

# Comparison of Discount Rates Disclosure Analysis in Goodwill Impairment Testing among Singapore Listed Firms

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## **Abstract**

*This study presents some evidence of discount rate selection on goodwill impairment testing under the new requirements of FRS 36. The selection of discount rates is believed to be an important key factor that affects the outcome of impairment assessment, especially when using the method of value in use. This study objectively examines the Singapore listed firm's selection of discount rates disclosed, and then tests and compares the variation between discount rates disclosed by firms for the goodwill impairment testing with independently generated estimates of firm specific risk adjusted discount rates for multi year samples of 2007, 2006 and 2005.*

*In order to achieve the objective of this study, the Capital Asset Pricing Model (CAPM) is chosen because it describes the relationship between risk and expected return and that is used in the pricing of risky securities. For the purposes of this paper, the final research sample consists of 142, 127 and 86 firms that employed the value in use method in goodwill impairment testing and defined only a single discount rate in 2007, 2006 and 2005 respectively. The results show most of the firms understated their discount rates for 2005, while in 2006 and 2007 some firms overstated their discount rate when compared with an independently estimated risk adjusted discount rate. The results also indicate that the Singapore listed firms have difficulties in the discount rates disclosure which may in turn limit the decision usefulness of their financial disclosures by potentially diluting the robustness of the impairment testing.*

**Keywords:** Discount rate selection, goodwill accounting, impairment testing, FRS 36.

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## 1. Introduction

Among the major accounting problems yet to be solved, accounting for goodwill appears unique when compared to other priority items. Accounting for goodwill is one of the most difficult aspects of financial reporting. Basically, the level of difficulty arises from the nature of goodwill, which is almost impossible to quantify. It is therefore also very difficult to find an accurate method to measure the consumption of goodwill. Seetharaman et al. (2008) described the accounting for goodwill as the most controversial issue in both theory and practice. It is also one of those rare intangibles that managers are trying to wheedle into the balance sheet in spite of accountants' best efforts.

Goodwill is an extremely interesting business phenomenon and usually generates greater interest whenever merger and acquisition activity is robust. Goodwill accounting enables a firm to derive a competitive advantage because of issues such as reputation, stability, technical excellence, perceived quality, well-trained workforce, and good contact within the industry and thereby allows firms to earn higher profits than it would otherwise have by selling its assets. However, accounting for goodwill remains a contentious and controversial problem<sup>1</sup> as is evidenced by a constant appearance of documents related to the matter being issued by a wide range of researchers as well as accounting standards bodies in their declarations on the conceptual framework.

The issue of goodwill has been cause for an unending debate among academics, financial communities and practising accountants for

more than 100 years. (Hughes, 1982; Falk & Gordon, 1977). Lee (1971) said that in 1891, Francis More started the first debate related to the accounting for goodwill.<sup>2</sup> Most of the issues on accounting for goodwill have their origin in a lack of consensus when establishing the definition of an asset and, as a result, that of the other elements which make up the conceptual framework. Some argue that the lengthy debate is caused by an inability to agree on the nature of goodwill itself. In other words, the debate on goodwill begins with definitions, when and how does it come into existence, what value should be placed on goodwill, and the disclosure of goodwill. According to Kieso & Weygandt (1992), other intangible assets that are difficult and probably create the greatest valuation challenges in accounting are recorded as goodwill.

The dilemma faced by academics and financial communities and practising accountants in valuing goodwill is best illustrated by Albert Einstein who said, "not everything that counts can be counted, and not everything that can be counted counts" (Bullen & Cafini, 2006). Indeed, Canning (1929) remarked that the main achievement of the literature accumulated on the subject of goodwill – such as its definition, in discussing its nature, and in proposing means of valuing it – was to generate a striking variety and number of disagreements reached on those issues. Additionally, Miller (1973) declared that the problem of goodwill in accounting stems from a mismatch between accounting based on aggregation and a focus on value in accounting. In terms of treatment of goodwill, Grinyer et al. (1990) argued that

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confusion arises because of the failure to identify what accountants are trying to measure and the purposes that they serve. Therefore, the literature appears to suggest that the issues related to accounting for goodwill is to discuss ways to improving the conceptual foundation of goodwill as an asset in accounting theory.

Referring to goodwill, in accounting terms it is widely known as the difference between the book value of goodwill and the implied fair value of goodwill. However, under the new regime of goodwill impairment, the valuation of goodwill impairment is not easy to calculate; valuation is not only measuring the difference between market capitalization and net book value. It requires a thorough knowledge and better judgment of intangible asset valuation methodology and price allocation. Based on this situation, it makes the goodwill impairment become complicated and definitely has created many arguments within the accounting literature over the period.

Although it has been mandated under International Financial Reporting Standards (IFRS) as well as US General Accepted Accounting Principles (US GAAP) which require firms to implement goodwill impairment in the annual treatment of accounting for goodwill, the effectiveness and usefulness of this approach is questionable. Practically, while firms may be claiming full compliance with requirements in impairment of goodwill standards, significant deviations exist. Previous studies on firms in three different geographical samples which are listed in U.S. Securities and Exchange Commission (SEC), Australia Stock Exchange (ASX) and FTSE

Bursa Malaysia (BURSA) prove that firms have had difficulty in fully complying with new financial reporting standards of impairment of goodwill (Sevin et al., 2007; Carlin et al., 2008; Carlin et al., 2007).

Additionally, Massoud & Raiborn (2003) have provided a good summary of what managers need to assess in order to determine goodwill impairment. They note that the determination of impairment of goodwill leaves significant room for management interpretation, judgment and bias both at the time of a merger and in future periods. It can be said that managers are now simply “picking a number out of a hat” when determining the impairment of goodwill. Now, managers have used their own creativity to report the goodwill impairment process in financial reporting. This is in line with the standard, with respect to goodwill CGUs represent “the lowest level within the entity at which the goodwill is monitored for internal management purposes”.

Consequently, critics have expressed concern over managers’ ability to defeat the standards’ purpose by relying on the new recommendations as a justification for making reporting decisions that can mislead financial statement users regarding the economic value of goodwill.

The test for impairment of goodwill under the new requirement is conducted at the level of the CGU or a group of CGUs which represents the lowest level at which internal managements monitor goodwill. The requirement of the standard also stipulates that the level for assessing impairment must never be more than

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a business or a geographical segment. This research believes that an understanding of the level of aggregation of CGUs is of prime significance. This is important because it has the capacity to impact on the likelihood of an impairment loss being recognized.

In terms of assumptions employed in determining recoverable amount through the discounted cash flow modelling, the selection of discount rates is believed to become a key factor contributing to the outcome of impairment assessment, especially when using the method of value in use. The cash flows are estimated with a certain assumption which reflects on this variable. Carlin & Finch (2008a) reveal that net present value estimates for recoverable amount can be highly sensitive even to small changes of the discount rates.

Based on the scenario of complication, and burdensome in implementing the new requirements of goodwill impairment, this study examines the Singapore listed firm's selection of discount rates disclosed in their annual reports that employed the value in use method in determining its recoverable amount. Specifically, this study tests and compares the variation between discount rates disclosed by firms for the goodwill impairment testing and independently generated estimates of firm specific risk adjusted discount rates through the Capital Asset Pricing Model (CAPM).

The rest of this paper is organized as follows. Section 2 overviews the technical context of the goodwill impairment standard in FRS 36. Section 3 reviews the previous literature. The details of the data sample and

methodology employed is described in Section 4. Section 5 provides an overview and discussion of the key results, and Section 6 offers conclusions and provides implications for future research.

## **2. Technical background**

Some debate regarding the most appropriate method of accounting for goodwill arises from the acquisition of firms. In previous literature, controversial during the early 1990s and again during the early 2000s, it is commonly referred to as "purchased" or "acquired" goodwill. During the 1993, the International Accounting Standards Board (IASB) amended an IAS, namely IAS 22 *Business Combination*, by removing the option of writing off purchased goodwill (referred to as goodwill) immediately on acquisition. The accounting treatment of goodwill that arises from an acquisition took a significant step in a new dimension with this amendment. From now, goodwill has to be recognized as an asset and amortized over its useful life.

The Financial Accounting Standards Board (FASB) in the United States of America (USA) sparked an international debate during 2001 when it adopted a Statement of Financial Accounting Standards (SFAS), SFAS 142, *Goodwill and other intangible assets*, thereby replacing the existing requirement to amortize goodwill with an impairment testing approach. Under SFAS No. 142, which mandated that, goodwill should no longer be amortized, but should be tested for impairment annually. Any firm in the United States suddenly needed to conduct an initial impairment test and for most

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companies, the 2002 annual report was the year in which the standard was implemented.

The IASB, seeking international convergence and global harmonization, followed the FASB, and issued a new IFRS, namely IFRS 3, Business Combination in March 2004. According to IFRS 3, from the beginning of the first annual report beginning on or after 31 March 2004, all entities must discontinue amortizing goodwill and must test the goodwill impairment annually instead. The debate in the early 1990's resulted in the amortization of goodwill. The current change is to an impairment test rather than amortization. This is a radical change, and it involves a very different accounting process (Moehrl, 2001).

A country's legal and institutional framework is likely to affect the extent to which listed firms domiciled in that country comply with requirements of IFRS. In Singapore, the legal and accounting standards formulated by the Accounting Standards Council (ASC) and Singapore Exchange (SGX) plays an important role in ensuring firms comply with the requirement of the standards. The reporting framework in Singapore that deals with the disclosure of impairment of goodwill is prescribed through the combined effects of the new internationalized Singaporean financial reporting standards in FRS 38 *Intangible Assets*, FRS 103 *Business Combinations*, and FRS 36 *Impairment of Assets*.<sup>3</sup> These standards should be applied on acquisition to goodwill acquired in business combinations. These standards are released by ASC to improve the information content of goodwill accounting which was applicable prospective-

ly from the beginning of the annual period beginning on or after 1 July 2004.

The major change to the accounting treatment of goodwill is embodied in FRS 103, which states: "Goodwill acquired in a business combination shall not be amortized. Instead, the acquirer shall test it for impairment annually or more frequently if events or change in circumstances indicate that it might be impaired, in accordance with FRS 36 *Impairment of Assets*". FRS 136.6 defines impairment loss as the amount by which the carrying amount of an asset or a cash-generating unit exceeds its recoverable amount. The recoverable amount of an asset is defined as the higher of its fair value less costs to sell and its value in use. Value in use is defined as the present value of the future cash flows expected to be derived from an asset or cash-generating asset. If the carrying amount of an asset recorded in the balance sheet is higher than its recoverable amount, the difference is considered under FRS 36 to be an impairment loss. Specifically, such an impairment loss should be recorded as an expense in the income statement and at the same time, the loss reduces the goodwill amount in the balance sheet. On the other hand, if the carrying amount of goodwill is lower than the recoverable amount, the revaluation of goodwill is prohibited (FRS 36.90).

In the event of impairment, the profit and loss account is charged with the computed impairment amount to ensure the immediate highlighting of poorly performing acquisitions. Goodwill is thus not seen as a steadily wasting asset but one with indefinite life and

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with a value linked to the performance of the unit. The shift from amortization to periodic reviews puts a new and continuous responsibility on management to determine the value of goodwill and also puts a new burden on auditors, regulatory bodies, and investors to evaluate management's determination (Hayn & Hughes, 2005).

Another significant change in the treatment of goodwill has arisen out of the requirement for treating all business combinations as purchases (FRS 103). This will eliminate the possibility of firms not recording goodwill by pooling the assets and liabilities of various firms together for preparation of financial statements. Thus, management now has to explain what the goodwill amount represents. Each of these new requirements poses a challenge to many entities considering acquisitions.

The test for impairment of goodwill under the FRS 36 is conducted at the level of a cash generating unit (CGU) or a group of CGUs representing the lowest level at which internal managements monitor goodwill. The FRS 36 also stipulates that the level for assessing impairment must never be more than a business or a geographical segment, using a two-step approach.

From the above explanation, it clearly provides specific guidance compared to the previous standards on goodwill impairment testing. Under the new requirements, there are two methodologies employed in estimating the CGU recoverable amount which are – fair value less cost to sell, and value in use<sup>4</sup>.

According to Carlin & Finch (2008a), the value in use technique is substantially the higher frequency application used among the firms.

For the firms, the determination of CGU value in use requires the construction of discounted cash flow models, a fact which necessitates a view on the part of reporting entities<sup>5</sup> on factors such as timing of expected cash flows, growth trajectories and risk. In order to construct the discounted cash flow models used to estimate the CGU recoverable amount, FRS 36 detailed elaboration of key inputs and assumptions for firms to use it as a specific guideline for testing impairment, which is an improvement from the prior standard.

### 3. Literature review

Prior research has suggested that one of the greatest challenges faced by firms in the context of FRS 36 is the manner in which goodwill is allocated among CGUs for the purposes of impairment testing. Wines et al. (2007) conducted research looking into the implications of the IFRS goodwill accounting treatment in Australian firms. They agreed that the first potential difficulty in goodwill accounting treatment is related to identifying the CGUs. According to Cearns (1999), the identification of an asset's CGU in impairment testing of goodwill is subjective and the process is open to abuse. The identification of a CGU could be difficult in cases where a firm has acquired another entity and the latter consists of a number of separate subsidiaries, divisions and/or branches.<sup>6</sup>

Moreover, Hayn & Hughes (2005) stated

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that identifying reporting units and assigning goodwill has proven to be one of the most difficult implementation issues of SFAS 142. This happened because to assess the fair value of goodwill and its involvement over time, it requires more specific information on the performance of the operating unit for which the goodwill is needed. As a result, both the preparers and group users of financial statements faced difficulties regarding the complexity, cost and inconsistency of this process that affect the impairment testing process.

The process of allocating goodwill into the CGU is a crucial process as the number of CGUs to which goodwill is allocated has the capacity to impact an impairment loss being recognized. The risk relating to allocate goodwill to CGU's is known as the CGU aggregation problem (Carlin et al, 2007, 2008 a,b,c), where too few CGUs are defined in the process of allocation of goodwill to CGUs. Those studies show that in practice there is a great deal of evidence that the Australian and Malaysian listed firms have complied loosely and often not at all with the mandated disclosure requirements of goodwill impairment. Most of the firms studied appear to systematically define fewer CGUs than appropriate. The inappropriateness of the CGU aggregation leads to the risk that impairment charges which should occur are avoided, or at least inappropriately delayed. This is important because various types of operations may have differing prospects for growth, rates of profitability, and also the degree of risk.

Regarding the possibility of a firm to lower the impairment threshold, under the new stan-

dard for managers, they now have the unique opportunity to protect their future operating earnings by maximizing the initial loss (Antunes et al., 2009). Through this practice, managers need more creativity in goodwill reporting for having more (or less) profit in their financial reporting, which is one of the attractive factors for managers to use it. However, they need to make a careful assessment because this will affect the quality of the balance sheet and the future cash flow expectations of the firm's operation. They can and must make use of their own judgement to forecast future performance, choose appropriate discount rates, and choose appropriate growth rates, etc. Massoud & Raiborn (2003) argued that managers have the flexibility to calculate either impairment or non-impairment in the same period, based on their selected underlying assumptions.

For managers, goodwill amortization can be used as an income manipulation and smoothing device in a firm's financial reporting (Seetharaman et al, 2008). This happens because the standard itself requires that the amortization policy should be reviewed at each balance sheet date and for adjustments to be made where necessary. This means that management is permitted to play around the key assumption used in determining the recoverable amount of goodwill to fulfil the firm's future desires.

Furthermore, the disclosures related to discount rate, which is a focus of this study, have also tended not to conform to the requirements of FRS 36. The discount rate and required rate of return, which are difficult to estimate with

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precision, can project serious limitations on the reliability of goodwill impairment measures, even if the estimates are made in good faith (Hetz *et al.*, 2001). In addition, Carlin *et al.* (2007, 2008a) proved that in practice, firms using the value in use method failed to disclose any details of the discount rate used in estimating the recoverable amount, even though they are required to do so<sup>7</sup>. Based on this scenario, it clearly indicates that the firms have difficulties in fully implementing the requirement of standards related to discount rate disclosure. Those firms which claimed to be transparent about the discount rates they employed for the impairment testing, basically failed to provide any meaningful information to group users.

The importance of the discount rate selection decision is clear from the wording of FRS 36. According to FRS 36, the discount rate employed for the purposes of transforming CGU future cash flow estimates to their present values are required to relate to the risk characteristics of each CGU. This engenders the expectation that firms assigning goodwill to multiple CGUs should also adopt multiple appropriate risk adjusted discount rates for the purposes of recoverable amount estimation. However, available empirical evidence demonstrates that in a substantial number of instances, firms disclose the application of a single discount rate as an element of the estimation of the recoverable amount of all CGUs.

Earlier studies have addressed this phenomenon from the perspective of yielding insight into compliance behaviour among listed firms as well as in relation to the effectiveness of regulatory and institutional mechanisms

designed to assure the quality of financial disclosures by these economically and systemically important organisations. The focus of this study lies on the level of the discount rates selected by reporting entities as an element of their impairment testing regime and how that rate may vary from an independent estimate thereof.

The opportunity to undertake this line of enquiry arises principally because of the high frequency with which firms define only one discount rate for the purposes of impairment testing. This in turn opens the way to comparative analysis pursuant to which the single point discount rates defined by firms may be compared with independently generated single point 'whole of firm' discount rates.

In circumstances where firms define multiple CGUs and assign unique risk adjusted discount rates to each, the execution of this form of comparative analysis is rendered difficult because of the greater degree of challenge in independently estimating discount rates applicable to parts of business enterprises, rather than the whole. This study focuses solely on discount rates set by firms which applied a single discount rate only in the process of undertaking mandated impairment testing.

#### **4. Data collection and research methodology**

##### ***4.1. Data collection***

The main aim of this research is to examine the variation between discount rates used by firms for the purposes of impairment testing and independently generated estimates of firm specific risk adjusted discount rates. The sam-

ple and data used in this study are obtained primarily from the Worldscope DataStream database and publicly available information.

Through the Worldscope DataStream Database, the process of construction of research samples focuses on the firms which are listed in the Singapore Exchange (SGX) in 2007, 2006 and 2005. The final sample selection procedures are summarized in Table 1. The total of 623, 593 and 562 firms for each of the particular years commences with the largest (on the basis of market capitalization) and moves to each progressively smaller of these firms. From the total number of firms, 364 (for 2007), 352 (for 2006) and 345 (for 2005), firms having no goodwill comprising an element of their asset base in their consolidated financial statements were excluded in the sample. The sample consists of 259, 241 and 217 firms listed in SGX with reported goodwill as at 2007, 2006 and 2005 respectively. The market capitalization was \$375,063 million at 2007, \$285,263 million in 2006 and \$245,587 million in 2005, which represented 71.76%, 74.41% and 76.50% respectively of

the total Singapore equity market capitalization as at the conclusion of December 2007.<sup>8</sup>

Several steps have been taken to reach the final sample and used the value in use method in goodwill impairment testing that defined only one discount rate. In order to reach a final selection of the sample, firms were excluded on the basis that they failed to make any basic disclosures in relation to the approach they used to impairment testing. These firms clearly did not provide any meaningful information to support the analytical techniques employed for the purposes of this study. Firms were deleted from the final sample because they employed the fair value less cost to sell method for testing the impairment of goodwill. Under this method, there are no discount rate disclosures available for these firms.

Further firms were eliminated from inclusion in the final sample for the reason that they used a combination of fair value and value in use methods. For these firms no single discount rate applicable to the whole of their business was disclosed. Finally, since this study will focus on firms that disclosed a single

**Table 1: Summary of Sample Selection Criteria**

Step	Description	No. of listed firms		
		2007	2006	2005
1	Firms that are on the official list at SGX	623	593	562
	<b>Deduct:</b>			
2	Firms without goodwill	364	352	345
3	Firms not disclosing any method in impairment testing	54	58	85
4	Firms disclosing fair value method	11	10	10
5	Firms disclosing mixed method	9	13	6
6	Firms using multiple discount rate (multiple and range)	43	33	30
	<b>Final sample (defined only single discount rate)</b>	<b>142</b>	<b>127</b>	<b>86</b>

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‘whole of firm’ discount rate, which is a key important element in the methodology employed, firms were also excluded from the sample based on the reason that they defined multiple discount rates (multiple discount rate and range discount rate). Thus, the final research sample consists of firms which employed the value in use method to goodwill impairment testing and defined only a single discount rate.

The other important aspect related to discount rates disclosed by sample firms as stated under FRS 36. FRS 36 (para. 55) which requires the use of pre-tax discount rates for the purposes of impairment testing. Despite this, there is one firm in the final research sample that disclosed post-tax rather than pre-tax discount rates.<sup>9</sup> Therefore, it is required to convert to pre-tax equivalent rates by dividing the rate by one minus the prevailing corporate tax rate.<sup>10</sup>

The selection of the final sample had to satisfy all the requirements stated below:

- Prepared annual report according to the Singapore Financial Reporting Standards (FRSs) and Companies Act of Singapore;

- Disclosure of accounting policy on goodwill in year 2007, 2006 and 2005 particularly firms that used the value in use method with a single discount rate;

- Converting non-Singapore dollar currency into Singapore dollars based on the exchange rate at December of each year for all balance sheet values;

- All profit and loss and cash-flow values – using the average exchange rate over the

course of 2007, 2006 and 2005, calculated as the sum of the exchange rates at the end of each month from January to December divided by 12.

The conversion of the different currencies into the Singapore Dollar, was based on source information in the website of [www.oanda.com/convert/fxhistory](http://www.oanda.com/convert/fxhistory)

## **4.2. Research methodology**

### *4.2.1. The Capital Asset Pricing Model (CAPM)*

The accuracy of the appropriate discount rates was measured by independent estimates of discount rates through The Capital Asset Pricing Model (CAPM). The use of CAPM is the bedrock method employed in estimating an accurate and appropriate discount rate as it represents the current market assessment and the risks specific to the CGU asset. Basically CAPM describes the relationship between risk and expected return and that is used in the pricing of risky securities. Therefore, CAPM is a relationship explaining how assets should be priced in the capital market.

Developed by Sharpe (1964), Lintner (1965) and Mossin (1966), CAPM is widely used both by practitioners and theoreticians, since it gives a manageable and attractive way of thinking about risk and required return on a risky investment (Bruner et al., 1998; Bartholdy & Peare, 2003). Graham & Harvey (2001) provided evidence the CAPM is the most popular (73.5% of respondents) method of estimating the cost of equity capital among the managers of U.S firms. The same results of popularity CAPM method<sup>11</sup> is also found

among the European firms (Bancel & Mittoo, 2003).

The following procedures are taken to calculate the CAPM for each of the sample firms and then compare their discount rate:

*First*, the levered beta ( $\beta_L$ ) for each firm was obtained from Worldscope DataStream database at 2007. The beta is a key parameter in the CAPM. The beta measures the volatility, or systematic risk of each firm's stock price sensitivity in comparison to the return of the market as a whole. The coefficient is based on between 23 and 35 consecutive month-end price percent changes and their relativity to a local market index. The Straits Times Index is used in the calculation of the beta of Singapore firms.

*Second*, the levered beta ( $\beta_L$ ) was then adjusted by the book-value leverage ratio specific to each firm<sup>12</sup>, and the company tax rate, to derive the unlevered asset beta ( $\beta_U$ ) using the Hamada (1972) equation shown below in Equation 1:

$$\beta_U = \beta_L / [1+(D/E)*(1-t)] \quad (1)$$

Where:

$\beta_U$  = the unlevered asset beta of the firm.

$\beta_L$  = the levered beta of the firm.

D/E = the book-value leverage ratio of the firm<sup>13</sup>.

t = company marginal tax rate, being 20%.

*Third*, using the unlevered asset beta ( $\beta_U$ ) obtained above, a comparison discount rate for each firm was derived using the Capital Asset Pricing Model (CAPM) as shown in Equation 2:

$$r_a = r_f + \beta_U*(r_m - r_f) \quad (2)$$

Where:

$R_a$  = the expected after-tax rate of return specific to the firm's assets.

$r_f$  = the long-term risk free rate.

$\beta_U$  = the unlevered asset beta of the firm.

$r_m - r_f$  = the market risk premium for equity shareholders.

The long-term risk free rate ( $r_f$ ) assumes a value of 2.68%, 3.05% and 3.21% being the yield-to-maturity of Singapore Government 10 year bonds at December 2007, 2006 and 2005 respectively<sup>14</sup>. This is consistent with the record from Singapore Government Securities at December 2007, 2006 and 2005 using average buying rates of Government Securities Dealers' 10-Year Bond Yield<sup>15</sup>. McKinsey and Company Inc. (Copeland, Koller et al., 2000) promote the use of the 10-year government bond yield in CAPM analysis.

The expected market risk premium for equity shareholders ( $r_m - r_f$ ) assumes a value of 5.70% for the years 2007, 2006 and 2005. This figure is consistent with the findings of Gameiro (2008) using data over the average from January 1995 to October 2008.

*Fourth*, the expected after-tax rate of return specific to the firm's assets ( $r_a$ ) is adjusted to reflect a pre-tax comparison discount rate by dividing the value by 0.8, being 1 minus the company tax rate of 20% for year 2007, 2006 and 2005.

#### 4.2.2. Goodwill intensity

This research also employed goodwill intensity to measure the relationship between the

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firm reported profit and the goodwill impairment charges. From the discount rates estimated pursuant to this process, this study then compared the estimated discount rate with those disclosed by each of the sample firms. The variance between estimated and observed discount rates was calculated and stratified on an industry sector basis and on the basis of the goodwill intensity of each sample firm<sup>16</sup>. Goodwill intensity is a measure of the sensitivity of sample firm reported profit to goodwill impairment charges, and is measured using Equation 3 below:

$$\text{Goodwill intensity} = \text{Goodwill/Net profit before tax} \quad (3)$$

There are several indications of the position of firms related to the results of goodwill intensity. The first possibility results from a goodwill intensity score greater than 1.0 and suggests firms have a high degree of sensitivity to a current period loss as a result of an impairment expense. The greater the goodwill intensity value, the greater the risk of losses in the current period. The second possible result of a goodwill intensity score of greater than zero but less than 1.0 suggests firms are in a lower degree of sensitivity to a write-down in current period profit as a result of an impairment expense, while the third possible result of a goodwill intensity score of less than zero means that the firm is already unprofitable and any impairment expenses will only further increase current period losses. The results of the analysis are set out in Section 5.

## 5. Results and discussion

The degree of compliance and the extent of firm disclosure will be used as a proxy of qual-

ity. With a higher degree of compliance and increased firm disclosure of requirements in the standard is significantly viewed as providing better quality and greater information usefulness to users. This relationship is proved in this section, through the variation between independent estimates through the CAPM and disclosed discount rate by firms in goodwill impairment testing. It is important to remind readers that this study objectively selected firms that disclosed only one discount rate in value in use method in their impairment testing. This is in line with the requirement of FRS 36, which stipulates clearly<sup>17</sup> that discount rates employed for the impairment testing should relate to the underlying risk characteristics of each defined CGU.

An important and interesting aspect was the question as to which degree of disclosure requirements of FRS 36 among the firms studied related to discount rate disclosure. The other question is how Singapore listed firms overcome the complexity of the new requirements in the standard of impairment testing process which required firms to have only one defined discount rate for the purposes of satisfying the requirements of the standard.

Findings of these important questions are set out in Table 2. As an overall pattern, there was a decline in the percentage of firms that defined only one CGU for the period of the study. Although the number of firms increases within the period, analysis using overall percentages, with the results of 54.65%, 51.97% and 45.07% for 2005, 2006 and 2007 respectively, significantly proves that the pattern of firms tending to avoid requirements of FRS 36

**Table 2: Number of Defined CGUs by Industry Sector**

Sector <sup>18</sup>	1 CGU			2 CGUs			3 CGUs			4 CGUs			5 CGUs			>5 CGUs			No disclosure		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
1	3	4	2	-	1	3	-	-	-	-	1	1	-	-	-	-	-	1	1	1	1
2	3	5	6	1	1	3	-	1	-	-	-	-	-	-	-	-	-	4	-	-	-
3	3	2	3	2	2	4	-	1	-	1	1	-	-	-	-	-	-	1	2	2	2
4	2	1	5	7	7	3	-	-	2	-	-	-	-	-	-	-	-	2	4	6	6
5	4	2	1	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1
6	2	2	2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2
7	3	7	6	-	4	4	1	2	1	-	-	-	-	-	-	-	-	1	3	2	2
8	5	12	7	1	4	8	1	1	4	-	-	1	1	-	-	-	-	1	3	1	1
9	6	10	12	-	1	2	-	-	-	-	1	1	-	-	-	-	-	1	1	1	1
10	4	6	7	1	1	2	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
11	9	11	8	1	2	3	1	-	1	-	-	1	-	-	-	-	-	-	-	1	2
12	3	4	5	4	4	3	-	-	1	-	-	1	1	-	1	1	2	1	1	1	2
<b>Total</b>	<b>47</b>	<b>66</b>	<b>64</b>	<b>20</b>	<b>29</b>	<b>38</b>	<b>3</b>	<b>7</b>	<b>11</b>	<b>1</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>3</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>12</b>	<b>18</b>	<b>20</b>

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in discount rate disclosure in the value in use approach. These results are consistent with Carlin & Finch (2008a), where it was indicated that if firms fail to present single discount rate for each CGU, they fail to relate the risk characteristics of each CGU in the recoverable amount estimation.

The most striking features from the multi-year data show there were some sample firms that failed to disclose any information relating to the discount rates they employed for the purposes of CGU recoverable amount estimation. Although it is an extremely basic requirement of FRS 36, a surprisingly increasing number of firms with well resourced management, failed to fulfil this requirement.

In addition, it is noticeable that firms continued to refuse to implement the requirement of the FRS 36 where they defined multiple explicit discount rates suited to the characteristics of each CGU. As a consequence, this situation will reduce the quality of the disclosures made pursuant to FRS 36, and as well diminish the capacity of financial reporting group users to independently evaluate and assess the extent to which values are assigned to goodwill in making their investment decision.

With an increasing number of defined CGUs, it totally contradicts the risk homogeneity proposition which requires only one single discount rate in impairment testing. This is important because various types of operations may have differing prospects of growth, rates of profitability, and also the degrees of risk. Therefore, the result from Table 2 again indicates that inappropriate discount rates are

being employed among the Singapore listed firms.

The data in Table 3 show that some firms have definitely failed to provide any useful information about goodwill to group users in their annual financial reporting in the multi-year dataset. However, through the goodwill intensity calculation<sup>19</sup> the group users have been able to evaluate the sensitivity changing of firms in goodwill valuation and in particular of earnings streams to potential impairment losses which have been explained in the previous section.

Table 3 explains the goodwill intensity of the firms in the final sample for year 2007, 2006 and 2005. Overall, mean goodwill intensity was 1.78, 1.01 and 1.29 with a minimum value of -2.77, -1.93, and 1.75, a maximum value of 59.58, 50.67 and 53.9 and a standard deviation of 5.42, 4.78 and 5.95 for 2007, 2006 and 2005 respectively. There are differences of \$4,416.50, \$3,143.16 and \$764.99 million between the value of goodwill and before tax earnings for multi years of the firms' sample, which suggests that a small proportionate of impairment of goodwill could generate disproportionate impacts on earnings.

As can be seen in Table 3; 98, 88, and 59 (approximately 69%, 69% and 68%) firms have a goodwill intensity with higher than zero but less than 1.0 resulting in a lower degree of sensitivity to a write-down in current period profit as a result of an impairment expense for 2007, 2006 and 2005 respectively. The slightly increased pattern among Singapore listed firms demonstrated that they tend to give use-

Table 3: Firm Goodwill Intensity by Industry Sector

Sector	<0		>0 and <1		>1 and <2		>2 and <3		>3 and <4		>4 and <5		>5		
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	
1	1	1	3	6	1	1	-	-	-	-	-	-	-	-	
2	-	1	6	4	-	-	-	1	1	-	1	-	1	-	
3	-	1	6	7	1	-	-	-	-	-	-	-	-	-	
4	1	2	7	7	2	1	-	-	1	1	-	1	1	-	
5	-	-	4	3	-	1	-	-	-	-	-	-	-	-	
6	-	-	3	4	1	-	-	-	1	1	-	1	-	-	
7	1	3	1	9	1	1	-	1	-	-	-	-	2	1	
8	2	2	7	14	-	2	-	-	1	1	-	-	-	1	
9	-	2	6	10	1	1	-	-	2	-	-	-	-	2	
10	3	3	2	4	-	1	-	-	1	-	-	-	-	2	
11	5	2	5	11	-	-	-	-	1	-	-	1	-	1	
12	-	-	9	9	1	1	-	1	1	-	-	-	-	-	
<b>Total</b>	13	17	59	88	7	9	-	3	6	2	4	4	1	2	2

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ful information for group users regarding the value of goodwill in reported earnings. As a result, in some cases, firms may present discount rates lower than those appropriate (understated discount rates) for having high profit in the annual financial statements. This situation occurred with firms modelling their CGU recoverable amount where they had a propensity to estimate its recoverable amount as exceeding its book value. Hence, this will increase the level of “headroom” between CGU book value and recoverable amount estimates<sup>20</sup>. At this stage, firms basically act opportunistically based on the level of the internal and external monitoring of the financial reporting process respectively undertaken by the board of directors (and more particularly the audit committee) and the auditors.

This paper believes that the elucidation of variances between independently estimated and observed actual discount rates needs good judgment and careful analysis. It is important because the potential inaccuracy of estimating discount rates always occur, especially when group users do a self-assessment in investment decisions. To overcome this situation, through the analysis of discount rate variance, for firms which fell within a band of plus or minus 150 basis point (bps) of independently estimated discount rate were considered to lie in a reasonable expected range. Firms which fell between 150 and 250 bps above expectation and exceeded the 250 bps expectation were categorized as an overstated discount rate expectation and vice versa.

However, the variances between expected and observed discount rates which fall within

150bps cannot be as readily explained as the product of estimation error (intentional or unintentional), and may be consistent with the existence of systematic bias when firms select their discount rates for the impairment testing process<sup>21</sup>. Goodwill impairment involves complex estimations that are difficult to comprehend (Wang, 2005). Table 4 shows the variances categorized by the magnitude and direction of the differential between estimated and observed discount rates across the sample. For each sector multi years data are explained with the number and proportion of firms which fell into each variance category.

As shown in Table 4, there are striking features of firms across the magnitude and direction of the differential between estimated and observed discount rates. There were slight fluctuations between the multi year data for the Singapore listed firms which this study considered as a reasonable expected range. The figure illustrates that 44 (31%), 34 (27%) and 25 (29%) out of 142, 127 and 86 firms disclosed the use of discount rates which fell in a range of 150 bps of the estimation for 2007, 2006 and 2005 respectively.

Moreover, the pattern of observed discount rates for 2007 and 2006 among the Singapore listed firms which fell above and below the reasonable expected range look similar in 55 firms (39%) and 43 firms (30%) for 2007 and 46 firms (36%) and 47 firms (37%) for 2006. Meanwhile, for 2005, there were only 19 firms (22%) that fell above the reasonable expected range compared with 42 firms (49%) which categorized below the reasonable expected range which signifies that most of the sample

Table 4: Analysis of Discount Rate Variance by Sector

Sector	>250 bp below expectation			>150 bp ,250 bp below expectation			Within expected range (+/- 150 bp)			>150 bp <250 bp above expectation			>250 bp above expectation		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
1	1	1	1	1	1	2	1	1	2	0	0	2	1	5	1
2	2	3	4	2	0	2	2	2	1	0	0	1	2	2	1
3	2	1	3	1	1	0	3	2	4	0	1	1	1	3	2
4	4	2	2	2	1	0	5	7	8	0	1	1	0	1	5
5	2	0	0	0	0	1	0	2	0	0	0	1	2	2	2
6	2	1	2	1	2	0	0	0	1	1	0	0	1	2	3
7	2	6	3	1	1	0	0	3	6	1	4	1	1	2	3
8	2	8	3	0	1	2	6	4	7	0	2	3	1	5	6
9	2	2	4	1	1	1	4	5	3	0	0	2	0	5	6
10	2	2	4	1	2	1	0	3	3	0	0	1	2	1	1
11	3	5	2	2	1	3	2	3	5	1	0	1	3	6	4
12	6	2	2	0	3	1	2	2	4	0	1	0	2	3	7
<b>Total</b>	30	33	30	12	14	13	25	34	44	3	9	14	16	37	41

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firms have understated their discount rate.

Interestingly, for multi-year data, from the 55, 46 and 19 firms which are regarded as above expectation, 41, 37 and 16 firms were in excess of 250 bps which resulted in an overstated discount rate. In other words, these firms recoverable amount is below the CGU book value and they are in a low profit position. The management of those firms usually has chosen desired profit at an early stage and employed the impairment process as an income manipulation and smoothing device in the firm's financial reporting (Seetharaman et al, 2008) that effect the economic decisions of the financial reporting users. Consequently, a firm's financial report does not truly reflect the "true and fair" concept.

By contrast; 30, 33 and 30 firms out of 43, 47 and 42 firms were grouped in excess of 250 bps lower than our independent risk adjusted estimate for 2007, 2006 and 2005 respectively. As a result, those firms were believed to understate discount rates by having a high profit in their financial reporting. With the firm's high profit setting, goodwill has appeared to be an umbrella concept embracing many features of a firm's activities that could lead to superior earning power, such as excellent management, an outstanding workforce, effective advertising, market penetration, etc. (Seetharaman et al. 2008).

Based on the above significant results again it is proved that under the new goodwill impairment regime, firms now have a greater volatility in earnings and traditional measures of return. This process seems to be an ideal

source to determine the amount of shareholder value generated in the period for value based management control systems. The results are consistent with Massoud & Raiborn (2003), Harris & Caplan (2002) and Eldridge (2005) who believed that under new impairment testing management employed their own capability of judgment to report the goodwill impairment based on the firms determination of current and future performance.

The trend of the data above has been influenced by several factors. One of the possibilities that is interesting to explain is the existence of systematic bias in which the independent discount rate estimates used for the purposes of the study were generated. In this case, the methodology employed play important roles in influencing the pattern of variances between estimated and observed discount rates. This study believes there would be similar pattern of variances between estimated and observed discount rates as appear in Table 4, if the discount rates estimates would tend on average to inflate discount rate estimates.

In order to overcome this possibility, a combination of methodologies are employed for multi-year analysis which comprises of betas (upper value of 2.0 in a bid), risk free rate [3.21% (2007), 3.05% (2006) and 2.68% (2005)], market risk premium (5.70% same for 2007, 2006 and 2005) and transforming levered betas to unlevered betas using the Hamada equation<sup>22</sup> needs careful assessment to reduce the estimated risk adjusted discount rates among the firms. The estimation of risk adjusted discount rates is reduced as the unlevered betas are inferred in analysing the firm's

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observed discount rates. The figures of all the important elements in the methodology employed generally are within the acceptable range of values assigned to the variable discount rate modelling to respond to the objective of this study.

The value of goodwill that is allocated into the CGUs, and other factors as well, influence the pattern of the discount rate variation among the firms studied. This kind of analysis may explain the real exercise of discretion and opportunistic behaviour in goodwill impairment testing related to discount rates disclosure. The value of goodwill among the firms is \$16,147, \$10,820 and \$991 million for 2007 and 2006 and 2005 respectively. Again in Table 5, the result is consistent with the previous results which show that the value of goodwill, which disclosed discount rates lower than independently estimated discount rates, is higher in 2005 compared to other years with \$490 million (approximately 49% of total goodwill in 2005).

For the years 2007 and 2006, we found that the value of goodwill was higher under the categorized observed discount rates and higher than independently estimated rates. This was so in the total value of goodwill at \$10,638 (approximately 66%) and \$10,082 (approximately 93%) out of \$16,147 and \$10,820 million under this range, with a goodwill value of \$10,579 and \$9,967 million in excess of 250 bps above our independent risk adjusted estimate with the main contribution from the utilities and transportation sector<sup>23</sup>. In contrast, approximately 31%, 3.4% and 41% or \$5,082, \$370 and \$412 million of the firm goodwill

using the reasonable range (+/- 150 bps) of an independently estimated risk adjusted discount rate in the goodwill impairment testing for 2007, 2006 and 2005 respectively. These results yet again provided evidence that the firms studied simply choose their discount rates when the impairment process is taking place without considering the requirements of the standard itself.

Upon viewing the data on an industry sector basis, as an example, all industries have been impairment tested using discount rates in excess of 250 bps above expectation for all the multi year samples except for 2005. Meanwhile, for the range more than 150 bps above expectations, there were only 2, 5 and 10 out of 12 sectors in 2005, 2006 and 2007 respectively that reported goodwill subjected to impairment testing. An explanation of these results is clearly illustrated in Table 5.

Goodwill intensity is also used in this study to elaborate the discount rates variance of the firms studied for 2007, 2006 and 2005. Results are similar to the previous table which indicates that the total sample firm goodwill subjected to impairment testing is a big proportion (66% and 92%) under the discount rates in the above expectations in year 2007 and 2006. However, for 2005, the result is in contrast where the big proportion is under the discount rates and below the expectation of an independently estimated risk adjusted discount rate. Consistent with these results, Jordan & Clarke (2003) agreed that normally firms took goodwill impairment charges as an income-decreasing strategy when their operation performance was poor for a particular year.

Table 5: Industry Sector Dollar Value of Goodwill by Discount Rate Variance

Sector	>250 bp below expectation			>150 bp, 250 bp below expectation			Within expected range (+/- 150 bp)			>150 bp <250 bp above expectation			>250 bp above expectation		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
1	14	11	20	1	1	168	6	1	16	0	0	6	2	29	1
2	7	9	13	6	0	7	283	34	1	0	0	29	2	196	191
3	16	0	3	7	1	0	3	9	34	0	7	6	0	2	1
4	49	5	27	2	0	0	60	107	122	0	87	1	0	8	43
5	44	0	0	0	0	1	0	3	0	0	0	3	20	69	60
6	61	1	7	1	61	0	0	0	60	5	0	0	18	5	8
7	84	6	17	1	82	0	2	39	84	0	8	1	1	2	46
8	4	30	4	0	64	3	31	44	4,216	0	12	3	0	17	66
9	67	42	43	2	0	15	16	10	87	0	0	5	0	17	31
10	6	2	6	7	25	11	0	28	450	0	0	1	4	1	2
11	9	12	0.4	86	0	68	1	83	8	1	1	4	4	11	3
12	15	10	10	0	6	4	10	12	4	0	0	0	32	9,610	10,127
<b>Total</b>	<b>376</b>	<b>128</b>	<b>150</b>	<b>113</b>	<b>240</b>	<b>277</b>	<b>412</b>	<b>370</b>	<b>5,082</b>	<b>6</b>	<b>115</b>	<b>59</b>	<b>83</b>	<b>9,967</b>	<b>10,579</b>

**Table 6: Discount Rate Variance and Goodwill Intensity (Value of Goodwill)**

Sector	No of Firm		>250 bp below expectation		>150 bp ,250 bp below expectation		Within expected range (+/- 150 bp)		>150 bp <250 bp above expectation		>250 bp above expectation							
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2007					
Goodwill intensity >5	4	4	82	8	4	1	64	67	322	80	611	0	0	1	0	0	26	
Goodwill intensity >4 and <5	1	2	60	0	26	0	0	0	0	82	0	0	0	0	0	0	195	2
Goodwill intensity >3 and <4	2	4	0	0	0	85	141	0	5	0	4,260	0	87	0	0	1	191	
Goodwill intensity >2 and <3	0	3	0	0	40	0	0	15	0	29	0	0	1	29	0	9,553	9,597	
Goodwill intensity >1 and <2	7	9	95	43	20	0	1	0	14	34	9	5	7	9	30	130	122	
Goodwill intensity >0 and <1	59	88	125	67	55	27	19	195	70	118	200	0	18	20	48	75	631	
Goodwill intensity <0	13	17	14	10	5	0	15	0	1	27	2	1	2	0	5	13	10	
<b>Total</b>	<b>86</b>	<b>127</b>	<b>376</b>	<b>128</b>	<b>150</b>	<b>113</b>	<b>240</b>	<b>277</b>	<b>412</b>	<b>370</b>	<b>5,082</b>	<b>6</b>	<b>115</b>	<b>59</b>	<b>83</b>	<b>9,967</b>	<b>10,579</b>	

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In exploring the write-offs decision, Francis et al (1996) suggests that goodwill write-offs are more likely to be made when management changes and when the firm's overall performance is deteriorating. As a result, there are several general aversions towards the forced recognition of impairment losses. A finding of prior literature on this subject is related to the value relevance of goodwill write-offs. Henning & Shaw (2003) show that the longer the amortization period, the more likely it is that an acquisition was not profitable. The information value of goodwill amortization charges generally suggests limited value relevance (Jarva, 2008; Hayn & Hughes, 2005; Jennings et al. 2001, Moehrl, 2001; Sloan, 1996).

Moreover, previous literature contributed to a material negative adverse response on the part of capital market to goodwill write-offs (Bartov et al., 1998; Hirschey & Richardson, 2002; Beneish & Vargus, 2002). As a result, the stock market does not seem to be efficient in pricing all the time because of the goodwill write-off decisions by firms. If the capital market responds to impairment losses, Li & Meeks (2006) found that impairment is associated with roughly *pari passu* reductions in market value. Therefore, based on two valuation models used by Li & Meeks (2006) it supports that amortization is value relevant.

## 6. Conclusion

Goodwill has become an increasingly important economic resource for many firms. As a consequence, better information about goodwill is needed. In an effort to achieve this

goal, ASC issued a new accounting standard, FRS 36. This new standard supersedes the previous standard which requires that goodwill with an indefinite useful life be tested at least annually for impairment. Changes included in this standard intend to better reflect the underlying economics of the goodwill. This standard improves prior standards by removing annual fixed-amount amortization into a regular and systematic basis valuation.

Bearing in mind that the mandatory adoption of FRS 36 in Singapore started on or after 1 July 2004, it is interesting to analyze the characteristics and behaviour of the firms that were already anticipating FRS 36 requirements, especially with the complexity lay of the technical process with respect to discount rates disclosure which are used in estimation of future cash flows. The discount rates selection is a key important variable employed to determine the firm's CGUs recoverable amounts when they construct the discounted cash flow modelling. Thus, discount rates selection is the main contribution of the outcome of impairment assessment especially when using the value in use method.

Given the increased prominence of goodwill on a firm's balance sheets and the abolishment of its systematic amortization, an accurate evaluation of this asset becomes an important issue. This research provides an analysis as to what degree the variation between discount rates disclosed by Singapore listed firms for the goodwill impairment testing and independently generated estimates of firm specific risk adjusted discount rates through the capital asset pricing model (CAPM) for a multi-year

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sample of 2007, 2006 and 2005. Our major finding of this study revealed that some of the firms failed to provide meaningful information related to discount rates disclosure. Hope (2003) assumed that if accounting standards are not complied with they will be of little value. This deficiency may result in a decreased ability of external group users to completely self-assess firm's performance.

Another factor contributing to failure in complying with the new standards was the lack of experience among the preparers since the new FRS 36 introduced a very high degree of complexity and detail. Under the requirements of goodwill impairment, elements including appropriate definition of CGUs, appropriate allocation of assets to CGUs, adoption of appropriate growth profiles for firm cash flows and of course, the selection of appropriate discount rate to translate estimates of future cash flows into their present economic equivalents, are really complicated to put into practice.

In a previous empirical study on the excessive aggregation of CGUs (Carlin & Finch 2008 a,b and Hayn & Hughes, 2005), it was found through the selection of discount rates firms are able to pursue impairment losses avoidance in their annual impairment testing. New requirements require firms to make choices to use their own justification and interpretation to manipulate the discount rates used in estimating the recoverable amount of goodwill in order to have a good reputation and

high performance in their operation.

Although the theoretical guidelines of the impairment regime of goodwill have clearly been represented in the standard, it evidently appears in this research that all has not been well in the process of translation from idea to action. The process of discount rates selection needs to be more transparent because of the likelihood of presenting a picture of a firm's future earnings which may help the users group better understand the economic implications of the impairments in the valuation process. To assure consistency in application, accounting policy makers and standard setters should provide more direction and examples regarding the valuation of goodwill impairment testing.

Our results should also be of interest to practitioners in the area of accounting standard setting and regulation, as we argue that the adoption of a new requirement of goodwill impairment testing, especially related to the selection of discount rates, limits the effectiveness of the standard. It is believed that the issue of compliance continues to be a contentious issue in accounting, and for instance, indicates that rigorous interpretation and application of the standard need to be revised to become more reliable and follow the current accounting practice needs. In addition, disclosure regarding reasons for any changes in the assumptions and methods used may also help limit opportunistic use of this new policy.

#### Notes:

1. See Carlin et al. (2008b, 2007), Seetharaman et al. (2008) and Lee (1971)
2. See also Seetharaman et al. (2008), and Lee (1971)

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3. See [www.asc.gov.sg/frs/index.htm](http://www.asc.gov.sg/frs/index.htm)
  4. The recoverable amount value is defined as the higher of the CGU's fair value less costs to sell and its value in use (FRS36.18)
  5. And their auditors.
  6. See also Dagwell et al. 2004
  7. See FRS 36.130(g).
  8. In undertaking the process of sample compilation, the audited financial statement for a total of 623, 593, and 562 listed firms for 2007, 2006 and 2005 respectively was screened. These firms had a combined market capitalization of \$522,628.45 million as at December 2007, \$383,347 million as at December 2006 and \$321,007 million as at December 2005.
  9. Haw Par Corporation Limited (Commerce & Diversified) applied a post tax discount rate of 10.31% (2007), 5.73% (2006) and 6.27% (2005).
  10. Lonergan (2006) notes that this approach is an oversimplification and will only lead to consistency on a before and after-tax basis when cash flows are in perpetuity and there is no growth in these cash flows.
  11. See also Bruner et al. (1998) which found that 85% of firms in their survey, which consisted of 27 best-practice firms, use the CAPM or a modified CAPM to determine the cost of equity.
  12. It is technically preferable to estimate leverage using market values. However, in most cases, a lack of data makes this difficult to achieve in practice. Consequently, a book value approach is adopted for the purposes of this paper.
  13. The book value leverage ratio for each firm was calculated using the data contained in each firm's 2007, 2006 and 2005 audited financial statements. An implicit assumption in the approach taken to delivering firm beta is that the observed book value leverage is the optimal or target capital structure for each sample firm. This may not be so in all cases.
  14. Monetary Authority of Singapore, MAS Monthly Statistical Bulletin, Table III.6 Singapore Government Securities (SGS): Prices and Yields, obtained online from [http://www.mas.gov.sg/resource/data\\_room/msb/March2009 Vol130 No3.pdf](http://www.mas.gov.sg/resource/data_room/msb/March2009 Vol130 No3.pdf)
  15. Singapore Government Securities, Historical Prices and Yields – Benchmark Issues (2005 to 2007), obtained online from <https://secure.sgs.gov.sg/apps/goto/?app=prices>
  16. Adjustments for firm specific systematic risk factors and other judgmental factors such as size, growth prospects, stage of business cycle and so on were not made. This lowered the risk of investigator induced idiosyncratic factors influencing the results. It is also consistent with the findings of Graham and Harvey (2001).
  17. FRS 36 requires that the discount rate be asset specific with respect to risk and independent of financing considerations (FRS 36.A19).
  18. The firm's sector is represented by the following numbers: 1 (commerce & diversified); 2 (construction); 3 (drugs, cosmetics, health care & chemicals); 4 (electrical & electronic); 5 (financial); 6 (food & beverages); 7 (machinery & equipment); 8 (manufacturing); 9 (metal product manufacturers); 10 (miscellaneous); 11 (retailers, textiles & apparel); 12 (utilities & transportation).
  19. The calculation of which is described in Equation 3.
  20. In some situations, opportunism may potentially also manifest in the opposite direction, via the application of excessive discount rates. However, there is little available empirical evidence to confirm the

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existence of this phenomenon in firms undertaking impairment testing.

21. Management process in deciding the appropriate “tolerance threshold” on CAPM analysis is demanding and tricky in practice, particularly when it has created a high standard of error terms in CAPM based estimates of the cost of equity capital (Fama & French 2003, 1997). However, in practice there is clear proof that CAPM is the most popular method used by firms to develop their cost of capital estimates (Fan, 2004; Bancel & Mittoo, 2003; Graham & Harvey, 2001; Bruner et al. 1998). Based on this leading model used in the cost of capital estimation, therefore, our application of CAPM corresponds tightly to the approaches used internally by sample firms, justifying the use of a tighter rather than a narrower tolerance threshold. Alternative approaches could have been based on the individual tolerances to beta standard errors.
22. As described in Section 3 under the equation 2.
23. Singapore Telecommunication Limited reported goodwill at \$ 9,563 and \$9,553 million.

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