRS on the coefficient of goodwill measures nor Hypothesis 6 regarding the value relevance of finite life intangibles.

The OLS coefficient of -0.191 indicates that a one-unit increase in TGT Goodwill is associated with a 0.191 unit decrease in the natural logarithm of acquisition premium under U.K. GAAP, while keeping the other variables constant. This result translates into a 19.1% decrease in acquisition premium for every one-unit increase in TGT Goodwill. One-unit increase in TGT Goodwill represents an increase in the goodwill on the balance sheet of the target firm, which is at the size of the total consideration paid. The size of the effect for the initial offer premium, is a decrease of 25.21 percentage points per one-unit increase in TGT Goodwill. The effect is nearly identical when taking into account year fixed effects. This effect can be considered somewhat significant, because one standard deviation change in TGT Goodwill represent a decrease of 9.58 percentage points in average initial offer premium.

Adding year fixed effects, however, do have implications for the significance of the OLS coefficient of -0.012 for Goodwill approximation under U.K. GAAP, which is now statistically significant at the 10% level. The size of its impact on the initial offer premium represents a decrease of 1.72 percentage points, when Goodwill approximation increases by one-unit. This effect translates to a decrease of 6.45 percentage points per one-unit change in standard deviation, which is clearly smaller than the impact of the goodwill on the balance sheet of the target firm. Other key variables such as the interaction between IFRS and goodwill variables and finite life intangibles do not seem to differ from zero at the 10% significance level, even though the sign of the coefficients of those variables are positive as expected. The most significant control variables in the model are Runup, TGT MTB and TGT ROE of which the Runup variable explains the largest part of the variation in acquisition premium by contributing a 0.79-0.83 percentage point change in average initial offer price per one percentage point change in Runup. This result is identical with the findings of Betton, Eckbo and Thorburn (2008) with US control bid data, who find that a dollar increase in the runup raises the initial offer price by $0.80.

To study whether the negative correlation between goodwill and acquisition premium still exists after the adoption of IFRS, I have employed a subsample analysis for U.K. GAAP and IFRS acquisitions separately. Table 11 presents the results for this subsample analysis. Subsample analysis shows weak level evidence that IFRS has made the previously found pre-IFRS goodwill related discount in acquisition premium insignificant and thus supports Hypothesis 2.

Table 11 – Regression results for U.K. GAAP transactions and IFRS transactions separately

This table presents the results of the OLS regression for U.K. GAAP acquisitions and IFRS acquisitions with announcement dates from Jan 1 1999 to Dec 2012 for acquisitions among listed firms in the U.K. Panel A presents normal regression results, while Panel B presents significantly changed results for model (2) after removal of statistical outliers and after adding variable transformations to improve normality of regression residuals. In models (1) and (2) the sample of 116 acquisitions is formed from transactions where acquirer has used U.K. GAAP acquisition accounting, while in models (3) and (4) IFRS has been used in business combinations to generate a sample size of 80 acquisitions. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid and *Goodwill approximation* is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. Control variables are based on the Baseline model excluding *FTSE 100 P/E* ratio and ACQ *Leverage* variables due to multicollinearity (VIF values>10) and *TGT Growth 1 year* variable due to small number of observations. These limitations lead to following 15 control variables: *Runup, Multiple bidders, Friendly, Share only, Toehold %, Initial agreement, TGT MTB, TGT ROE, TGT Size, TGT FCF,* ACQ *Insider ownership %,* ACQ *ROE,* ACQ *Size,* ACQ *Board ownership* £ and ACQ *FCF*. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

Panel A: Normal regression results

	Dependent Variable = Acquisition Premium			
	U.K. GAAP business combinations		**IFRS business combinations**	
Independent Variables	(1)	(2)	(3)	(4)
TGT Goodwill	-0.236*		-0.080	
	(-1.90)		(-0.91)	
Goodwill approximation		-0.013*		-0.008
		(-1.72)		(-0.64)
Finite life intangibles	0.360	-0.086	0.073	0.062
	(0.46)	(-0.04)	(0.43)	(0.36)
Constant	0.249	0.122	-0.507	-0.635
	(0.77)	(0.36)	(-0.74)	(-0.88)
Control variables	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Number of acquisitions	116	116	80	80
Adjusted R^2	0.717	0.696	0.464	0.458
Shapiro-Wilk test	0.982	0.980*	0.916***	0.921***
Durbin-Watson statistics	2.273	2.251	2.632	2.671

Panel B: Regression results for model (2) without cases when recognised goodwill has indefinite life and with variable transformations

	Excluding U.K. cases with indefinite life goodwill	**With variable transformations applied**
	(5)	(6)
Goodwill approximation	-0.012	
	(-1.58)	
Goodwill approximation, IHS transformed		-0.117**
		(-2.40)
Finite life intangibles	-0.047	-0.084
	(-0.02)	(-0.04)
Constant	0.103	0.133
	(0.29)	(0.41)
Control variables	yes	yes
Year fixed effects	yes	yes
Number of acquisitions	113	116
Adjusted R^2	0.707	0.705
Shapiro-Wilk test	0.984	0.991
Durbin-Watson statistics	2.262	2.354

Table 11 shows that the model clearly works much better for U.K. GAAP acquisitions as expressed by higher adjusted r-squared values compared to IFRS acquisitions. One potential reason could be that the sample size for the IFRS sample is smaller and thus it is more vulnerable to the effects of outliers. This theory is confirmed by an untabulated robustness test, where the removal of one statistical outlier improves the models' adjusted r-squared values from 0.464 to 0.589 in case of TGT Goodwill model and from 0.458 to 0.587 in case of Goodwill approximation model. While the IFRS sample models violate the normality assumption of regression residuals and somewhat suffers from autocorrelation as seen from Durbin-Watson Statistics that exceed 2.5, it is unlikely that these would have had a serious effect on the significance of the results due to small coefficients.

Under U.K. GAAP the same measures for goodwill as in Table 10, namely TGT Goodwill and Goodwill approximation, exhibit negative correlations with acquisition premium. The Goodwill approximation measure is vulnerable to changes in model specifications. For example, exclusion of U.K. GAAP observations where recognised goodwill has been considered to have an indefinite life makes the variables coefficient insignificant, while employing variable transformations to increase normality of regression residuals makes the coefficient significant at 5% level.

8.1.2 The influence of CEO bonuses

Table 12 describes how different incentives for CEOs connect CEOs' actions to changes in the association between goodwill and acquisition premiums. More specifically, Table 12 shows the coefficients for key variables for two subsamples: those with reported earnings based incentives and those without. A CEO has reported earnings based incentives if he has been paid bonuses in either of the two previous years before acquisition and those bonuses are based on increase in earnings, operating profit, EPS or return on sales figures. Goodwill related independent variables in Table 12 are TGT Goodwill and Recognised goodwill, of which the latter is the amount of goodwill recognised in business combinations.

Table 12 – Regression results for acquirers with and without earnings based bonus incentives

This table presents the results of the OLS regression for acquirers with and without earnings based bonus incentives with announcement dates from Jan 1 1999 to Dec 2012 for acquisitions among listed firms in the U.K. Panel A presents normal regression results, while Panel B presents significantly changed results for model (4) after removal of statistical outliers and after adding variable transformations to improve normality of regression residuals. In models (1) and (2) the sample is formed from transactions where acquirer hasn't paid bonuses to CEO in the two previous fiscal years or bonuses are based on something else than earnings, operating profit, EPS or return on sales, while in models (3) and (4) only transactions where acquirer has paid bonuses in either of the two previous years to CEO and those bonuses are linked to one of the aforementioned indicators are included. Models (1) and (2) also include transactions were bonuses are tied to EVA/PANI/ROCE/EP or transactions where only word profitability is mentioned. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid and *Recognised goodwill* is the recognised balance sheet value of goodwill divided by the consideration paid. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. Control variables are based on the Baseline model excluding *FTSE 100 P/E* ratio and ACQ *Leverage* variables due to multicollinearity (VIF values>10) and *TGT Growth 1 year* variable due to small number of observations. These limitations lead to following 15 control variables: *Runup, Multiple bidders, Friendly, Share only, Toehold %, Initial agreement, TGT MTB, TGT ROE, TGT Size, TGT FCF,* ACQ *Insider ownership %,* ACQ *ROE,* ACQ *Size,* ACQ *Board ownership £* and ACQ *FCF*. See Table 3 for definitions of independent control variables. In models (3) and (4), year dummies for years 2011 and 2012 are combined in constant term due to only one observation for year 2012. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

Panel A: Normal regression results

	Dependent Variable = Acquisition Premium			
	No bonuses paid in previous years or bonuses not awarded from increase in reported earnings		**Bonuses paid in previous years and bonuses awarded from increase in reported earnings**	
Independent Variables	(1)	(2)	(3)	(4)
TGT Goodwill	-0.020		-0.441**	
	(-0.10)		(-2.28)	
Recognised goodwill		0.041		-0.074**
		(0.31)		(-2.05)
IFRS	-0.082	0.055	-0.117	-0.099
	(-0.38)	(0.23)	(-1.28)	(-1.07)
TGT Goodwill*IFRS	0.005		0.395	
	(0.02)		(1.59)	
Recognised goodwill*IFRS		-0.178		0.110*
		(-0.91)		(1.81)
Finite life intangibles	0.066	0.044	0.081	0.083
	(0.21)	(0.15)	(0.49)	(0.44)
Constant	-0.643	-0.415	0.772*	0.367
	(-0.60)	(-0.43)	(1.71)	(0.67)
Control variables	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Number of acquisitions	71	71	101	101
Adjusted R^2	0.658	0.678	0.667	0.593
Shapiro-Wilk test	0.939***	0.934***	0.981	0.961***
Durbin-Watson statistics	2.552	2.475	2.456	2.484

Panel B: Regression results for model (4) without two statistical outliers and with variable transformations

	Excluding two statistical outliers	**With variable transformations**
	(5)	(6)
Recognised goodwill	-0.059**	-0.065
	(-1.99)	(-1.49)
IFRS	-0.093	-0.126
	(-1.08)	(-1.25)
IFRS*Recognised goodwill	0.096	0.117*
	(1.62)	(-1.76)
Finite life intangibles	0.077	0.198
	(0.041)	(0.91)
Constant	0.463	0.433
	(1.09)	(0.79)
Control variables	yes	yes
Year fixed effects	yes	yes
Number of acquisitions	99	101
Adjusted R^2	0.660	0.561
Shapiro-Wilk test	0.982	0.980
Durbin-Watson statistics	2.452	2.551

Again dividing the sample in two pieces increases the deviation of regression residuals from normal distribution, as measured with the Shapiro-Wilk test. Otherwise models exhibit nearly equal explanatory power when compared to full sample analyses.

The most striking result from Table 12 is that the earlier discovered significant relation between TGT Goodwill and acquisition premium hold only for transactions where the CEO has reported earnings based bonus incentives. Thus there is support for Hypothesis 3. The size of this effect is increased by 12.54 percentage points and now a one standard deviation change in TGT Goodwill represent a 22.12 percentage points decrease in initial offer premium. Additionally, while full sample analysis did not show any correlation between Recognised goodwill and acquisition premium, the bonus sample analysis reveals a significantly negative correlation under U.K. GAAP at the 5% level and a significantly positive correlation under IFRS at the 10% level. The effect sizes for these relations are minus 5.86 percentage points and plus 8.71 percentage points, respectively. The significance of the results for the Recognised goodwill, however, are questionable due to violation of the normality assumption. Therefore, Table 12 presents separately the results after removal of two statistical outliers and with variable transformations to shed some light on the issue. These results for models (5) and (6) in Table 12 are conflicting. Results without statistical outliers present only significant and negative correlation between Recognised goodwill and acquisition premium under U.K. GAAP, while the results with variable transformations show that IFRS has had a significantly positive effect on the coefficient of Recognised goodwill. Pulling these results together, it can be said that there is weak evidence that the mandatory adoption of IFRS removes the recognised goodwill related discount in acquisition premium; when the acquirers' CEOs have reported earnings based bonus incentives. For transactions made by other acquirers, amortisation of goodwill seems to have no effect at all under U.K. GAAP and this relation stays unaffected by the adoption of IFRS.

Furthermore, the Goodwill approximation variable is insignificant and is thus excluded from Table 12. This is not surprising, because it is the most controversial measure of goodwill of the three measures used in this thesis. First, it is perfectly correlated with TGT MTB ratio, thus it resembles the fair value of growth assets. Second, it is significantly and positively correlated with the recognised amount of goodwill, because it measures, for example, the going concern goodwill of the target. Third, by its definition it excludes the goodwill on the balance sheet of the target firm and thus is significantly and negatively correlated with it. It is worth noticing that goodwill on the balance sheet of the target firm is also part of the recognised goodwill, since its fair value in PPA is zero. Fourth, it also includes part of the intangible assets to be recognised in business

combinations. These issues make Goodwill approximation the most inaccurate of the three goodwill measures used. Therefore, I will give less weight to it than other measures.

8.1.3 Acquisition premiums and managerial discretion in purchase price allocations

The relation between managerial discretion in purchase price allocations and acquisition premiums is studied by introducing two organisational complexity related variables called Segment and HHI, and one variable measuring unverifiable net assets (UNA). Segment is the natural logarithm of the number of business segments and HHI measures internal sales concentration. See the exact calculation for UNA in Table 3. All these variables are calculated for the combined firm after acquisition. Table 13 presents results for organisational complexity related variables and Table 14 describes the impact of UNA.

Table 13 – The relation of combined firm complexity with acquisition premium pre- and post-IFRS
This table presents the results of the baseline OLS regression extension for *Segment* and *HHI* variables with announcement dates from Jan 1 1999 to Dec 2012 for acquisitions among listed firms in the U.K. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. In models from (1) to (2) *TGT Goodwill* and *Goodwill approximation* (*Goodwill$_k$*) are studied without year fixed effects, which are added on to models from (3) to (4). *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid and *Goodwill approximation* is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. *Finite life intangibles* is the recognised amount of finite life intangible assets divided by the consideration paid. *Segment* is the natural logarithm of the number of business segments and *HHI* is the Herfindahl-Hirschman ratio of business segment sales. Both variables are estimated for the combined firm after effective date of the transaction. Control variables are same than in Table 10: *Runup, Multiple bidders, Friendly, Share only, Toehold %, Initial agreement, TGT MTB, TGT ROE, TGT Size, TGT FCF,TGT Growth 1 year,* ACQ *Insider ownership %,* ACQ *ROE,* ACQ *Leverage* ACQ *Size,* ACQ *Board ownership £* and ACQ *FCF*. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

	Dependent Variable = Acquisition Premium			
Independent Variables	(1)	(2)	(3)	(4)
TGT Goodwill	-0.182**	-0.173**		
	(-2.27)	(-2.26)		
Goodwill approximation			-0.015**	-0.015**
			(-2.22)	(-2.04)
IFRS	-0.113	-0.001	-0.089	0.016
	(-1.41)	(-0.01)	(-1.04)	(0.15)
TGT Goodwill*IFRS	0,096	0.075		
	(0.92)	(0.74)		
Goodwill approximation*IFRS			0.004	0.006
			(0.46)	(0.67)
Finite life intangibles	0,111	0.094	0.066	0.046
	(0.91)	(0.77)	(0.51)	(0.36)
Segment	-0.057*		-0.075**	
	(-1.75)		(-2.16)	
Segment*IFRS	0.069		0.070	
	(1.31)		(1.29)	
HHI		0.109		0.156**
		(1.58)		(2.13)
HHI*IFRS		-0.075		-0.077
		(-0.60)		(-0.59)
Constant	0.292	-0.170	0.234	0.54
	(1.33)	(0.72)	(1.03)	(0.22)
Control variables	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Number of acquisitions	166	162	166	162
Adjusted R^2	0.688	0.678	0.667	0.656
Shapiro-Wilk test	0.982**	0.985*	0.985*	0.988
Durbin-Watson statistics	2.534	2.574	2.515	2.541

Table 13 shows us that selection of goodwill variables have an effect on the coefficients of Segment and HHI variable. When those are combined with Goodwill approximation their correlation with acquisition premium is noticeably stronger than when combined with the TGT Goodwill variable. In addition, none of the organisational complexity variables significantly support the Hypothesis 4, which states that more complex acquirers should be more willing to pay higher premiums under IFRS due to larger opportunities to engage in goodwill management. Before IFRS there is evidence that diversified firms pay less than others for acquisitions as the coefficient for Segment is significantly negative and the coefficient for HHI variable is significantly positive for the model with Goodwill approximation. Results regarding Segment must be interpreted with care due to the fact that those models violate the normality assumption of OLS. To confirm my results, variable transformations were applied and these results are in more detail discussed in section 8.4.3. In short those results support the results for models (3) and (4), but when combined with TGT Goodwill the Segment variable is no longer significant.

Regarding the size of the effect, one per cent change in Segment translates to -0.057 or -0.075 per cent changes in acquisition premium, when all other variables are kept constant. To elaborate this effect, if the acquirer were to have three segments after acquisition then it would pay either 3.76 or 4.95 percentage points less, in terms of average initial offer price, than an acquirer with two segments after acquisition. HHI variable's impact on acquisition premium according to model (4) is +15.6% per one-unit change in HHI variable. Thus an extremely diversified firm with 10 equal segments and an HHI of 0.1 would pay 18.53 percentage points less initial offer price than a firm with one segment and a HHI of 1 after acquisition.

Next, I will go through the results for unverifiable net assets and acquisition premium according to Table 14. Hypothesis 5 states that a firm with more unverifiable net assets would be able to "combine" internally generated goodwill with external goodwill to potentially avoid necessary impairments in goodwill. As we can see from the results, we must reject Hypothesis 5 regardless of how the UNA variables are calculated.

Table 14 – The relation of unverifiable net assets with acquisition premium

This table presents the results of the baseline OLS regression extension for *UNA* variables with announcement dates from Jan 1 1999 to Dec 2012 for acquisitions among listed firms in the U.K. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. *TGT Goodwill* is the balance sheet value of goodwill for the target firm divided by the consideration paid. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. *Finite life intangibles* is the recognised amount of finite life intangible assets divided by the consideration paid. *UNA* and *ModUNA* are measures of unverifiable net assets for the combined firm after effective date of the transaction (see calculation in Table 3). *UNA* is winsorised at the 1% and 1% percentiles and *ModUNA* at the 2.5% and 97.5% percentiles. Additionally, results for in-sample ranks are presented for both variables. Control variables are same than in Table 10: *Runup, Multiple bidders, Friendly, Share only, Toehold %, Initial agreement, TGT MTB, TGT ROE, TGT Size, TGT FCF,TGT Growth 1 year,* ACQ *Insider ownership %,* ACQ *ROE,* ACQ *Leverage* ACQ *Size,* ACQ *Board ownership* £ and ACQ *FCF*. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

	Dependent Variable = Acquisition Premium					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
TGT Goodwill	-0.164**	-0.162**	-0.165**	-0.165**	-0.159**	-0.160**
	(-2.14)	(-2.05)	(-2.12)	(-2.19)	(-2.06)	(-2.07)
IFRS	-0.030	-0.028	-0.011	-0.031	-0.032	-0.051
	(-0.42)	(-0.39)	(-0.12)	(-0.43)	(-0.41)	(-0.58)
TGT Goodwill*IFRS	0.055	0.052	0.056	0.054	0.049	0.050
	(0.55)	(0.48)	(0.53)	(0.54)	(0.45)	(0.47)
Finite life intangibles	0.089	0.102	0.107	0.088	0.101	0.102
	(0.64)	(0.71)	(0.77)	(0.65)	(0.73)	(0.74)
UNA	-0.002					
	(-0.13)					
UNA*IFRS	0.004					
	(0.22)					
UNA winsorised		-0.001				
		(-0.06)				
UNA winsorised*IFRS		0.000				
		(0.00)				
UNA in-sample ranked			0.000			
			(0.14)			
UNA in-sample ranked*IFRS			-0.000			
			(-0.24)			
ModUNA				-0.004		
				(-0.23)		
ModUNA*IFRS				0.001		
				(0.05)		
ModUNA winsorised					-0.004	
					(-0.19)	
ModUNA winsorised*IFRS					0.006	
					(0.16)	
ModUNA in-sample ranked						-0.000
						(-0.04)
ModUNA in-sample ranked*IFRS						0.000
						(0.44)
Constant	0.152	0.196	0.184	0.156	0.203	0.187
	(0.59)	(0.76)	(0.75)	(0.61)	(0.80)	(0.72)
Control variables	yes	yes	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes	yes	yes
Number of acquisitions	161	161	161	161	161	161
Adjusted R^2	0.699	0.696	0.696	0.699	0.696	0.697
Shapiro-Wilk test	0.976***	0.979**	0.979**	0.976***	0.979**	0.978**
Durbin-Watson statistics	2.577	2.589	2.585	2.573	2.584	2.586

Table 14, however, shows no evidence that Hypothesis 5 would hold in reality. In fact, none of the ways to calculate unverifiable net assets are even close to be significant. Thus I must reject it.

8.2 Results for Bugeja and Loyeung (2011) model

Table 15 presents the cross-sectional regression results for the Replica model in which the dependent variable is also the acquisition premium measured as the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. Year fixed effects controls for changes in the acquisition premium during the period are

added to models from (4) to (6). The purpose of Table 15 is to make direct comparison with the Bugeja and Loyeung (2011) results and also to showcase the need for a more advanced model specification due to the qualities of my sample.

Table 15 – Goodwill and acquisition premium, Replica results

This table presents the results of the OLS regression for the Replica model studied by Bugeja and Loyeung (2011) with announcement dates from Jan 1 1999 to Dec 2012 for 179 acquisitions among listed firms in the U.K. The dependent variable is *Acquisition premium*, which is the natural logarithm of the final offer price divided by the target share price 42 days before original acquisition announcement date. In models from (1) to (3) TGT Goodwill, Goodwill approximation and Recognised goodwill ($Goodwill_k$) are studied without year fixed effects, which are added on to models from (4) to (6). *TGT Goodwill* is the balance sheet value of goodwill for the target firm before acquisition divided by the consideration paid, *Goodwill approximation* is the target firm market value of equity 42 days before original announcement date minus the book value of equity, divided by the book value of equity and *Recognised goodwill* is the recognised balance sheet value of goodwill divided by the consideration paid. *IFRS* is an indicator variable denoting acquisitions accounted according to IFRS. Replica model includes following control variables used in Baseline models: *Multiple bidders, Friendly, Toehold %, TGT MTB, TGT ROE, TGT Size, TGT FCF,* ACQ *Insider ownership %,* ACQ *ROE,* ACQ *Leverage,* ACQ *Size* and ACQ *FCF.* Control variables not included in Baseline models are: *Cash only, TGT Insider ownership, TGT Leverage* and ACQ *MTB.* Table 9 further explains the difference between Replica and Baseline models. See Table 3 for definitions of independent control variables. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

	Dependent Variable = Acquisition Premium					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
TGT Goodwill	-0.314*			-0.294		
	(-1.88)			(-1.54)		
Goodwill approximation		-0.010			-0.015	
		(-0.44)			(-0.65)	
Recognised goodwill			0.042			0.062
			(0.48)			(0.67)
IFRS	-0.004	0.024	0.050	-0.105	-0.007	0.035
	(-0.08)	(0.42)	(0.66)	(-1.24)	(-0.08)	(0.29)
TGT Goodwill*IFRS	0.165			0.139		
	(0.89)			(0.67)		
Goodwill approximation*IFRS		-0.013			-0.014	
		(-0.59)			(-0.64)	
Recognised goodwill*IFRS			-0.066			-0.066
			(-0.66)			(-0.61)
Constant	0.127	-0.078	-0.068	0.038	-0.055	-0.029
	(0.34)	(-0.20)	(-0.18)	(0.10)	(-0.13)	(-0.07)
Control variables	ves	ves	ves	ves	ves	ves
Year fixed effects	no	no	no	yes	yes	yes
Number of acquisitions	179	179	179	179	179	179
Adjusted R^2	0.260	0.180	0.175	0.300	0.240	0.235
Shapiro-Wilk test	0.953***	0.957***	0.957***	0.972***	0.979***	0.978***
Durbin-Watson statistics	2.209	2.109	2.116	2.388	2.339	2.356

I will start my analysis with the overall statistical fit of the Replica model. It can clearly be seen from the adjusted R^2 that the explanatory power of the Replica model is weak; at best it only reaches a value of 0.300. However, the explanatory power in the context of consolidated acquisitions among listed U.K. firms is significantly higher than in the Bugeja and Loyeung's (2011) comparative adjusted R^2 of 0.023 with the sample of Australian acquisition offer bids. The Replica model also suffers from another problem, which is its inability to meet the requirement of the normality assumption of regression residuals. Transforming variables with IHS and Ln transformations is not enough to make the regression residuals normal. Only the removal of four statistical outliers allows the models (4) and (6) in Table 15 to meet that requirement.

Therefore, due to low explanatory power and violation of the normality assumption it is not surprising that results for all measures of goodwill are shown as insignificant. Even in reality they are not as evidenced by the results of the Baseline model. Also, the results after removal of statistical outliers are insignificant for these two models. Removal of statistical outliers, nevertheless, makes regression residuals closer to normal distribution and increases the adjusted r-squares to 0.349 for model (4) and to 0.246 for model (6) in Table 15. These results without statistical outliers cannot be given full weight due to the fact that only those outliers that are unique from other observations in the sample or represent a population other than the one I am interested in can be dropped from the sample such as the extreme outlier discussed in the following Subchapter 8.3. One could argue that these conflicting results are driven by different samples. However, when looking at the descriptive statistics in Subchapter 5.2 more carefully it can be seen that Replica and Baseline samples are reasonably similar especially in the case of the values for the dependent variable and key independent variables.

Thus, based on the lower explanatory power of the Replica model, I reason that the difference in results is mainly driven by omitted variable bias. Another fact that supports my reasoning is that in the Replica models there are at least three statistical outliers for each model specification while in the basic Baseline models there are at most only two statistical outliers. Regarding omitted variables, Bollen and Jackson (1990) state that a case can be an outlier because an important explanatory variable has been omitted from the model – indeed, in such setting, the outlier may be the most important case in the analysis because it points to this form of specification error. In fact, the Replica model omits Runup, the most important variable, when compared to the Baseline models and two of the outliers of the Replica model are included as normal observations in the Baseline sample, but are not considered as statistical outliers. Therefore, my Summary and Conclusions Chapter is mainly based on the findings of the baseline models.

8.3 Elimination of significant outlier from my sample

As explained in Section 7.2.2 extreme outliers were searched by studying studentized residuals and Cook's D. I found only one statistically extreme outlier. Studentized residuals greatly exceeded the threshold of 3 for each of the models studied in this thesis. Furthermore, Cook's D was also higher than the comparable threshold of 0.5, effectively meaning that the outlier was also significantly influential. After studying the transaction documents more carefully I found out

that WPP plc. – as the largest creditor of the Cordiant Communications group – acquired the firm before Cordiant Communications group was required to enter into administration. The offer document describes the impact of WPP's financial support: *"If such support is withdrawn, and if additional sources of financing are not made available to Cordiant, it is likely that an administrator or administrative receiver would be appointed in respect of Cordiant. In these circumstances, Cordiant Shareholders would be highly unlikely to receive any value for their shares."* Thus it seems that the transaction was effectively a fire sale situation for the shareholders of Cordiant, which is also backed up by the fact that calculated acquisition premium for the transaction is extremely negative (-91.5%). This transaction is different from all other observations and thus its removal from the sample can be justified. As a result of this analysis, I have excluded this extreme outlier from my sample for all regression models. This elimination drastically improved the normality of the regression residuals, adjusted r-squared and lowered the coefficients of goodwill variables. As results including this extreme outlier are not reliable, those results are not tabulated.

8.4 Sensitivity and robustness tests

I now present the results of robustness tests that were undertaken to ensure the robustness of my primary results. First, in Section 8.4.1, I will report the results for variables that were affected by statistical outliers. Second, in Sections 8.4.2 and 8.4.3, I will go through results for models utilizing variable transformations, namely inverse hyperbolic sine transformation and logarithmic transformation, to transform the variables employed in the regression models to reduce the severity of non-normality of regression residuals and also reduce the impact of heteroskedasticity. To further mitigate econometric issues associated with heteroscedastic error terms, the HC3 adjustment procedure was applied to all regression models evaluated in my empirical analysis.

8.4.1 Outliers and changes in regression coefficients

Data employed in my analysis was investigated for outliers. The investigation was done by evaluating the studentized residuals associated with the variables. According to Belsley, Kuh and Welsch (1980) and Fox (1991) the studentized residuals computed from a regression equation with an absolute value of greater than 2 could raise concerns, while studentized residuals with an absolute value of greater than 3 are considered to be outliers. The impact of these outliers was further studied with Cook's Distance, which is an overall measure of influence. I therefore re-

estimated regression models after deleting observations with studentized residuals with an absolute value greater than 3 and Cook's D greater than 4/n, which can be assumed as a cut-off point according to Bollen and Jackson (1990). These outliers have an impact on the results and therefore it is justified to present comparable results for the variables that were changed the most.

Recall from Section 8.1.2 that removal of outliers made the interactive term IFRS*Recognised goodwill insignificant in the sample, where acquirers' CEOs have earnings based targets. This information is already placed on Table 12 to show the reader the most important findings immediately. Table 16 below presents the results also for other changed coefficients with their t-statistics.

Table 16 – Robustness tests: The impact of statistical outliers to the coefficients of key variables
This table presents all changes in the significance of the coefficients of the key variables after removal of statistical outliers. Statistical outlier is here defined as an observation, which studentized residual exceed 3 and Cook's D exceed 4/n. There were no other changes made to models. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively. All standard errors are corrected using the HC3 robust adjustment procedure for small samples.

	Dependent Variable = Acquisition Premium					
	Regression results			**Excluding outliers**		
Independent Variables	Obs.	Coefficient	t-value	Obs.	Coefficient	t-value
Baseline models						
TGT Goodwill (no fixed effects)	178	-0,191**	-2,34	177	-0,206***	-2,75
U.K. GAAP Sample						
TGT Goodwill[a]	116	-0,236*	-1,90	114	-0,215	-1,64
Acquirers with earnings based incentives						
IFRS*Recognised goodwill	101	0.110*	1.81	99	0.096	1.62

[a]Regression residuals for the model excluding outliers deviate significantly from normal distribution according to Shapiro-Wilk test at 10% level. Therefore, t-statistic for the model without outliers is unreliable. For the sample including outliers, regression residuals do not deviate significantly from normal distribution.

Table 16 shows us first and foremost that only in two cases, in addition to the aforementioned case shown already in Table 12 had the removal of the statistical outliers any impact on the coefficients of the key variables. In the first case, the significance of the coefficient for TGT Goodwill variable in the Baseline model without year fixed-effects increased from 5% level to 1% level when statistical outliers were excluded. In the second case, Table 16 further shows that the removal of statistical outliers from the U.K. GAAP Sample makes the coefficient of the TGT Goodwill variable insignificant. This last result, however, is unreliable due to the fact that regression residuals, after removing two outliers from the sample, deviate significantly from normal distribution when tested with the Shapiro-Wilk test. Table 20 regarding the impact of outliers on the normality of regression residuals can be found from Appendix C. Table 20 together with Table 16 confirms the results obtained regarding organisational complexity due to increased normality of regression residuals and somewhat strengthens my baseline results.

Results, however, fail to confirm or reject U.K. GAAP Sample results due to violation of the normality assumption. In this rare case removing statistical outliers changes the model and exposes it to other statistical outliers. In summary, this robustness test reveals that only the result for the IFRS*Recognised goodwill variable seems to be driven by statistical outliers, while there are not any other significant and negative impact on the results.

8.4.2 IHS and logarithmic transformations

To transform my variables, I have used IHS and natural logarithmic transformations. Regression statistics and illustrative impact of IHS and logarithmic transformations are presented in Table 22, which can be found from Appendix F. I have applied IHS transformation in situations where A) Shapiro-Wilk test statistics indicate large variations from normal distribution, B) applying IHS transformation has a positive impact on the normality of the observations, C) the variable has observations with zeros or negative values and D) applying the IHS transformation does not have a significantly negative impact on the adjusted r-squared of the model. Variables transformed for Baseline models with IHS are, Goodwill approximation, Recognised goodwill, TGT ROE, ACQ ROE and ACQ Leverage. In addition Acquisition premium and TGT FCF variables have been transformed with IHS for a few models. Due to the violation of D) the following variables cannot be transformed with IHS in my sample sizes: TGT Goodwill, Toehold % and Finite life intangibles. In addition, I have applied logarithmic transformation for MTB variables.

Employing part of those variables to models eliminates problems with normality of regression residuals for the following models: Baseline TGT Goodwill model, U.K. GAAP Sample: Goodwill approximation model, No bonus sample: Goodwill recognised model and models regarding organisational complexity. In total, all 16 models tested show improved normality of regression residuals after employing selected variable transformations. Transformed variables included in all models can be seen from Table 21 in Appendix E. The Durbin-Watson Statistics have also improved for 12 out of the 16 models. Similarly adjusted r-squares have improved for 8 models, especially for the weaker Replica models. Thus it can be reasonably concluded that employing these transformations have increased the robustness of the results in general.

8.4.3 Variable transformations and changes in regression coefficients

Table 17 below shows the significance levels for key variables before and after employing variable transformations to correct violations of the OLS normality assumption. While violations of normality assumption do not have an impact on the regression coefficients it will make hypothesis testing with t-statistics invalid. Thus the impact of the results should be read from pre-transformed coefficients, while the significance should be read from Table 17. The Shapiro-Wilk test is used to test overall changes in regression residuals' normality for each model.

Table 17 – Robustness tests: Variable transformations and changes in the significance of the coefficients of key variables
This table shows changes in significance of the coefficients for key variables after employing variable transformations including Inverse Hyperbolic Sine transformation. Sign represent either positive or negative change or no change (NA) in the significance of the variable. Changes in the coefficient's significance are only posted here if the model's residuals do not deviate significantly from the normal distribution at 10% level after employing variable transformations. Normality of regression residuals is estimated with Shapiro-Wilk test. Variable transformations employed can be seen from Table 21, which can be found from Appendix E.

	Changes in significance level				
	Pre-transformation			Transformed	
Independent Variables	t-statistics	two-tailed p-value	Sign	t-statistics	two-tailed p-value
Bonus incentives: Recognised goodwill model, *N*=101					
Recognised goodwill	-2.05	0.043	-	-1.49	0.140
IFRS*Recognised goodwill	-1.81	0.074	NA	1.76	0.082
U.K. GAAP Sample: Goodwill approximation model, *N*=116					
Goodwill approximation	-1.72	0.087	+	-2.40	0.018
Segment Sample: TGT Goodwill model, *N*=166					
TGT Goodwill	-2.27	0.025	+	-2.63	0.009
Segment	-1.75	0.081	-	-1.13	0.261
HHI Sample: TGT Goodwill model, *N*=162					
TGT Goodwill	-2.26	0.025	+	-2.75	0.007
Segment Sample: Goodwill approximation model, *N*=166					
Goodwill approximation	-2.22	0.028	NA	-2.30	0.022
Segment	-2.16	0.032	NA	-2.24	0.026

Based on the information in Table 17, it can be concluded that in Bonus incentive sample the coefficient of Recognised goodwill variable is no longer negative at any significance level. Regardless, transformed results do support the positive impact of the Recognised goodwill variable after adoption of IFRS for firms with reported earnings based incentives. In U.K. GAAP Sample the coefficient of Goodwill approximation variable is significantly negative at the 5% level, when data transformations are applied. In both Segment and HHI models TGT Goodwill variable's significance level exceeds 1% threshold, but Segment variable's significance level drops below 10% threshold. However, when paired with the Goodwill approximation variable, Segment variable's significance at 5% level is unchanged after adopting variable transformations. Pulling these results together, previous main findings are largely supported and are negatively changed only in the case of the Recognised goodwill variable in the Bonus incentives model.

8.5 Further analyses

In addition to the previously presented analysis further investigation was undertaken into:

1. whether U.K. acquisitions where the recognised goodwill has indefinite life have any impact on the results
2. whether goodwill is negatively correlated with the percentage of bonuses paid to CEOs
3. whether the addition of an analyst dispersion measure to the model would have an impact on the results

Reasons for these investigations are the following. First, under U.K. GAAP as explained in Section 2.2.2, firms had an incentive to record goodwill with indefinite life if strict requirements were met. Based on this, I expect that transactions where recognised goodwill is recorded with indefinite life should be similar with IFRS observations due to similar accounting treatment. Second, CEOs with relatively large accounting based bonuses might have an incentive to avoid targets with goodwill before IFRS due to amortisation's negative impact on reported earnings. Third, the findings of Chatterjee, John and Yan (2012) suggest that investors' divergence of opinion is positively and significantly related to total acquisition premiums. Therefore I investigate the effect of adding an analyst earnings forecast measure to my models.

Regarding the first part, I eliminated all observations where recognised goodwill was given indefinite life under U.K. GAAP. However, results reveal that in U.K. GAAP Sample goodwill approximation variable's significance was actually lowered after making this elimination instead of the opposite. Otherwise results do not differ from the main results. Regarding the second and third parts, there are no significant results that would contradict my findings or add new information. In both of those models, regression residuals were significantly different from normal distribution, which implies either a small sample size (analyst dispersion models) or omitted variable bias (CEO bonus percentage). In case of the CEO bonus percentage, I find that it is not correlated negatively with goodwill measures. Adding the analyst dispersion variable, measured as the dispersion in EPS forecasts for FY+1 before the offer announcement, to the model drastically decreased sample size for Baseline model to 94. In addition, when measured with VIF statistics, IFRS and goodwill variables suffer from multicorrelation with year dummies and each other in models with the analyst dispersion variable. Therefore the effect of analyst dispersion variable cannot be tested with year fixed-effects.

9 Summary and conclusions

This study investigates whether changes in acquisition accounting from U.K. GAAP to IFRS influence acquisition premiums paid on acquisitions of control among U.K. listed firms. My main sample consists of 178 domestic acquisitions with announcement dates from 1999 to 2012. My main findings partially support the existence of goodwill related discount on premiums. Goodwill on the balance sheet of the target firm and the goodwill approximated are significantly correlated with acquisition premium. The former represent an estimated discount of 9.58 percentage points from average initial offer price for one-unit change in standard deviation while the latter's effect size is 6.45 percentage points per one-unit change in standard deviation. Thus, there is supporting evidence concerning goodwill related discount. However, goodwill recognised in transactions is not significantly and negatively correlated with acquisition premium probably due to joint determination of acquisition premium and recognised goodwill. The benefit of goodwill on the balance sheet of the target is that it is automatically included in recognised goodwill and it is free from above mentioned endogeneity issue (see Subchapter 6.2).

The goodwill related discount on premium does not seem to be significantly affected by the introduction of IFRS. The coefficients for IFRS and goodwill interaction variables, however, are positive and that indicates that the discount on premium might not be significant anymore after the adoption of IFRS. When separately testing IFRS and U.K. GAAP acquisitions I find that the negative discount on premium seems to hold only for acquisitions accounted under U.K. GAAP. My results differ from Bugeja and Loyeung (2011) as they find that goodwill related discount is significantly smaller after the adoption of IFRS.

My results further show that goodwill related discount only exists for transactions where the CEO has reported earnings related incentives for the goodwill on the balance sheet of the target firm. There is no discount for the goodwill approximated to be generated in transactions, but it is not surprising given the fact that it is the most controversial measure for goodwill (see Subchapter 6.2). However, this is the first time in this thesis when the recognised amount of goodwill indicates a significant correlation with acquisition premiums. There is weak level evidence that the recognised amount of goodwill has a negative effect on acquisition premium before IFRS and that IFRS has had a significant and positive effect on the coefficient of Recognised goodwill variable.

Finally, I find some evidence that diversified firms paid lower premiums than others before the adoption of IFRS, but that adoption of IFRS has not had any significant impact on this relation. Furthermore, I find no indication that unverifiable net assets or their recognition would have had a significant impact on acquisition premiums pre- or post-IFRS. Thus I can reject Hypotheses 4-6. In addition, when testing separately the model used by Bugeja and Loyeung (2011), serious concerns arose regarding omitted variable bias due to the model's low explanatory power, low normality of regression residuals and somewhat large amount of statistical outliers.

Following Table 18 summarises my hypotheses and implications of my main results for each hypothesis.

Table 18 – Summary of hypotheses and results

#	Short description of the hypothesis	Verification
H1	Goodwill correlates negatively with acquisition premium pre-IFRS	Partially supported and economically strong
H2	The mandatory adoption of IFRS decreases goodwill related discount in acquisition premium	Partially supported and economically weak
H3	H1 and H2 only hold when acquirer's CEO expects to receive bonuses based on reaching earnings related targets	Supported and economically strong
H4	For organisationally complex firms the impact of IFRS on acquisition premium is positive	Rejected
H5	Unverifiable net assets has a positive impact on the acquisition premium after the adoption of IFRS	Rejected
H6	Recognition of acquired finite life intangible assets is positively correlated with acquisition premium	Rejected

Possible weaknesses of my thesis include criticism regarding the impact of external factors on acquisition premiums. One can argue that acquisition premiums have changed due to a sixth merger wave, which occurred from 2003 to 2007 (see Alexandridis, Mavrovitis and Travlos, 2012), market crash during 2000 and 2001 or due to the financial crisis. Robinson and Shane (1990) present another criticism and argue that the empirical relation between acquisition accounting method and acquisition premiums is difficult to assess, because benefits (or costs) associated with accounting method are difficult to isolate and measure separately. However, it is not clear that these issues or events would influence the coefficients of the main variables. In addition, I have already included an exhaustive number of control variables and year fixed effects to minimise those effects. Furthermore, the results from U.K. and IFRS sub sample analysis confirm the main findings from full sample analysis. This evidence indicates that it is unlikely

that my results are driven by any change in the association of the acquisition premiums with any of the control variables between pre- and post-IFRS periods.

My findings also shed more light on how IASB's decisions regarding financial statement information can influence the actions of certain market participants. Previously, it was known that firms in the U.K. use the discretion in goodwill impairment according to the objectives of IASB and thus convey private information about future cash flows (AbuGhazaleh, Al-Hares and Roberts, 2011). In addition, the findings of Detzen and Zülch (2012) and Shalev, Zhang and Zhang (2013) indicate that firms with bonus incentives engage in earnings management in purchase price allocations to decrease future amortisations of finite life intangible assets. My results paint a more comprehensive picture by providing information that U.K. firms with bonus incentives are likely to lower (increase) paid acquisition premium, when future reported earnings decrease(increase) due to changes in financial reporting standards.

Market participants, especially those who are selling their business, can use my findings to acknowledge how the CEOs of potential buyers might see the goodwill on their balance sheet and the goodwill that will be generated from acquisitions. My results can be applied to give an overall idea about how listed and private acquirers might behave regarding the difference in their accounting for goodwill. Thus, based on the results for U.K. GAAP, I expect that private acquirers with earnings targets for bonuses lower their offer price if the target has goodwill on the balance sheet or the acquisition generates goodwill. However, my results are only directional and a separate study concerning private acquirers would be needed to draw further conclusions.

In the case of the public firms one aspect that has not been studied before regarding IFRS and M&As would be how beneficial are transaction multiples calculated according to IFRS rules when compared to local standards. This kind of study could follow methodologically, for example, the doctoral thesis of Schreiner (2007) regarding equity valuation using multiples. It would be important to study the changes in the value relevance of transaction multiples as the impact of the adoption of IFRS on financial ratios and other reported information was significant (see e.g. Kallunki, Lantto and Sahlström, 2008; Capkun et al. 2008). Furthermore it would add to the literature studying the usefulness of IFRS in the context of firm valuation in M&A.

10 Appendix

APPENDIX A: Rest of the correlation coefficients for other variables

APPENDIX B: Other statistical tests used in this thesis

APPENDIX C: Statistical outliers and changes in the normality of the regression residuals

APPENDIX D: Optimisation script used to estimate theta for IHS transformations

APPENDIX E: Variables transformed and employed in re-estimated regression models

APPENDIX F: Regression statistics for re-estimated models with variable transformations

APPENDIX A: Rest the correlation coefficients of for control variables

Table 19 – Correlation coefficients for control variables

This table presents to correlation coefficients for control variables. Correlation coefficients for key variables are shown in Table 7.

	Runup -1-42	FTSE 100	Multiple bidders	Friendly	Cash only	Share only	Toehold %	Initial agreement	TGT MTB	TGT Insider ownership %	TGT ROE
Runup -1 -42	1.00										
FTSE 100	0.16**	1.00									
Multiple bidders	0.02	0.02	1.00								
Friendly	0.08	0.08	-0.08	1.00							
Cash only	-0.04	-0.31***	-0.05	0.02	1.00						
Share only	-0.17***	-0.07	-0.05	0.04	-0.36***	1.00					
Toehold %	-0.02	-0.01	0.02	-0.09	0.07	-0.01	1.00				
Initial agreement	0.01	0.07	-0.12	0.44***	-0.02	0.05	-0.05	1.00			
TGT MTB	0.03	0.10	0.08	-0.02	0.01	-0.09	0.06	0.00	1.00		
TGT Insider ownership %	-0.09	0.04	-0.05	0.04	0.07	-0.04	0.11	0.19***	-0.10	1.00	
TGT ROE	0.07	0.01	0.10	-0.01	0.07	-0.26***	0.03	-0.06	0.27***	-0.08	1.00
TGT Leverage	0.01	-0.01	0.09	-0.09	-0.07	-0.09	0.09	-0.05	0.18***	-0.09	0.11
TGT Size	-0.03	0.01	0.14**	-0.12	-0.14**	-0.06	-0.05	-0.12	-0.10	-0.31***	0.21***
TGT FCF	0.07	0.11	0.03	-0.01	0.06	-0.34***	0.02	-0.04	0.28***	-0.07	0.72***
TGT Growth 1 year	-0.02	-0.11	-0.02	0.08	0.06	0.00	0.14**	0.01	0.08	-0.04	0.05
ACQ MTB	-0.04	-0.04	-0.03	0.04	0.07	-0.01	-0.03	0.03	0.31***	0.02	0.07
ACQ Insider ownership %	-0.07	0.11	-0.09	-0.01	-0.04	0.08	0.02	0.00	-0.03	0.16**	-0.14**
ACQ ROE	-0.02	-0.04	-0.02	0.03	0.09	-0.09	-0.03	0.03	0.08	0.01	0.13
ACQ Leverage	-0.03	-0.08	-0.03	0.02	0.00	-0.06	-0.03	0.02	-0.01	0.00	0.05
ACQ Size	0.06	-0.10	0.11	-0.05	0.20***	-0.31***	-0.01	-0.01	0.04	-0.20***	0.22***
ACQ FCF	-0.14**	-0.01	0.03	-0.01	0.05	0.02	0.02	0.20***	0.06	-0.04	0.02
ACQ Board ownership £	0.04	-0.02	0.04	-0.02	-0.01	-0.09	-0.01	-0.03	0.11	-0.15**	0.07

	TGT Leverage	TGT Size	TGT FCF	TGT Growth 1 year	ACQ MTB	ACQ Insider ownership %	ACQ ROE	ACQ Leverage	ACQ Size	ACQ FCF	ACQ Board ownership £
TGT Leverage	1.00										
TGT Size	0.32***	1.00									
TGT FCF	0.08	0.23***	1.00								
TGT Growth 1 year	0.11	-0.09	0.10	1.00							
ACQ MTB	-0.09	0.01	0.04	-0.01	1.00						
ACQ Insider ownership %	-0.15**	-0.19***	-0.12	-0.08	0.11	1.00					
ACQ ROE	-0.08	0.08	0.08	-0.03	0.92***	0.03	1.00				
ACQ Leverage	-0.03	0.03	0.12	-0.04	0.69***	0.00	0.82***	1.00			
ACQ Size	0.19***	0.59***	0.26***	0.02	0.02	-0.44***	0.18***	0.18***	1.00		
ACQ FCF	0.03	0.05	0.03	0.03	0.22***	-0.14**	0.35***	0.02	0.26***	1.00	
ACQ Board ownership £	0.03	0.17***	0.02	0.05	-0.01	0.03	0.00	-0.03	0.26***	0.01	1.00

APPENDIX B: Other statistical tests used in this thesis

The variance inflation factor to test multicollinearity

To test the presence of multicollinearity, the variance inflation factor (VIF) is used with a simple rule of thumb as a guiding rule whether to exclude a specific variable from regression model or not. Variables are excluded from the model if VIF values exceed 10. The variance inflation factor is according to Fox and Monette (1992), a useful diagnostic tool because it indicates directly the harm inflicted by collinearity on the precision of estimation of individual coefficients. The variance inflation factor for independent variable *j*, is computed as 1/[1 - *p*], where *p* is the multiple correlation coefficient from regressing independent variable *j* on all of the remaining independent variables.

Durbin-Watson statistics for serial correlation of residuals

To test whether there is any serial correlation of residuals due to possibility that certain acquirers dominate my sample, I will apply Durbin-Watson statistics. It is important to test for serial correlation, because serial correlation leads to biased OLS regression estimates if it is not taken into account. However, in this case Durbin-Watson statistics is more like a precautionary action, because pooled cross sections data is not as vulnerable to serial correlation as panel data. Durbin-Watson test uses unstandardised residuals and for independent observations the rule of thumb is that test statistics should be between 1.5 and 2.5. Here is the linear regression algorithm for Durbin-Watson statistics:

$$DW = \frac{(\sum_{i=2}^{I} e_i - e_{i-1})^2}{\sum_{i=1}^{I} e_i^2}, \tag{7}$$

where

$e_i = Y_i - \widehat{Y}_i$

Durbin-Watson statistics are applied to the results of all regression models.

APPENDIX C: Statistical outliers and changes in the normality of the regression residuals

Table 20 – Robustness tests: Statistical outliers and changes in the normality of the regression residuals
This table presents Shapiro-Wilk test statistics before and after removal of statistical outliers for regression models. Only those models are presented, which regression residuals' normality have either increased or decreased after removal of statistical outliers. For the residuals of other models, statistical outliers did not have any significant impact. Year fixed effects are applied to all regressions unless otherwise specified. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively.

	Shapiro-Wilk test statistics					
	Regression results			Excluding outliers		
Regression model	Obs.	Statistic	Sig.	Obs.	Statistic	Sig.
Baseline TGT Goodwill	178	0.983**	0.030	176	0.995	0.842
U.K. GAAP Sample: TGT Goodwill	116	0.982	0.118	114	0.978*	0.055
U.K. GAAP Sample: Goodwill approximation	116	0.980*	0.084	113	0.974**	0.028
IFRS Sample: TGT Goodwill	80	0.916***	0.000	79	0.966**	0.032
IFRS Sample: Goodwill approximation	80	0.921***	0.000	79	0.969**	0.048
No bonus Sample: TGT Goodwill	71	0.934***	0.001	70	0.983	0.449
No bonus Sample: Goodwill recognised	71	0.939***	0.002	70	0.977	0.231
Bonus Sample: Goodwill recognised	101	0.961***	0.005	99	0.982	0.210
Segment: TGT Goodwill	166	0.982**	0.027	165	0.989	0.220
HHI: TGT Goodwill	162	0.985*	0.070	161	0.990	0.341
Segment: Goodwill approximation	166	0.985*	0.063	165	0.990	0.324
UNA	161	0.976***	0.006	159	0.994	0.751
UNA winsorised	161	0.979**	0.015	159	0.995	0.826
UNA in-sample ranked	161	0.979**	0.016	159	0.996	0.921
ModUNA	161	0.976***	0.007	159	0.994	0.81
ModUNA winsorised	161	0.979**	0.016	159	0.995	0.87
ModUNA in-sample ranked	161	0.978**	0.011	159	0.994	0.774
Replica: TGT Goodwill, no fixed effects	179	0.953***	0.000	175	0.986*	0.077
Replica: Goodwill approximation, no fixed effects	179	0.957***	0.000	176	0.983**	0.032
Replica: Recognised goodwill, no fixed effects	179	0.957***	0.000	176	0.985**	0.049
Replica: TGT Goodwill	179	0.972***	0.001	175	0.988	0.138
Replica: Goodwill approximation	179	0.979***	0.008	176	0.983**	0.035
Replica: Recognised goodwill	179	0.978***	0.006	175	0.987	0.109

APPENDIX D: Optimisation script used to estimate theta for IHS transformations

An example about the script used with R integration plug-in for SPSS to estimate θ by optimizing Shapiro-Wilk test's p-value, when x is *Goodwill approximation* variable, is presented below.

```
BEGIN PROGRAM R.

casedata <- spssdata.GetDataFromSPSS()

# Define IHS transformation

IHS <- function(x, theta){

  (1/theta)*asinh(theta * x)}

#Input IHS transformation function to Shapiro-Wilk test to estimate p-value

Shapiro.test.pvalue <- function(theta, x){

  x <- IHS(x, theta)

  shapiro.test(x)$p.value }

#function used to optimise p-value of Shapiro-Wilk test

optimise(Shapiro.test.pvalue, lower=0.0000000000001, upper=5000,x=casedata$V180,
maximum=TRUE)

END PROGRAM.
```

APPENDIX E: Variables transformed and employed in re-estimated regression models

Table 21 – Robustness tests: Variables transformed and employed in re-estimated regression models

This table presents variables that are transformed for each of the models that have been re-estimated to improve normality of regression residuals and goodness of fit. Panel A shows transformations applied and its impact on the normality of the variables in Baseline and Replica models. Theta in Panel A is calculated as the value, which maximizes Shapiro-Wilk test p-value by optimizing a function presented in Section 7.2.4. Theta is a scaling factor in Inverse Hyperbolic Sine function (IHS). Panel B shows how transformed variables are employed in regression models. *Initial offer premium %* in Panel B is defined as the final offer price minus target share price 42 days before original acquisition announcement date divided by the target share price 42 days before original acquisition announcement date. *TGT FCF* is here defined as the cash flow from operations less dividends for target firm in fiscal year t-1 without deflating the variable with total assets. Other variables are estimated as described in Table 3.

Panel A: The normality of variables for Baseline sample

			Shapiro-Wilk test statistics			
			Pre-transformation		Transformed	
Variables	Transfor-mation	Theta θ	Statistic	Sig.	Statistic	Sig.
Baseline Sample transformations (N=178)						
Goodwill approximation	IHS	2.75	0.502***	0.000	0.970***	0.001
IFRS*Goodwill approximation	IHS	2.75	0.309***	0.000	0.736***	0.000
Recognised goodwill	IHS	1.44	0.820***	0.000	0.964***	0.000
IFRS*Recognised goodwill	IHS	1.44	0.577***	0.000	0.706***	0.000
TGT MTB	Ln	-	0.502***	0.000	0.965***	0.000
TGT ROE	IHS	7.53	0.523***	0.000	0,920***	0,000
ACQ ROE	IHS	6.68	0.433***	0.000	0.913***	0.000
ACQ Leverage	IHS	14.80	0.145***	0.000	0.915***	0.000
IFRS Sample transformations (N=80)						
Acquisition premium	IHS	2.07	0.949***	0.003	0.979	0.217
No bonus incentives sample (N=71)						
TGT FCF	IHS	0.10	0.600***	0.000	0.708***	0.000
Replica Sample transformations (N=179)						
Goodwill approximation	IHS	2.44	0.491***	0.000	0.973***	0.001
IFRS*Goodwill approximation	IHS	2.44	0.330***	0.000	0.784***	0.000
Recognised goodwill	IHS	1.18	0.868***	0.000	0.966***	0.000
IFRS*Recognised goodwill	IHS	1.18	0.618***	0.000	0.745***	0.000
TGT MTB	Ln	-	0.491***	0.000	0.972***	0.000
ACQ MTB	Ln	-	0.317***	0.000	0.951***	0.000
ACQ ROE	IHS	6.37	0.448***	0.000	0.933***	0.000
TGT Leverage	IHS	45.36	0.565***	0.000	0.893***	0.000
ACQ Leverage	IHS	13.57	0.144***	0.000	0.906***	0.000

Panel B: Transformed variables used in re-estimated models

Regression model	Transformed variables
Baseline TGT Goodwill	TGT MTB
U.K. GAAP Sample: Goodwill approximation	Goodwill approximation
IFRS Sample: TGT Goodwill	Acquisition premium %, TGT MTB
IFRS Sample: Goodwill approximation	Acquisition premium %, Goodwill approximation
No bonus Sample: TGT Goodwill	TGT ROE, TGT FCF, TGT MTB
No bonus Sample: Goodwill recognised	Recognised goodwill, IFRS*Recognised goodwill, TGT MTB, TGT ROE, TGT FCF
Bonus Sample: Goodwill recognised	TGT MTB, TGT ROE, ACQ ROE
Segment: TGT Goodwill	TGT MTB
HHI: TGT Goodwill	TGT MTB
Segment: Goodwill approximation	ACQ ROE, ACQ Leverage
All Replica models	TGT MTB, ACQ ROE, TGT Leverage, ACQ Leverage

APPENDIX F: Regression statistics for re-estimated models with variable transformations

Table 22 – Robustness tests: Regression statistics for re-estimated models with variable transformations
This table presents regressions statistics before and after variable transformations. Panel A presents the results of Shapiro-Wilk test. Panel B present Adjusted R^2 and Durbin-Watson Statistics for the important models with problems in normality of regression residuals. Year fixed effects are applied to all regressions unless otherwise specified. Asterisks ***, **, * represent statistical significance levels at the 1%, 5%, and 10% levels (two-tailed), respectively.

Panel A: The normality of regression residuals		**Shapiro-Wilk test statistics**			
		Pre-transformation		Transformed	
Regression model	Obs.	Statistic	Sig.	Statistic	Sig.
Baseline TGT Goodwill	178	0.983**	0.030	0.990	0.268
U.K. GAAP Sample: Goodwill approximation	116	0.980*	0.084	0.991	0.691
IFRS Sample: TGT Goodwill	80	0.916***	0.000	0.953***	0.005
IFRS Sample: Goodwill approximation	80	0.921***	0.000	0.948***	0.003
No bonus Sample: TGT Goodwill	71	0.934***	0.001	0.958**	0.017
No bonus Sample: Goodwill recognised	71	0.939***	0.002	0.973	0.134
Bonus Sample: Goodwill recognised	101	0.961***	0.005	0.980	0.118
Segment: TGT Goodwill	166	0.982**	0.027	0.989	0.227
HHI: TGT Goodwill	162	0.985*	0.070	0.991	0.428
Segment: Goodwill approximation	166	0.985*	0.063	0.987	0.119
Replica: TGT Goodwill, no fixed effects	179	0.953***	0.000	0.964***	0.000
Replica: Goodwill approximation, no fixed effects	179	0.957***	0.000	0.969***	0.001
Replica: Recognised goodwill, no fixed effects	179	0.957***	0.000	0.968***	0.000
Replica: TGT Goodwill	179	0.972***	0.001	0.980**	0.012
Replica: Goodwill approximation	179	0.979***	0.008	0.987*	0.087
Replica: Recognised goodwill	179	0.978***	0.006	0.985**	0.048

Panel B: Adjusted R^2 and Durbin-Watson Statistics		**Other statistics**			
		Pre-transformation		Transformed	
Regression model	Obs.	Adjusted R^2	DWS	Adjusted R^2	DWS
Baseline TGT Goodwill	178	0.688	2.535	0.685	2.481
U.K. GAAP Sample: Goodwill approximation	116	0.696	2.251	0.705	2.354
IFRS Sample: TGT Goodwill	80	0.464	2.632	0.495	2.617
IFRS Sample: Goodwill approximation	80	0.458	2.671	0.463	2.681
No bonus Sample: TGT Goodwill	71	0.658	2.552	0.699	2.487
No bonus Sample: Goodwill recognised	71	0.678	2.475	0.718	2.491
Bonus Sample: Goodwill recognised	101	0.593	2.484	0.561	2.551
Segment: TGT Goodwill	166	0.688	2.534	0.686	2.454
HHI: TGT Goodwill	162	0.678	2.574	0.690	2.513
Segment: Goodwill approximation	166	0.667	2.515	0.665	2.506
Replica: TGT Goodwill, no fixed effects	179	0.260	2.209	0.272	2.051
Replica: Goodwill approximation, no fixed effects	179	0.180	2.109	0.162	2.010
Replica: Recognised goodwill, no fixed effects	179	0.175	2.116	0.172	1.974
Replica: TGT Goodwill	179	0.300	2.388	0.322	2.223
Replica: Goodwill approximation	179	0.240	2.339	0.213	2.204
Replica: Recognised goodwill	179	0.235	2.356	0.234	2.215

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