THE VALUE RELEVANCE OF GOODWILL AND GOODWILL AMORTIZATION IN A DANISH SETTING

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Abstract

Based on data from the Danish Stock Exchange, this paper examines the value relevance of purchased goodwill and explores how goodwill should be measured subsequent to initial recognition. Danish accounting legislation requires capitalization and amortization of purchased goodwill. As of 2005 Danish listed companies must comply with international financial reporting standards (IFRS) issued by the International Accounting Standards Boards (IASB). An exposure draft (ED 3: Business Combinations) is presently under consideration by the IASB. If this exposure draft is implemented, Danish listed companies must carry out impairment tests on goodwill. The value relevance is tested by examining the association between goodwill and goodwill amortization and share prices, incremental to other accounting variables.The overall findings suggest that investors perceive goodwill as an asset with a long economic life time. The results support the Danish Financial Statements Act that requires capitalization of all purchased goodwill. The findings brings into question if goodwill amortization provides useful information to investors. This suggests that impairment testing might be an alternative way to measure acquired goodwill assets in subsequent years.

Keywords: capital markets, investors, financial reporting, goodwill, amortization, impairment tests, value relevance

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1. Introduction

The accounting treatment for purchased goodwill has been a controversial issue for decades. In this light it is hardly surprising that goodwill has been treated differently under different accounting regimes in the past. In the US goodwill must be capitalized and undergo impairment tests. Internationally, IASB requires capitalization and amortization over a period of up to 20 years. In Denmark companies were allowed to write-off goodwill or capitalize it subject to amortization over its useful life time that was expected not to exceed 5 years. The Danish Financial Statements Act has been revised as of January 1, 2002. It now requires goodwill to be capitalized and amortized over a maximum of 20 years. IASB has currently issued an exposure draft on Business Combinations[1] that requires companies to capitalize goodwill subject to impairment testing. As all listed companies within the EU must apply IFRS issued by the IASB, a standard for goodwill accounting that requires capitalization and impairment testing is expected to become a universal standard in the foreseeable future. Despite extensive empirical research on the value relevance of goodwill, no studies have examined the usefulness of these resources in a Scandinavian setting.

Based on capital market research this paper examines if goodwill and goodwill amortization as reported by companies listed on the Danish Stock Exchange provides value relevant information to investors. In particular the paper addresses if purchased goodwill is priced by investors as a resource with limited economic lifetime, that is, if goodwill should be recognized as an asset subject to amortization. The findings should also provide some evidence, albeit indirectly, to the question of whether goodwill should be amortized in a systematic manner (i.e., straight line amortization over the life time of goodwill) or rather should be subject to impairment testing.

[1] International Accounting Standards Board Exposure Draft ED 3 Business Combinations, December 2002

2. The goodwill controversy

Few, if any, subjects have been debated as intensely as the proper accounting treatment for purchased goodwill[2]. The controversy was fuelled in part by the shift in the economy from manufacturing to information and service industries (knowledge-based activities) (Jennings, LeClere, & Thompson, 2001). Even though cash flows are not directly affected by how goodwill is accounted for, the impact of different accounting methods should be carefully considered by management, financial analysts, investors, and other who are concerned with financial statements. For instance, it has often been argued that UK companies had an advantage over US bidders in contested acquisitions. This was so because US bidders had to recognize and amortize goodwill resulting in lower reported earnings. Meanwhile UK bidders could 'afford' to pay a higher price, as goodwill could be written off against equity, thus, no goodwill amortization had to be charged against earnings[3] (e.g., Hussey & Ong, 2000).

Hall (1993) found that the length of the goodwill amortization period for goodwill is related to firm size and leverage for firms with debt contract. They conclude that:

'Thus it appears that managers consider economic consequences in deciding the number of years over which goodwill is amortized'. Numerous other examples of the consequences of different accounting treatments for goodwill are provided by Petersen (2002).

On theoretical grounds recognizing goodwill as an asset is based on the premise that goodwill comply with the definition of an asset since it represents probable future economic benefits (e.g., Johnson & Tearney, 1993; Johnson & Petrone, 1998). Others (e.g., Colley & Volkan, 1998) argue that management would not have paid for goodwill, if it were not expected to produce future benefits to the firm, especially when goodwill has been determined through a negotiation between a willing buyer and a willing seller. Recognizing goodwill in the balance sheet (net of goodwill amortization) provide an indication of the value the investment. Herring & Herring (1990: 40) express the view that because the balance sheet is used by investors and stockholders to evaluate performance its accuracy and communicative abilities are critical (i.e., goodwill is an important determinant of firm value).

Despite the strong rationale for recognizing goodwill as an asset measurement problems and reliability issues may question if this is the proper accounting treatment. For instance, Davis (1992) and Nobes (1992) argue that many intangibles are never shown on the balance sheet due to measurement problems. This view is accentuated by e.g., Raffournier (1998), who argue that goodwill cannot be measured with sufficient reliability because it's merely a residual. Tweedie & Blanchet (1989), among others, question that goodwill is an asset, as the value of goodwill is uncertain and its useful life indeterminable. Ma & Hopkins (1992) argue that purchased goodwill should not be capitalized, since it is not identifiable with a specific source of future benefits.

If goodwill is capitalized it begs the question how to measure it subsequent to initial recognition. Davis (1992) assume that goodwill is a wasteful asset like any tangible asset (except a few e.g. land) and hence should be amortized over its useful economic life. Johnson & Tearney (1993) reason that goodwill has a limited life albeit impossible to measure, and, thus, should be amortized. Proponents of amortization further argue that the value of goodwill cannot be maintained indefinitely. Goodwill represents a company's superior earnings ability relative to its competitors. It is not likely, however, that the company's competitive advantages (and thus higher earnings) will last forever (Grinyer & Russell, 1992).

If goodwill is amortized it requires an estimate of its useful life. Some argue that assessing the amortization period of goodwill is difficult because the asset is in itself a combination of various elements with diverse useful lives (Raffournier, 1998). Colley & Volkan (1998) argue that the 40-year amortization period[4] used in practice is too long and cannot be supported on either theoretical or technical grounds. This view is supported by FASB who, in their September 1999 Exposure Draft, considered to reduce the maximum goodwill amortization period to 20 years, as they observed that the rapid pace of technological change was shortening product life cycles and requiring enterprises to reinvent themselves more regularly in order to survive.[5]

Impairment testing of goodwill will provide more transparency and provide users of financial statements with more insight than an arbitrary amortization scheme for goodwill (Moehrle & Reynolds-Moehrle, 2001). If goodwill does not

[2] This paper only addresses purchased goodwill. Internally generated goodwill is not being considered.

[3] Present accounting regulation does not permit UK companies to write off goodwill against equity, and goodwill should not be amortized according to US GAAP (SFAS No. 142). In order to avoid the drain on earnings some US companies accounted for business combinations using the pooling of interests procedure. According to SFAS No. 141, this method is no longer permitted.

[4] Until June 2001 the U.S. required purchased goodwill to be capitalized and amortized over a period of up to 40 years (APB 17).

[5] As described in this paper the Board of FASB later changed its mind, so the current FASB Statement No. 142 requires impairment tests in place of systematic amortization.

decline in value over time or, alternatively, has an indefinite life, impairment testing may be the appropriate treatment.[6] As pointed out by Duval, Jennings, Robinson, & Thomson (1992) capital maintenance that arises from the use of physical assets does not happen in the case of goodwill[7], goodwill will last indefinitely if properly maintained making goodwill amortization unjustifiable. Economic value added (EVA) is a concept that has gained increasing popularity.[8] According to the EVA concept, goodwill should not be amortized in assessing the performance of a company (Stewart, 1997). This is based on the notion that goodwill represents an investment, which management should be able to earn a return on. Evidently, researchers strongly disagree about the accounting treatment of goodwill.

The major premise underlying SFAS No. 142, "Accounting for Goodwill and Other Intangible Assets was that goodwill does not necessarily decrease on a regular and systematic basis (Massoud & Raiborn, 2003). If goodwill amortization adds noise to earnings and balance sheet measures, SFAS No. 142 and IASB's exposure draft on Business Combinations that requires impairment testing might improve the quality (usefulness) of financial statements.

3. Prior literature and hypotheses

3.1. Prior empirical literature

The disagreement on the relevant accounting method for goodwill, as discussed in the previous section, has stimulated numerous empirical studies particularly in the US. These studies examined if goodwill is value relevant in the sense that it is priced as an asset in equity valuation. The value relevance of goodwill was tested by exploring the association between stock prices (returns) and accounting numbers for purchased goodwill (goodwill amortization) based on Ohlson's (1995) model (price model) and the related return model.[9, 10]

Recent studies that examines the value relevance of goodwill and goodwill amortization include Wang (1993), Chauvin & Hirschey (1994), McCarthy & Schneider (1995), Barth & Clinch (1996), Jennings, Robinson, Thompson, & Duvall (1996), Huijgen (1996), Wilkins, Swanson, & Loudder (1998), and Henning, Lewis, & Shaw (2000).

Based on a price-levels specification (regressing security prices on accounting variables including goodwill), McCarthy & Schneider (1995) found that goodwill was valued at least as much as other assets. Barth & Clinch (1996) who explored the effects of international accounting differences and their relation to share prices and returns for different components including goodwill found that stock prices of UK firms act as if goodwill was an asset, but at a discount relative to other assets.

Barth and Clinch (1996) further found that goodwill amortization expenses under U.S., U.K., and Australian GAAP were "too small" relative to the expense reflected in returns. Wang (1993) who applied Landsman (1986) equity valuation model to examine the amortization period for goodwill and provided evidence that attempts to shorten the amortization period of goodwill from presently 40 years might cause reported (capitalized) goodwill to be significantly understated.[11]

Jennings et al. (1996) provided evidence that stock prices behave as if investors perceived purchased goodwill as an asset, but they found only limited evidence about whether investors view goodwill amortization as an expense. Huijgen (1996) analyzed investors' perception of goodwill for companies listed on the Amsterdam Stock Exchange. His results indicated that investors value goodwill as an asset with a long economic lifetime. However, the findings were not conclusive as to the (exact) amortization period. Indeed, for several specifications he found that goodwill amortization had an unexpected sign.

Overall, the review of the empirical studies conducted in recent years strongly suggest that there is a significant and positive association between reported goodwill numbers and market values, that is, goodwill is perceived as value relevant by investors. The findings concerning the (proper) amortization period, however, are inconsistent, and it

[6] The practical implementation of goodwill impairment testing raises a number of concerns. For instance, what is the appropriate discount rate, how should goodwill be divided to the different cash generating units etc. These matters are not further discussed, since the objective of this study is to examine the value relevance purchased goodwill.

[7] It may be that the value of (purchased) goodwill does not decrease, as it is substituted by internally generated goodwill.

[8] ISS, for example, use the term 'The EVA Company' on the face of their annual report.

[9] A vast number of none-marked based accounting research papers have discussed goodwill accounting (e.g., Brunovs & Kirsch, 1991; Grant, 1996; Miller, 1995; Pelham, 1996; Steven, 2002. In their seminal work, Ball & Brown, 1968 argue that one of the major shortcomings of the traditional normative approach is that it ignores a significant source of knowledge, and that source is the extent to which the predictions of the model conform to observed behavior.

[10] Including both book value and earnings in valuation models became dominant from the mid 1990s following a theoretical framework developed by Ohlson (1995) and Feltham & Ohlson, 1995).

[11] Until recently US corporations were required to amortize goodwill over a maximum of 40 years (APB 17) However, according to the newly adopted SFAS 142 US companies shall no longer amortize goodwill but rather make it subject to impairment testing.

is unclear whether investors perceive the periodic amortization expense (goodwill amortization) as value relevant. Finally, it's an open question if goodwill is priced at least on par with other assets or at a discount.

3.2. Hypotheses

In line with the stream of research discussed in the previous sections, this paper addresses the value relevance of goodwill and goodwill amortization, reported by companies listed on the Danish Stock Exchange. The following hypotheses are examined:

Hypothesis 1: Investors perceive goodwill as value relevant

Hypothesis 2: Investors value goodwill amortization as an expense

The first hypothesis examines if the requirement in the Danish Financial Statements Act to capitalize goodwill seems justified based on investors perception of reported goodwill numbers. The second hypothesis is aimed at testing if goodwill should be amortized, and, if so, what the proper amortization period might be. The findings from these tests also provide (some) indirect evidence of whether impairment testing provides more useful information than the present treatment (in Danish accounting legislation) of goodwill amortization.

4. Sample selection and research design

4.1. Sample

The accounting variables and the monthly, adjusted stock prices have been extracted from Account Data.[12] The criteria for inclusion (or exclusion) in the final sample are as follows:

Since the aim of this study is to analyze the value-relevance of goodwill, only those companies reporting goodwill are included in the final sample. Companies that have been delisted during the period have been included in order to avoid survivorship bias. Financial companies are left out as they are different in nature and have their own accounting regulation. Foreign companies listed on the Copenhagen Stock Exchange are excluded from the sample, as data for those companies are not available in Account Data. To avoid double counting holding companies (i.e., companies owing other listed companies) have been left out. Companies that have changed their financial reporting period have been deleted. However, in order to save observations only the years affected by the change in the financial reporting period are deleted. The Danish stock market has different stock classes, typically A, B, C, and preference stocks. In all cases the market values and returns are based on the prices of the stocks that are traded most frequently, which generally are labelled B stocks.

The final pooled sample consists of 307[13] firm year observations after deletion of outliers with *Rstudent* in excess of |3.0|.

4.2. Research design

A methodology commonly used to measure market perception of accounting variables is an examination of the association between those variables and stock prices and stock returns, that is, market based accounting research.

Beaver (1998) and Barth, Beaver, & Landsman (2000) provide formal definitions on value relevance. According to these definitions accounting numbers are value relevant, if they have a significant association with security prices and returns. In value relevance studies, research designs selectively include the variables of interest to learn about the valuation characteristics of particular accounting variables. Value relevance research studies using price levels and returns specifications have been characterized as adopting a "measurement" and an "informational" perspective, respectively (Beaver (1998).[14] The value relevance of certain group of assets (e.g.., R&D, brands, software, goodwill) or liabilities (e.g., pensions) have been examined in a vast number of papers that have employed a simplified version of Ohlson's (1995) model (often labelled E-B-O after Edwards & Bell, 1961 and Ohlson, 1995).[15]

The empirical tests in this paper follow recent work by Jennings et al. (1996) and Vincent (1997), among others, who use balance sheets and income statements numbers to assess the value relevance of purchased goodwill and goodwill amortization. To provide evidence about the value relevance of goodwill and goodwill amortization (hypotheses 1 and 2), those goodwill numbers ability to explain observed share prices were examined by the following version of Ohlson's price model[16]:

[12] Account Data is a database maintained at the Copenhagen Business School. It contains a variety of accounting data and stock prices for companies listed on the Danish Stock Exchange.

[13] Outliers are defined as those with studentized residuals in excess of |3.0|. This is approximately equivalent to removing 1% of the observations.

[14] An interpretation of the informational perspective is that accounting numbers provide new information to the markets. Under the measurement perspective, accounting items measure assets, liabilities, revenues, and expenses, even though such information may not be "new" to the market.

[15] Ohlson's (1995) model is based on the well-known residual income valuation model (Preinreich, 1938; Edwards & Bell, 1961) whose general formulation is:

$$P_t = bv_t + \sum_{\tau=1}^{\infty} (1+k)^{-\tau} * E_t\left[x_{t+\tau} - k * bv_{t+\tau-1}\right]$$

[16] Like in a host of other studies (e.g., Aboody & Lev, 1998) all variables are measured at time *t*. However, stating BV at time t is inconsistent with Ohlson's

$$P_{it} = \alpha_0 + \alpha_1 EBX_{it} + \alpha_2 ALGW_{it} + \alpha_3 GW_{it} + \alpha_4 LIAB_{it} + \varepsilon_{it} \quad \text{(Eq. 1)}$$

where P the stock price for company i is measured four month after financial year end t to ensure sufficient time for the financial statements to become public available.

EBX is earnings before extraordinary items. *ALGW* is non goodwill assets (i.e., total assets less goodwill), *GW* is book value of goodwill and *LIAB* equals book value of liabilities. All variables are measured on a per share basis. Consistent with Jennings et al. (1996) *EBX*, *ALGW* and *GW* are expected to have positive coefficients, while *LIAB* is expected to have a negative coefficient.

The value relevance of goodwill amortization (hypothesis 2) was further examined by estimating a separate coefficient for goodwill amortization leaving the following regression model:

$$P_{it} = \alpha_0 + \alpha_1 EBXG_{it} + \alpha_2 GWA_{it} + \alpha_3 ALGW_{it} + \alpha_4 GW(X)_{it} + \alpha_5 LIAB_{it} + \mu_{it} \quad \text{(Eq. 2)}$$

where *GWA*, the goodwill amortization expense for company *i* for period *t*, is expected to have a negative sign. The other variables are as defined previously.

Table 1 provides sample statistics for the main variables and the related Pearson correlation coefficients. As expected there is a high correlation between non-goodwill assets and liabilities [see appendices, table 1].

Empirical results

5.1. Investors perceive goodwill as value relevant

Table 2 presents the results from applying regression model (Eq. 1). After deletion of outliers there is a total of 307 firm-year observations with reported goodwill in the balance sheet. The results reported are based on pooled data. However, the coefficients are likely to vary over time. The year-by-year results from the main regression – not tabulated – show variation in the coefficients as might be expected.[17] In order to mitigate heteroscedasticity all t-statistics are based on White's (1980) heteroscedasticity-consistent covariance estimator.

As in McCarthy and Schneider (1995) several different measures are used as proxies for income.[18] Clean surplus is the theoretically correct income proxy since it is consistent with the model suggested by Ohlson (1995). Earnings after tax includes all revenues, expenses, gains and losses and is presumably used by investors and financial analysts in assessing the performance and value of firms. The idea behind employing earnings change as a proxy is that Ohlson's (1995) model includes abnormal earnings as an independent variable. By applying a simple random walk model,[19] unexpected earnings or abnormal earnings is simply the change in earnings between two subsequent periods (years). Finally, earnings before extraordinary items are typically used in similar studies examining the value relevance of other intangibles, (e.g., Aboody & Lev, 1998; Barth, Foster, Clement, & Kasznik, 1998; Lev & Sougiannis, 1996). Although defining earnings (per share) as income before extraordinary items and discontinued operations (per share) violates the clean surplus assumption, it eliminates potentially impenetrable effects of large one-time items and is consistent with prior research (e.g., Dechow, Hutton, & Sloan, 1999). Further, empirical evidence suggests that with the exception of financial firms, there is no evidence that comprehensive income (clean surplus) is more strongly associated with stock returns and stock prices than net income (Dhaliwal, Subramanyam, & Trezevant, 1999).

The results appear to be robust to these alternative proxies for income. All coefficients are significantly different from zero at the 0.01 level and carry the expected signs. The coefficient on goodwill using clean surplus as an earnings proxy (2.49) and earnings (2.53) are somewhat higher than the coefficient on goodwill in the specification employing earnings before extraordinary items (2.24). If earnings change is applied as the earnings proxy, the coefficient on goodwill becomes 1.94. The coefficients on non-goodwill assets and liabilities are highly significant and close to +1 and –1, respectively. In particular they are 1.01 and – 0.99, respectively when clean surplus is applied. The specification with earnings change has a significantly lower adjusted R^2. Since the use of earnings change as a proxy for income assumes that earnings follow a simple random walk model, this may be a poor description of actual earnings processes. The coefficient on the intercept (between 45.49 and 156.46) suggests the possibility of correlated omitted variables in the price-levels specification [see appendices, table 2].

(1995) model as earnings for the period *t*
enters the model twice (Lo & Lys, 1999). Further, Ohlson's model include an additional variable
('other information') not captured in book value of equity or (abnormal) earnings. However, entering
balance sheet variables at time *t-1* does not change the results reported in this paper.

[17] All regressions are run on pooled data as the number of observations per year is small (30 or less). The results based on separate regressions for each year - not reported – confirm that goodwill is positively associated with stock prices; however, the coefficient varies significantly from year to year. The coefficient on GW has the expected sign for all years expect 1990. The results for this year may be ascribed to a leverage point. After deletion of this one observation the goodwill coefficient becomes positive.

[18] In similar studies that examine the value relevance of other intangibles, earnings before extraordinary items is typically used as the earnings variable.

[19] A random walk model may be expressed as $X_t = X_{t-1} + \mu_t$, where X is earnings and μ is noise.

5.1.1. Econometric checks

The findings suggest that goodwill is significantly understated as the coefficient on goodwill for all specifications reported in table 2 is significantly greater than 1.0[20]. In order to test the robustness of the findings a variety of sensitivity checks were carried out.

Table 1 indicates a strong relationship between assets less goodwill (ALGW) and total liabilities (LIAB) with a correlation coefficient of 0.98. In order to reduce the problem of multicollinearity in the regression model equation 1 is reestimated in a) a net form where assets less goodwill and total liabilities are combined to form one independent variable, net assets, and b) by excluding either ALGW or LIAB as an independent variable. Table 3 provides the results for these specifications. The coefficient on goodwill (between 1.94 and 3.17) is still significant, and the results are consistent with the presumption that investors perceive goodwill as an asset [see appendices, table 3].

As pointed out in a number of recent papers (e.g., Laureen, Bartov, Fairfield, Hirst, Iannaconi, Mallett et al., 2002) a major issue in price-levels regressions is the exclusion of potential correlated omitted variables. Ohlson's (1995) model includes additional variable, 'other information'. Yet, no such variable appears in the regression models that are applied in the majority of value relevance studies. Since share prices are obviously based on other information than earnings and balance sheet numbers, price-levels specifications may suffer from a correlated omitted variable(s) problem.

Since firms that are acquisitive are most likely growing there is a possibility that goodwill produced from these acquisitions is a proxy for a correlated omitted variable most likely growth options (McCarthy & Schneider, 1995). To examine this possibility different proxies for growth are added to the model. Table 4 present the results with either three-year average growth in sales or assets as an additional independent variable. The goodwill coefficient remains significant in both cases, and the other coefficients remain fairly constant and statistical significant. The coefficient on the growth proxy (average growth in sales or total assets) is insignificant, suggesting that growth does not affect the results, at least for growth proxies as defined in this setting[21] [see appendices, table 4].

Scale is a serious problem in price-levels regressions. In order to alleviate scale effects, deflation by either book value of equity or sales is often suggested. According to recent research (e.g., Deng & Lev, 1998) a model focusing on the market-to-book ratio is better specified and more economically meaningful than the levels regression.[22] Even after deflating by sales as suggested by Barth & Clinch (1999) and removing two highly influential points[23], the results still confirmed that goodwill is valued as an asset. Barth & Clinch (1999) further suggested mitigating the effects of scale by including sales or number of shares as an additional independent variable in the undeflated model. The coefficient on goodwill for these regressions – not reported - is still significantly greater than one, and (as expected) larger than in models that are expressed on a per share basis (deflated).

The specification (1) assumes linearity in the parameters. It has been questioned if this is a valid description of the data (e.g., Lo & Lys, 1999). Burgstahler & Dichev (1997) employ a model, which intends to control for non-linearity. Piece-wise regressions provide a test of the predicted convex shape by allowing the slope and the intercept of the regression line to vary with the magnitude of return on equity. In line with their work the sample is divided into three groups of equal size with the 'high' group containing the one third of the sample with the highest return on equity, the 'low' group containing the one third of the sample with the lowest return on equity, and the 'middle' group containing the final one third of the observations. Applying their model does not change the major finding that goodwill is perceived as an asset.

A total of five cross sectional factors that may have an impact on the results have been identified.[24] These factors, industry membership, size, risk, permanence of earnings and growth, are often considered in carrying out cross-sectional analysis (see for example Joos, 1997). These five common cross-sectional factors are also controlled for (but not reported). The overall findings are also robust after controlling for these factors. Chauvin & Hirschey (1994) find that goodwill reported by manufacturing companies is not value relevant. This study finds that goodwill is still perceived as value relevant across industries, and there is no significant difference

[20] Though not reported the null hypothesis H_0 that GW = 1.0 has been tested and rejected, that is, goodwill is significantly greater than 1.0.

[21] Untabulated findings from using change in market value as a proxy for growth are consistent with the results presented. Market to book measures have been shown to be consistently correlated with subsequently realized growth. (e.g., Sanjay, 1999). The M/B-ratio is used in this paper as a control for scale effects.

[22] Barth, Beaver, & Landsman (2000) note that deflation by (lagged) equity market value transforms the model from a price-levels to a returns specification, which results in transforming the research question.

[23] The goodwill coefficient was highly significant even without removing the influential points. However, the coefficient (approx. 30) was clearly affected by extreme observations in the Y-space (dependent variable),

[24] As pointed out by (Barth et al., 2000) cross sectional analysis is a way to consider non-linearity in Ohlson's (1995) model.

between the coefficients on goodwill between groups even though the coefficient on goodwill on non-manufacturing (service industries etc.) is somewhat higher than on manufacturing. This may be explained by the fact that service industries to a large extent are dependent upon intangible assets but do not recognize these resources.

In summary, the results from all these sensitivity checks – not reported[25] – are robust across a number of different specifications including (potential) misspecification of the model and various econometric checks. Further, the findings indicate that the coefficient on goodwill (GW) is significantly above 1.0, indicating that the book value of goodwill is understated compared to its 'true' value. For the other variables included, the sign is as predicted and all coefficients are statistically significant.

In interpreting the results, caution should be taken since all regressions are based on pooled data due to the small sample. Based on year-by-year regressions the coefficients on goodwill (and the additional variables) fluctuated significantly within the sample period - just as expected a priori. However, the results from model (1) run by year supported that goodwill is perceived as an asset that contributes to the market value of a firm. In addition, the results may be driven by measurement errors in goodwill since goodwill is a residual, that is, the amount of goodwill initial recognized depends on how the acquires assets (except goodwill) and liabilities are valued (measured). Acquired intangible assets that are not recognized in a business combinations, for instance due to measurement problems, accentuates the measurement issues attached to goodwill.

5.2. The value relevance of goodwill amortization

The coefficient on reported capitalized goodwill (2.24) in table 2[26] suggests that companies on average amortize goodwill too quickly. In order to examine this, adjusted income statements and balance sheets have been constructed for each firm-year in the sample, as if all sample firms recognize goodwill as an asset subject to uniform amortization schemes with amortization periods ranging from 5 – 20 years or alternatively assuming that goodwill is left unamortized in the balance sheet.

If goodwill numbers are adjusted to reflect a uniform amortization period of, say, 10 years, book value of goodwill at time *t* ($GW10_t$) is calculated as follows:

$GW10_t = 0.9GWE_t + 0.8GWE_{t-1} + \ldots\ldots. + 0.2GWE_{t-7} + 0.1GWE_{t-8}$.

where GWE_t = purchased goodwill in year *t*

The amortization expense, consequently, is calculated as follows:

$GWA_t = 0.1GWE_t + 0.1GWE_{t-1} + \ldots.. 0.1GWE_{t-8} + 0.1GWE_{t-9}$

where, GWA_t = goodwill amortization expenses for year *t*.

Similarly formulas apply to calculating capitalized goodwill and yearly amortization for amortization periods of any length of time.[27] The results from amortizing all purchased goodwill over various periods are provided in Table 5 [see appendices, table 5].

The coefficients on earnings before extraordinary items (EBX), non-goodwill assets (ALGW), goodwill (GW) and liabilities (including provisions) (LIAB) are all statistically significant at the 0.01 level and with the expected signs for all specifications. The number of observations (307) is constant for these specifications making the results comparable to the results obtained from the regression with reported goodwill assets (Table 2).

With goodwill amortized over 5 years the coefficient on goodwill (2.23) is almost identical to the one on reported goodwill (2.24), indicating that on average companies amortize goodwill over approximately 5 years. This seems intuitively correct, as the Danish Financial Statements Act, before it was revised in 2001, required capitalized goodwill to be amortized over its useful life not to exceed 5 years.[28] As the amortization period is extended, the coefficient on goodwill decreases, while adjusted R^2 increases slightly. With no amortization the coefficient on goodwill is 1.10 with an adjusted R^2 of approximately 0.76. These results indicate that investors value goodwill as a non wasting resource or at least as an asset with a substantial economic life time.

5.2.1. The economic lifetime of goodwill

This paper examines the value relevance of goodwill in a period (1984 – 1997) where goodwill had to be amortized over a period not to exceed 5 years. As goodwill in the US prior to SFAS No. 142 was amortized over a maximum of 40 years, the coefficient on goodwill is expected to be somewhat higher in a Danish setting, and this seems to be the case. For instance, Wang (1993) found the average

[25] All results are available upon request.

[26] In the following tests earnings before extraordinary items (EBX) is used as the earnings proxy, as is the case in extant literature examining the value relevance of intangible assets.

[27] Periods of time (number of years) applied in this paper are: 5, 10, and 20. An amortization period of 5 years is common practice in Denmark (prior to 2001), where as internationally an amortization period of up to 20 years is normal practice (e.g., the UK, IASB).

[28] However, if the economic life time of goodwill is in excess of 5 years the amortization period might be extended. In that case the firm must supply additional disclosure.

coefficient on goodwill reported by US companies for the period 1988 – 1989 to be 1.61. Wilkins et al. (1998) examined the period 1988 – 1996 and found the coefficient on goodwill to be 0.75 or less for all years. McCarthy & Schneider (1995) covering the period 1988 – 1992 reported average goodwill coefficients ranging from 0.88 to 2.68. Finally, Jennings et al. reported an average coefficient on goodwill reported by US companies for the period 82 – 88 of 3.11. However, the coefficient on goodwill for the fixed effects regression was considerable lower at 0.68. Even though the samples from the US are not directly comparable to the sample examined in this paper (due to samples covering different time periods and different industries), a conservative interpretation of the findings suggests that since the coefficient on goodwill for the Danish sample is substantial higher than for the US samples, Danish accounting legislation apparently requires goodwill to be amortized over too short a period.

Huijgen (1996) examined the value relevance of goodwill in a Dutch setting. Danish and Dutch accounting legislation are based on EU directives and the accounting treatment for goodwill is comparable for the two countries. Interestingly, Huijgen (1996) found the average coefficient on goodwill to be 1.69 (1.29) for goodwill uniformly amortized over a period of 10 (20) years. As evidenced from table 5 the results from the Danish stock market are strikingly similar with a coefficient on goodwill for an amortization period of 10 (20) years of 1.70 (1.38).

Further, an *F*-test for the difference between the coefficient on goodwill and non-goodwill assets are carried out. The results – not tabulated – confirm that goodwill on average is significantly understated compared to other assets. As an additional test non goodwill assets have been separated into property, plants and equipment (PPE) and other assets. An *F*-test for the difference between the coefficient on goodwill and PPE prove that goodwill on average is significantly understated compared too PPE.

5.3. Further evidence of the value relevance of goodwill amortization

Table 6 reports the value relevance of goodwill amortization from utilizing regression model (Eq. 2). Earnings before extraordinary items have been decomposed into earnings before extraordinary items and goodwill amortization (EBXG) and goodwill amortization (GWA). The predicted sign on earnings before extraordinary items and book value of equity is positive, whereas the predicted sign on GWA is negative, assuming that investors perceive amortization of the goodwill asset as an expense. Based on reported accounting numbers the coefficient on EBXG (2.72) is significant at any conventional level. The coefficient on goodwill (GW) is 2.26 and highly significant. The coefficient on GWA (-2.93) has the predicted sign indicating that goodwill amortization as reported is perceived as an expense.[29]

The table also provides the results assuming that goodwill amortization has been calculated *as if* all companies reporting goodwill had amortized purchased goodwill uniformly over a period ranging from 5 to 20 years. The results confirm that EBXG and BVE have the predicted signs and are in all cases significantly greater than zero. However, the coefficient on GWA is statistically insignificant for all amortization periods and has an unexpected sign if amortized over 10 years. The overall fit (*F*-statistics and adjusted R^2) indicated that the regression models on average explain approximately 75% of the distribution of share prices. [see appendices, table 6].

As in Jennings et al. (2001) further evidence as to whether goodwill amortization contains value-relevant information, in addition to earnings before extraordinary items and goodwill amortization, the following cross-sectional regression is estimated:

$$P_{it} = \alpha_0 + \alpha_1 EBXG_{it} + \alpha_2 GWA_{it} + \mu_{it}$$

EBXG and *GWA* are defined as previously.

The idea behind the regression is that a stock may be priced as a multiple of earnings (price-earnings). If goodwill amortization is priced by investors as an expense, the valuation multiple on goodwill amortization should be negative, i.e., the coefficient on GWA should be negative. The results from running the regression – not tabulated - are comparable to the findings from Jennings et al. The coefficient on EBX is positive and statistical significant at any conventional level, while the coefficient on GWA has an unexpected sign.[30]

Overall the evidence on the value relevance of goodwill amortization is inconsistent. The results are comparable to previous research that has shown similar mixed findings. For instance, Huijgen (1996: 102) found that goodwill amortization has an unexpected sign consistently.[31] Likewise, empirical research suggest that in the relation between accounting earnings and share values, goodwill amortization is a source of noise rather than a source of useful information (Jennings et al., 2001) or at least that it is unclear whether goodwill amortization expenses are associated with stock returns. Alternatively, goodwill may not be viewed as an amortizable asset by investors.

A host of explanations may contribute to the

[29] The coefficient, however, is relative sensitive to influential observations for the criterion (dependent) variable.

[30] Amortizing goodwill uniformly over 5 – 20 years provide similar results. Goodwill amortization has consistently an unexpected.

[31] Huijgen (1996) applied returns-earnings regressions only, to examine if goodwill amortization was perceived as an expense.

lack of value relevance for goodwill amortization. One possible explanation for the findings is that goodwill expenses may have two incompatible effects. Investors may regard goodwill amortization as an expense since goodwill cannot be maintained forever since competition tends to force earnings down to a normal level. However, goodwill expenses may also be regarded as investments that generate future cash-inflows, while the value of these investments (assets) does not decline.

If goodwill amortization is of less importance to investors than other components of net income, any association is difficult to observe due to experimental 'noise' in the research design (Clinch, 1995). For instance, the large Danish brewery, Carlsberg, reports earnings after tax but *before* goodwill amortization. This indicates that Carlsberg does not perceive goodwill amortization as part of operating income.

Analysts may also disregard goodwill amortization. For example, First Call Corporation[32] reports earnings per share (EPS) before goodwill amortization for Internet Stocks that have poor EPS due to goodwill amortization (Moehrle et al., 2001: p. 244). Reporting earnings figures as earnings before interest, taxes, depreciation and amortization (EBITDA) has become widespread. Danish newspapers (e.g., Børsen[33]) routinely reports EBITDA in their financial sections.

A potential problem in the research design is that only the straight-line method of amortization is considered. As noted by Brown (1995: 17), the accounting research literature contains little guidance on which amortization period best reflects the amount and timing of expected future benefits.

Finally, the research design may be inappropriate. Price-levels regressions are known to suffer from a number of potential econometric problems. Also as indicated, the results regarding the value-relevance of goodwill amortization are sensitive to influential points.

Goodwill amortization or impairment tests

The results from this and other similar studies indicate that goodwill amortization is not a good indicator of the change of value of the underlying goodwill asset. To explore if goodwill amortization provide any value relevant information Jennings et al. (2001) and Moehrle, Moehrle, & Wallace (2001) examine if earnings before extraordinary items and goodwill amortization is relative more value relevant that earnings before extraordinary items. Jennings et al. find that earnings before goodwill amortization explains significantly more of share prices than earnings after goodwill amortization, while Moehrle et al. (2001) find that the two earnings measures do not differ significantly. In this paper the relative information content of the two earnings measures are examined by estimating the following pooled regressions:

$$P_{it} = \alpha_0 + \alpha_1 EBXG_{it} + \alpha_2 BVE_{it} + \varepsilon_{it}$$

and

$$P_{it} = \beta_0 + \beta_1 EBX_{it} + \beta_2 BVE_{it} + \upsilon_{it}$$

where P is company i's closing stock price four months after financial year end. BVE is book value of equity per share at financial year end. $EBXG$ is earnings per share before extraordinary items and goodwill amortization, and EBX is earnings per share before extraordinary items for period t. To assess whether one of these alternative earnings measures are relative more value relevant the difference between the adjusted R^2 for the two models are compared and a Z-statistic based on Vuong's likelihood ratio test for equivalence of explanatory power in nonnested models have been calculated. [see appendices, table 7].

Based on the results provided in table 7 it cannot be rejected that the two earnings measures are equally informative. Considering the evidence on the value relevance of goodwill amortization it seems appropriate to include an earnings measurement that excludes goodwill amortization. Though no direct evidence is provided the mixed findings may suggest that impairment testing is a feasible alternative to goodwill amortization.

Summary and conclusion

Based on the work pioneered by Ohlson (1995) this paper examined the value relevance of goodwill and goodwill amortization building on prior empirical work. A number of tests have been carried out in order to examine the robustness of the findings.

The results strongly confirm that goodwill is perceived as an asset. Based on the analyses there seems to be ample evidence in support of the new Danish Financial Statements Act that requires capitalization of goodwill. While goodwill should be recognized as an asset initially it remains unclear how to measure goodwill in subsequent periods. Goodwill represents a firm's superior earnings power. In the long run competition should ensure that superprofit will dissipate, requiring goodwill to be amortized. Since earnings before extraordinary items and goodwill amortization and earnings before extraordinary items but including goodwill amortization are equally informative, goodwill amortization should be separately disclosed. However, the value relevance tests also provided some evidence that goodwill amortization may not be regarded as an expense. This suggests that

[32] First Call Corporation is an analysts' forecast tracking firm.

[33] Børsen is the Danish counterpart to the Financial Times or the Wall Street Journal.

impairment testing might be a relevant alternative.

There are some caveats, however. First, a small sample with an average of approximately 20 observations per year made it necessary to base the analyses on pooled data. Second, since goodwill is merely a residual measurement errors in all other assets and liabilities affects the reported value of goodwill, and, hence, the coefficient. Likewise, goodwill may proxy for correlated omitted variable(s) including internally generated goodwill and other non-recognized intangible assets. Finally, a number of explanations that are not easily examined may account for the lack of value relevance of goodwill amortization. This includes that straight line amortization is not a good measure of the 'consumption' of goodwill. It might also be questioned if a uniform amortization schedule captures the decline in the value of goodwill in vastly different industries.

If impairment testing provides more useful information to investors and other users of financial statements is ultimately an empirical question. If impairment testing becomes mandatory in the EU, a research project that compares the usefulness of financial statements before and after the implementation seems warrante.

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Appendices

Table 1. Sample description

Panel A: Descriptive statistics for the full sample (*n*=307). Variables deflated by No. of shares

Variable	Minimum	Quartile 25%	Mean	Median	Quartile 75%	Maximum
P	2.00	148.00	374.83	300.00	530.00	2500.00
EBX	-568.00	8.93	30.22	2.73	48.58	226.65
GWA	0.00	0.06	3.30	0.54	2.49	109.17
ALGW	0.00	208.31	726.26	626.20	975.47	8058.16
GW	0.00	0.06	10.70	1.00	7.24	188.96
LIAB	0.00	122.21	479.91	340.67	632.80	6041.66

Panel B: Pearson correlation matrix for the main variables (*n* = 307)

Variable	P	EBX	GWA	ALGW	GW	LIAB
P	1.0000	0.3222	0.1763	0.6674	0.2266	0.5753
EBX	0.3222	1.0000	0.0203	-0.1674	-0.0524	-0.2261
GWA	0.1763	0.0203	1.0000	0.1565	0.2640	0.1534
ALGW	0.6674	-0.1674	0.1565	1.0000	0.0897	0.9812
GW	0.2266	-0.0524	0.2640	0.0897	1.0000	0.1076
LIAB	0.5753	-0.2261	0.1534	0.9812	0.1076	1.0000

Notes:	
P	Stock price
EBX	Earnings before extraordinary items
GWA	Goodwill amortization
ALGW	Non-goodwill assets
GW	Goodwill (capitalized)
LIAB	Liabilities and provisions

Table 2. Value relevance of capitalized goodwill - different income proxies

$$Model: P_{it} = \alpha_0 + \alpha_1 E_{it} + \alpha_2 ALGW_{it} + \alpha_3 GW_{it} + \alpha_4 LIAB_{it} + \varepsilon_{it}$$

Proxy (Earnings)	*Intercept*	*Earnings*	*ALGW*	*GW*	*LIAB*	*Adj. R^2*
EBX	45.49	2.72	0.85	2.24	-0.82	0.76
(t-stat)	(3.58)	(15.81)	(14.07)	(3.50)	(-9.83)	
E	50.10	2.86	1.01	2.53	-1.01	0.73
(t-stat)	(4.26)	(12.20)	(14.96)	(3.72)	(-11.24)	
ΔE	156.46	1.72	0.93	1.94	-0.98	0.73
(t-stat)	(6.14)	(2.92)	(8.72)	(2.82)	(-7.92)	
CS	71.54	2.48	1.01	2.49	-0.99	0.71
(t-stat)	(6.25)	(14.38)	(14.57)	(3.47)	(-10.78)	

*Notes:*The number of observations in the regression after deletion of outliers with *RStudent* > |3.0| is 307. All variables are on a per share basis. *EBX:* Earnings before extraordinary items for company *i* for period *t; E*: Earnings after tax*; ΔE:* Change in earnings after tax; *CS:* Clean surplus earnings; *ALGW:* Assets less goodwill*; GW:* Goodwill*; LIAB:* Liabilities. *t*-statistics in parentheses based on White's (1980) procedure.

Table 3. Test for multicollinearity

Panel A: Value relevance of reported goodwill - netting assets less goodwill and liabilities

$$Model: P_{it} = \alpha_0 + \alpha_1 EBX_{it} + \alpha_2 GW_{it} + \alpha_3 BVELG_{it} + \mu_t$$

Variable	*Intercept*		*EBX*		*GW*		*BVELG*		*Adj. R^2*	
	282.86		2.00		3.17		0.00		0.18	
	(6.92)		(1.69)		(2.14)		(-1.57)			

Panel B: Value relevance of goodwill - leaving out assets less goodwill (non goodwill assets)½

$$Model: P_{it} = \alpha_0 + \alpha_1 EBX_{it} + \alpha_2 GW_{it} + \alpha_3 LIAB_{it} + \mu_t$$

Variable	*Intercept*		*EBX*		*GW*		*LIAB*		*Adj. R2*	
Coefficient	125.66		2.75		2.00		0.30		0.55	
(t-stat)	(5.96)		(5.15)		(2.14)		(6.64)			

Panel C: Value relevance of goodwill - leaving out liabilities

$$Model: P_{it} = \alpha_0 + \alpha_1 EBX_{it} + \alpha_2 ALGW_{it} + \alpha_3 GW_{it} + \mu_t$$

Variable	*Intercept*		*EBX*		*ALGW*		*GW*		*Adj. R^2*	
Coefficient	85.22		2.82		0.25		1.94		0.65	
(t-stat)	(5.22)		(8.39)		(10.56)		(2.46)			

Notes:
The number of observations in the regression after deletion of outliers with *RStudent* > |3.0| is 307. All variables on a per share basis. *EBX:* Earnings before extraordinary items for company *i* for period *t; ALGW*: Assets less goodwill; *GW:* Goodwill; *BVELG:* Book value of equity less goodwill. *t*-statistics based on White's (1980) procedure.

Table 4. Value relevance of goodwill - growth included to control for correlated omitted variable problem

$$Model: P_{it} = \alpha_0 + \alpha_1 EBX_{it} + \alpha_2 ALGW_{it} + \alpha_3 GW_{it} + \alpha_4 LIAB_{it} + \alpha_5 g_{it} + \mu_{it}$$

Proxy (g)	*Intercept*	*EBX*	*ALGW*	*GW*	*LIAB*	*g*	*Adj. R^2*	*N*
Sales	43.49	2.51	0.81	2.43	-0.76	23.38	0.75	265
(t-stat)	(2.94)	(12.54)	(12.77)	(3.33)	(-8.90)	(1.45)		
Assets	47.80	2.57	0.82	2.21	-0.78	-0.24	0.75	273
(t-stat)	(3.36)	(13.66)	(13.34)	(3.42)	(-9.20)	(-1.06)		

Notes:
N is the number of observations in the regression after deletion of outliers with *RStudent* > |3.0| .All variables are on a per share basis
EBX: Earnings before extraordinary items for company *i* for period *t; ALGW:* Assets less goodwill*; GW:* Goodwill*; LIAB:* Liabilities; *g*: Growth proxy, i.e. average total assets or average sales.
t-statistics in parentheses based on White's (1980) procedure.

Table 5. Value relevance of purchased goodwill all purchased goodwill capitalized – different amortization periods

$$Model: P_{it} = \alpha_0 + \alpha_1 EBX5_{it} + \alpha_2 ALGW_{it} + \alpha_3 GW5_{it} + \alpha_4 LIAB_{it} + \mu_{it}$$

Amortization period	*Intercept*	*EBX*	*ALGW*	*GW*	*LIAB*	*Adj. R^2*
5 years	54.41	2.56	0.83	2.23	-0.79	0.73
(t-stat)	(3.48)	(13.56)	(13.46)	(3.88)	(-9.49)	
10 years	50.63	2.58	0.81	1.70	-0.78	0.75
(t-stat)	(3.77)	(13.86)	(13.77)	(5.26)	(-9.92)	
20 years	47.66	2.58	0.81	1.38	-0.78	0.76
(t-stat)	(3.70)	(13.96)	(13.95)	(5.27)	(-10.08)	
No amortization	45.96	2.58	0.80	1.10	-0.78	0.76
(t-stat)	(3.67)	(13.89)	(14.11)	(5.06)	(-10.18)	

Notes:
The number of observations in the regression after deletion of outliers with *RStudent* > |3.0| is 307. All variables on a per share basis.
EBX: Adjusted earnings before extraordinary items for company *i* for period *t; ALGW:* Assets less goodwill*; GW:* Adjusted goodwill*; LIAB:* Liabilities.
t-statistics based on White's (1980) procedure.

Table 6. Value relevance of goodwill amortization - different amortization periods

$$Model: P_{it} = \alpha_0 + \alpha_1 EBXG_{it} + \alpha_2 GWA_{it} + \alpha_3 ALGW_{it} + \alpha_4 GW(X)_{it} + \alpha_5 LIAB_{it} + \mu_{it}$$

Amortization period (goodwill)	*Intercept*	*EBXG*	*GWA*	*ALGW*	*GW(X)*	*LIAB*	*Adj. R^2*
Reported	48.57	2.72	-2.93	0.85	2.26	-0.82	0.76
(t-stat)	(3.26)	(16.63)	(-3.15)	(16.26)	(6.66)	-11.65	
GW amortized over X = 5 years	52.37	2.57	-0.28	0.82	1.54	-0.77	0.73
(t-stat)	(3.57)	(15.49)	(-0.18)	(14.78)	(2.54)	(-10.54)	
GW amortized over X = 10 years	48.38	2.57	0.34	0.81	1.35	-0.77	0.75
(t-stat)	(3.38)	(15.92)	(0.11)	(15.05)	(3.10)	(-10.87)	
GW amortized over X = 20 years	47.48	2.58	-1.92	0.80	1.34	-0.78	0.75
(t-stat)	(3.36)	(16.06)	(-0.29)	(15.16)	(3.49)	(-11.02)	
No amortization of GW	45.96	2.58	-	0.80	1.10	-0.78	0.76
(t-stat)	(3.31)	(16.34)	-	(15.31)	(6.86)	(-11.15)	

Notes:
The number of observations in the regression after deletion of outliers with *RStudent* > |3.0| is 307. All variables are reported on a per share basis.
EBXG: Earnings before extraordinary items and goodwill amortization for company *i* for period *t; GWA:* Goodwill amortization; *ALGW:* Assets less goodwill*;*
GW(X): Adjusted goodwill assuming a uniform amortization period of X years*; LIAB:* Liabilities.
t-statistics based on White's (1980) procedure.

Table 7. Comparison of the value relevance of earnings measures with and without goodwill amortization

$$P_{it} = \alpha_0 + \alpha_1 EBXG_{it} + \alpha_2 BVE_{it} + \varepsilon_{it} \text{ vs. } P_{it} = \beta_0 + \beta_1 EBX_{it} + \beta_2 BVE_{it} + \upsilon_{it}$$

Amortization period (goodwill)	*Intercept*	*EBXG / EBX*	*BVE*	*Adj. R^2*	Difference in R^2	Z score
*Earnings **before** extraordinary items and goodwill amortization (EBXG)*	56.20	2.54	0.93	0.7403		
(t-stat)	(3.94)	(15.71)	(27.03)		0.0014	< 1.0
*Earnings **after** extraordinary items and goodwill amortization (EBX)*	57.42	2.62	0.95	0.7417		
(t-stat)	(4.05)	(15.81)	(27.53)			

Notes:
The number of observations in the regression after deletion of outliers with *RStudent* > |3.0| is 307. All variables are reported on a per share basis.
EBXG (EBX): Earnings before extraordinary items and goodwill amortization (earnings before extraordinary items) for company *i* for period *t*; *BVE:* Book value of equity. *t*-statistics based on White's (1980) procedure.