Acquisitions and the value versus growth phenomenon

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Purpose: To investigate whether investors value the future growth from acquisitions and the subsequent realisations thereof accurately.

Design/methodology/approach: The paper calculates conventional and adjusted market-to-book ratios and investigates abnormal cumulative returns over 20 quarters after portfolio formation for a sample of S&P 500 firms using a hedge portfolio and regression approach.

Findings: Hedge portfolios formed using adjusted market-to-book ratios underperform conventional hedge portfolios over a five year period. Dividing the hedge into its comprising elements reveals that the underperformance of the adjusted hedge is mainly caused by weaker returns from value firms.

Research limitations/implications: Findings are specific to large firms in a specific setting and future research is needed to determine if findings are equally applicable to other situations. Findings imply that investors underrate the growth from new acquisitions and overrate the extent to which this has materialised.

Practical implications: The study highlights that the extrapolation of future growth rates should be carefully considered in any equity valuation of a firm with current or past acquisitions.

Originality/value: This study shows that inaccurate valuation of the growth of new acquisitions and the realisation thereof is at least partially responsible for the value versus growth phenomenon. It shows that the accounting information could be improved and highlights the importance of extrapolating past growth rates with care.

Keywords: Value; growth; hedge; goodwill; value-relevance

Article Classification: Research paper

1. Introduction

Cross-sectional differences between stocks offer the elusive opportunity to earn market-beating ("abnormal") returns. Consequently, a vast body of research attempts to find persistent cross-sectional differences. Ever since Fama and French (1992) found that value firms outperform growth firms, the "value versus growth phenomenon" has been a major research focus area. Today, the consensus opinion is that value stocks consistently outperform growth stocks, but the debate about the underlying causes is still ongoing (Chan & Lakonishok, 2004).

Some researchers use rational asset pricing theories to explain the value versus growth phenomenon. Fama and French (1992, 1993) contend that higher returns of value stocks compensate for higher inherent risk. Asness *et al.* (2013) argue that consistent return premiums for value and momentum strategies across markets and asset classes imply the presence of common risk factors for which the excess returns of both strategies compensate. In contrast, other researchers attribute the value versus growth phenomenon to investors' irrational growth expectations. Lakonishok *et al.* (1994) conclude that a value strategy is not fundamentally riskier than a growth strategy. Skinner and Sloan (2002) reveal that a powerful explanation of the value versus growth phenomenon is the disproportionately negative reaction of growth firms to disappointing earnings announcements. They conclude that their findings are due to overoptimistic earnings expectations of investors. This paper extends some of the elements in Skinner and Sloan (2002) by investigating a potential cause of such overoptimistic earnings expectations, namely recognised goodwill.

In theoretical valuation models, earnings expectations are represented by the required rate of return. This paper uses the residual income model (Ohlson, 1995) to illustrate that equity investors apply a required rate of return to both book value of equity and earnings to determine the market value of a firm [1]. Recognised goodwill is a component of book value

of equity and investors therefore apply the required rate of return to this asset. However, recognised goodwill complicates the valuation.

Firstly, goodwill is initially recognised as management's assessment of the future growth prospects of the acquiree. However, it is the other assets and liabilities of the acquiree which will generate this future growth. Therefore the required rate of return in an accurate valuation is applied to book value of equity excluding goodwill [2]. The second complication is that recognised goodwill is never derecognised in terms of accounting standards when future growth prospects that goodwill represents, materialise in the form of other assets. Therefore, an accurate valuation will ignore goodwill to avoid double-counting of assets. However, precisely because goodwill is not derecognised, investors cannot determine to which extent the future growth prospects of the acquisition have realised. This complicates the determination of an appropriate expected rate of return. Consequently, both newly recognised goodwill and older goodwill complicates the valuation process.

As value and growth firms are most frequently defined using market-to-book ratios (Skinner & Sloan, 2002:294; Chan & Lakonishok, 2004:71) the valuation complication that recognised goodwill represents, is incorporated into these definitions. Therefore, it is possible that a value minus growth hedge earns abnormal returns because investors struggle to value the growth prospects of new acquisition accurately and do not have adequate information to evaluate the extent to which this growth has materialised in subsequent years. As both the initial growth prospects of new acquisitions and the subsequent materialisation thereof correlate with the carrying amount of recognised goodwill, the research question is operationalised by investigating whether investors value recognised goodwill accurately.

This study uses the returns from a sample of S&P 500 firms from 31 December 2002 to 31 December 2013 and follows prior research (Fama & French, 1992; Lakonishok *et al.*, 1994; Skinner & Sloan, 2002) in defining value (growth) stocks as stocks with low (high)

market-to-book ratios. Following Skinner and Sloan (2002), stocks are allocated to hedge portfolios based on quintiles of market-to-book ratios on the date of portfolio formation. To determine whether investors price recognised goodwill accurately, this study uses the methodology of Veith and Werner (2014) to compare hedge returns of the conventional hedge to those of a hedge where recognised goodwill has been excluded from the market-to-book ratio calculation [3]. This methodology reveals not only whether goodwill is priced by investors (its "value-relevance") but also the degree of accuracy with which it is priced.

Results show that cumulative returns for hedge portfolios based on adjusted market-to-book ratios underperform conventional hedge portfolios over a five year period. As the hedge returns differ, adjusting market-to-book ratios for goodwill does not have a random effect on hedge returns. It therefore implies that future growth prospects of new acquisitions and the subsequent realisation thereof (for which recognised goodwill is a proxy) are priced by investors. However, the lower abnormal returns of the adjusted hedge mean that this pricing is inaccurate and that investors underrate (overrate) firms with (without) recognised goodwill. In other words, investors appear to underestimate the growth from new acquisitions and overestimate the degree to which this has already materialised.

In addition, the underperformance of the adjusted hedge must be due to lower returns for one (or both) of its comprising elements. Further investigations reveal that the underperformance of the adjusted hedge is mainly caused by weaker returns from firms classified as value firms under the adjusted definition. More specifically, it appears that investors overrate (underrate) firms who finance future growth with liabilities (cash or equity). In addition, a statistical analysis concludes that the comparatively weaker returns are not due to a reduction of risk. The overall conclusion of the study is therefore that investors extrapolate past growth rates into the future and are therefore frequently caught unawares by changes in earnings growth rates.

This study contributes to the value versus growth debate by revealing that a substantial portion of the phenomenon arises because investors do not value the growth prospects of new acquisitions and the subsequent materialisation thereof accurately. It lends support to the argument that irrational investor expectations are at least partially responsible for the outperformance of value stocks over growth stocks, given that there is no glaring increase in risk between sample firms of the two hedges. This suggests that further research is required on whether investor expectations could be improved by additional information. As this information could be accounting information, this study also contributes to the literature about the accounting treatment of goodwill. Lastly, the study highlights that the extrapolation of growth rates into the future is an important research area.

The findings of this study will be of interest to those who prepare valuations of firms with current or past acquisitions and those practitioners and researchers interested in the causes of the value versus growth phenomenon. Findings will also be of interest to those involved in financial reporting, as they reveal that the accounting for and disclosure of goodwill, and the expected or realised growth prospects that it represents, could be improved.

The next section of the paper considers prior research findings in greater detail. In the sections that follow, the research design, sample and descriptive statistics are discussed. Thereafter detailed findings are set out and the paper is summarised and concluded.

2. Prior research

2.1.General findings on the value versus growth phenomenon

A seminal paper by Fama and French (1992) shows that stocks with low market-to-book ratios (value stocks) earn higher returns than those with high market-to-book ratios (growth stocks). While the existence of this phenomenon is now generally accepted, probable causes of the value versus growth phenomenon are still being investigated extensively (Chan &

Lakonishok, 2004). In this respect, both rational and irrational investor expectations have been advanced as potential explanations. For instance, Fama and French (1992, 1993) suggested that the phenomenon represents a rational compensation for higher risk in value stocks. Similarly, Fama and French (2007) show that a substantial portion of the value-versus-growth phenomenon is due to the migration of stocks between the top and bottom 30 per cent of market-to-book ratios and suggest that investors rationally expect this migration to take place. More recently, Asness *et al.* (2013) find that both value and momentum strategies produce abnormal returns across markets and asset classes and content that this is evidence of risk factors which all markets and asset classes share.

By contrast, Lakonishok *et al.* (1994) argue that growth stocks earn lower returns due to investors overestimating future growth rates of these stocks and that a value strategy is not fundamentally riskier. Chan *et al.* (2003) show that the earnings growth persistence for value firms is no worse than that of growth firms which supports the view that investors do not estimate future growth rates accurately. Skinner and Sloan (2002) add to these findings by showing that growth stocks react disproportionately to negative earnings surprises, suggesting that investors' overoptimistic expectations are corrected by subsequent earnings announcements. Moreover, once the asymmetric response has been controlled for, they find no remaining evidence of the value versus growth phenomenon. This paper extends some of the elements in Skinner and Sloan (2002) and investigates another potential cause of overoptimistic earnings expectations, namely recognised goodwill.

2.2.Recognised goodwill and valuation

The residual income model relates market value of equity to book value of equity and a measure of abnormal earnings (Ohlson, 1995):

$$M_t = BVE_t + \sum_{\tau=1}^{\infty} R^{-\tau} E_t[\chi^a_{t+\tau}] \quad \textbf{(1)}$$

where M_t is the market value of equity; BVE_t is the book value of equity; χ^a is abnormal earnings, calculated as net income in excess of the opening book value times the discount rate; R is the discount rate (i.e. the required rate of return); and $E_t[.]$ is the expected value operator at time *t*.

The key element from the residual income model is that the required rate of return is applied to the book value of equity to determine the market value of equity. This is consistent with other researchers who show that the dividend discount model applies the required rate of return to both earnings and changes in book value of equity (Fama & French, 2006; Novy-Marx, 2013). As recognised goodwill is a comprising element of the book value of equity, the required rate of return is also applied to this asset. However, recognised goodwill represents a complex valuation problem.

Goodwill arises in business combinations as the difference between (i) the sum of the fair value of the consideration paid and non-controlling interest and (ii) the net fair value of identifiable assets less liabilities of the acquiree (IASB, 2008:32). By implication, goodwill is an asset which is not identifiable and was not recognised by the acquiree. As unrecognised assets represent future growth prospects (Beaver & Ryan, 2005; Easton & Pae, 2004) the firm essentially recognises management's assessment of the future growth prospects of the acquiree. This represents the first aspect of the valuation problem, as it is the other assets and liabilities of the acquiree which will generate the future growth. Therefore, the required rate of return in an accurate valuation is applied to book value of equity excluding goodwill. The second complication is that recognised goodwill is never derecognised in terms of accounting standards, unless the acquiree is sold or impaired (i.e. the growth prospects fail to materialise). If the future growth prospects therefore materialise in the form of other assets,

an accurate valuation will ignore goodwill to avoid double-counting assets. However, precisely because goodwill is not derecognised in this case, investors cannot determine to which extent the future growth prospects of the new acquisition have materialised. This complicates the determination of an appropriate expected rate of return. Consequently, both newly recognised goodwill and older goodwill complicate the valuation process.

As value and growth firms are most frequently defined using market-to-book ratios (Skinner & Sloan, 2002:294; Chan & Lakonishok, 2004:71) the valuation complication that goodwill represents is incorporated into these definitions. Therefore, it is possible that a value minus growth hedge earns abnormal returns because investors struggle to value the growth prospects of new acquisition accurately and do not have adequate information to evaluate the extent to which this growth has materialised in subsequent years. As both the initial growth prospects of new acquisitions and the subsequent materialisation thereof correlate with the carrying amount of recognised goodwill, the research question is operationalised by investigating whether investors value recognised goodwill accurately.

2.3.Recognised goodwill as an assessment of future growth

On the one side of the valuation problem that recognised goodwill represents, management has a considerable advantage over investors in predicting future growth from new acquisitions due to information asymmetry. Even so, prior researchers (Hayn & Hughes, 2006; Li *et al*., 2011) find that management's assessments are frequently overoptimistic. Specifically, these researchers find that larger acquisition premiums, greater use of stock as consideration and higher percentages of purchase consideration allocated to goodwill are all significant predictors of subsequent goodwill impairment. Gu and Lev (2011) refine these results and conclude that it is particularly the greater use of overpriced stock to pay for acquisitions which contributes to subsequent impairment losses.

On the other side of the valuation problem (the degree to which growth prospects have materialised), the requirements of the accounting standards limit research to cases where the growth prospects have failed to materialise (meaning that an impairment loss was recognised). In this respect, Hayn and Hughes (2006) find that recognised impairments of goodwill typically lag the economic impairment thereof by three to four years, but by as much as six to ten years for a third of their sample. This suggests that the overoptimistic assessment of management remains in the financial statements for a considerable period of time. Therefore, although a small number of firms recognise goodwill impairments [14% of the sample in Hayn and Hughes (2006)] economic impairments are likely to be significantly higher, as the absence of a recognised impairment loss does not necessarily mean that no impairment has taken place (Li *et al.*, 2011). Although these findings are not equally applicable to situations where future growth opportunities materialise (management could simply be averse to recognising losses), they do suggest firm insiders find it difficult to identify whether and to what extent growth has materialised. As outsiders, investors are therefore extremely hard placed to consider the subsequent realisation of growth prospects in valuations.

In this respect, Hayn and Hughes (2006) find that highly probable impairments have no significant value-relevance when they occur and conclude that investors predict the occurrence thereof. By contrast, Li *et al*. (2011) find that negative analyst and market reactions to the impairment of goodwill suggest that impairment losses as a whole are not anticipated. Collectively, prior research is therefore unclear on whether investors price the growth expectations of new acquisitions and the subsequent materialisation thereof accurately. As recognised goodwill correlates with both of these occurrences, this paper investigates whether equity investors price recognised goodwill accurately.

3. Research design

Skinner and Sloan (2002) show that the value versus growth phenomenon can be effectively investigated using quintiles of market-to-book ratios. As this paper is an extension of some of the elements in Skinner and Sloan (2002), sample firms are divided into quintiles, based on their market-to-book ratios at the start of a given quarter. Conventional market-to-book ratios and adjusted market-to-book ratios are determined based on the latest annual financial results of a firm and its market capitalisation at the beginning of the quarter. To ensure that the necessary information will be available to investors when forming each portfolio, following Skinner and Sloan (2002), the annual financial results of a firm are only updated if the start of the quarter is at least three months after the annual financial reporting date. Buy and hold returns for each portfolio are hand-calculated for twenty quarters after portfolio formation, as prior research shows that the differential returns of value versus growth firms last for five years after portfolio formation (Lakonishok *et al.*, 1994).

Returns throughout the study are determined with reference to buy and hold returns based on the total return index (RZ) on Datastream. The total return index obtained from the database has been adjusted for the net normal and special dividends paid, stock splits, capital distributions and other significant corporate events by the data provider. Results are reported on the basis of a hand-calculated, equal-weighted hedge, purchasing stocks in the lower quintiles of conventional or adjusted market-to-book ratios (value stocks) and selling short those in the higher quintiles (growth stocks). Abnormal buy-and-hold returns are calculated by deducting the equal weighted return of all sample firms (i.e. the entire portfolio) from the raw returns of the hedge for each corresponding quarter. Following Skinner and Sloan (2002), transaction costs are ignored for the purposes of this paper.

To determine whether investors price goodwill accurately, the methodology of Veith and Werner (2014) is used to compare the returns of a conventional and adjusted hedge. This

methodology firstly reveals whether goodwill is priced by investors (i.e. its "value-relevance"), as the adjusted market-to-book ratio alters the quintile to which sample firms have been assigned. If investors do not price goodwill, the reassignment is a random activity and the hedge returns will be unaffected. In addition, the methodology enables an assessment of the degree of accuracy with which goodwill is priced. As both hedges use the same sample firms, the maximum return from the sample is capped. The method therefore determines whether the conventional or adjusted hedge selects the optimal combination of firms. As the difference between the hedges depends solely on goodwill, this is also the cause of the change in hedge returns. The optimal combination of firms in the hedge represents the best "edge" over other investors, i.e. making better use of the information content of goodwill than others are. Therefore a higher (lower) return from the adjusted hedge would imply that mispricing is greater (lower) for other assets and liabilities than for recognised goodwill. If this difference is significant, so is the mispricing.

4. Sample, data and descriptive statistics

Sample firms comprise firms included in the S&P 500 index on 31 December 2002 and still included in the index on 31 December 2013. This sample specification ensures that sample firms represent large firms throughout the sample period and that results are easily comparable to those of Skinner and Sloan (2002), who also focus on large firms. Importantly, this increases the probability that hedge returns would have been realisable, as the stocks of larger firms have greater liquidity than those of smaller firms. Conversely, the sample selection *decreases* the probability of significant results, as prior research shows that the value versus growth phenomenon is more prevalent for smaller firms (Chan & Lakonishok, 2004; Fama & French, 1992; 2007). As an added benefit, the sample selection therefore mitigates against survivorship bias (survivorship bias normally *increases* the probability of

significant results).

Financial services firms, per the industry classifications of Datastream, are eliminated from the sample. In addition, for 10 remaining firms, data on goodwill is not available on Datastream and they are deleted from the sample. The final sample is therefore 238 unique firms with a resultant 119 000 firm-quarter observations. As portfolios are tracked for twenty quarters subsequent to their formation, the first portfolio is formed on 31 December 2002 and the last portfolio on 31 December 2008. All financial statement and returns data are obtained from Datastream.

[INSERT TABLE 1 ABOUT HERE]

Descriptive statistics for the sample firms are presented in Table 1. Consistent with the sample selection criteria, sample firms are large with a mean (median) market value equity of $21 617 million ($8 054 million) on the first selection date of 31 December 2002 and $43 013 million ($20 685 million) on the second selection date of 31 December 2013. The overwhelming majority of sample firms have recognised goodwill with a mean (median) value of $2 466 million ($853 million) on 31 December 2002 increasing to $5 753 million ($2 268 million) by 31 December 2013. Of greater interest is that the conventional market-to-book ratio has a mean of 3.2 compared to a median of 2.7 on 31 December 2002. Recalculating the market-to-book ratio, by excluding recognised goodwill from the book value of equity, reduces the discrepancy between the mean market-to-book ratio (3.5) and its median (3.4) dramatically. Furthermore, the mean adjusted market-to-book ratio appears to be more stable across time. On 31 December 2013, the mean of conventional market-to-book ratios has increased to 9.3, while the mean of adjusted market-to-book ratios is 5.4 on this date. Adjusted market-to-book ratios are generally higher than conventional market-to-book

ratios. However, removing goodwill from book value increases the number of firms with negative market-to-book ratios dramatically from 4 to 40, resulting in a lower mean ratio under the adjusted definition.

The comparison of the conventional and adjusted market-to-book ratios suggest that adjusting the market-to-book ratio for recognised goodwill flattens the ratio across firms. By implication, the difference between value firms and growth firms is likely to be less extreme when adjusted market-to-book ratios are used. This offers an initial suggestion that some of the returns of the conventional hedge can be attributed to recognised goodwill. The next section details the results of hedge returns, based on conventional and adjusted market-to-book ratios.

5. Detailed findings

This study investigates the pricing of goodwill. Conventional market-to-book ratios and ratios adjusted for goodwill form the basis of a conventional and adjusted hedge portfolio in which value stocks are bought and growth stocks are sold short. Necessarily any differences between the conventional and adjusted hedges must be due to firms migrating between quintiles when conventional and adjusted market-to-book values are calculated.

[INSERT TABLE 2 ABOUT HERE]

Firms are more likely to migrate to the growth category, as removing goodwill reduces the denominator of the market-to-book ratio. However, some firms migrate to the value category, because either they have little goodwill (their category is affected by the movement of other firms) or their goodwill exceeds book value of equity (the market-to-book ratio becomes negative). Table 2 confirms this and shows that a total of 613 firms migrate

into or out of quintile one (growth) over the 25 portfolios, giving a mean migration of 25 firms per portfolio. By contrast, only 554 firms migrate into or out of quintile five (value) over the 25 portfolios, giving a mean migration of 22 firms per portfolio.

[INSERT FIGURE 1 ABOUT HERE]

Detailed findings for the main hedge are displayed in Panel A of Figure 1. This hedge is formed by being long stocks with market-to-book ratios in quintile five at portfolio formation date (value stocks) and short stocks with market-to-book ratios in quintile one (growth stocks). Figure 1 shows that the total cumulative abnormal buy-and-hold return of the conventional hedge is 24.920 per cent over 20 quarters, which compares well with the results of Skinner and Sloan (2002:298). In comparison, the adjusted hedge has a total cumulative abnormal buy-and-hold return of only 20.015 per cent over the same period. Consequently it is clear that removing goodwill from the calculation of market-to-book ratios reduces the returns of the hedge. Following the methodology of Veith and Werner (2014), it is possible to determine that recognised goodwill therefore explains approximately 19.683 per cent of the increased abnormal returns of the conventional hedge.

As the returns of the hedge portfolios differ, it is clear that goodwill is not a random reassignment. In other words, investors price the future growth of new acquisitions and the subsequent materialisation thereof. This agrees with prior research findings (using other research designs) that goodwill is value-relevant (Jennings *et al.*, 1996). However, as the returns of the adjusted hedge are almost 20 per cent lower than those of the conventional hedge, significant mispricing is present. Investors appear to underrate (overrate) expected returns of firms with (without) goodwill. In other words, investors underestimate the growth from new acquisitions and overestimate the degree to which this has already materialised.

As both hedges consists of two elements, namely growth stocks and value stocks, the reduced return of the adjusted hedge must be due to changes in either (or both) of the comprising elements. Therefore, to identify the source of the difference in the hedge returns, the comprising growth and value stocks are analysed separately. Panel B of Figure 1 shows that the definition of value stocks is the main reason for the divergence between the conventional and adjusted hedge. Under the conventional definition, the cumulative abnormal buy-and-hold return for value stocks is 13.311 per cent, compared to 9.257 per cent under the adjusted definition. By contrast, the difference in cumulative abnormal returns between conventional and adjusted growth stocks is a mere 0.250 per cent over the portfolio period.

These results suggest that it is not the general mispricing of recognised goodwill which causes the divergence in returns of the hedge, but rather the mispricing of the recognised goodwill of *value* firms. The descriptive statistics provide further insight into this aspect of results. At 31 December 2013, 40 firms had negative adjusted market-to-book ratios, compared to only 4 under the conventional definition. This means that a high number of value firms under the adjusted definition have significant liabilities. Consequently the weaker returns of the value firms imply that investors overrate (underrate) firms who finance future growth with liabilities (cash or equity).

In order to assess the impact of extreme values on results, abnormal buy-and-hold returns are also calculated for the conventional and adjusted hedges using firms with market-to-book ratios in the second and fourth quintiles. This hedge is formed by being long stocks with market-to-book ratios in the fourth quintile at portfolio formation date (value stocks) and short stocks with market-to-book ratios in the second quintile (growth stocks). Once again, abnormal buy-and-hold returns are tracked for 20 quarters following portfolio formation date. The results are depicted in Panel A of Figure 2, which shows that the adjusted hedge had cumulative abnormal buy-and-hold returns of 19.366 per cent over this period, compared to

the 20.232 per cent of the conventional hedge. In other words, recognised goodwill only explains approximately 4.280 per cent of the abnormal returns of this conventional hedge, suggesting that mispricing of goodwill is less significant for the middle quintiles. It is also interesting that the adjusted portfolio's returns for the Quintile 2 vs Quintile 4 hedge (19.366 per cent) is very similar to that of its return for the Quintile 1 vs Quintile 5 hedge (20.015 per cent). By contrast, the conventional hedge reflects a much larger difference when quintiles two and four are used to form the hedge (20.232 per cent), as opposed to quintiles one and five (24.920 per cent).

[INSERT FIGURE 2 ABOUT HERE]

In addition, Panel B of Figure 2 shows that, when the hedge is formed using quintiles two and four, the difference in cumulative abnormal buy-and-hold returns between the conventional and adjusted hedge is not only attributable to value firms. While value firms under the conventional definition (11.167 per cent) still outperform those under the adjusted definition (9.488 per cent), growth firms under the adjusted definition now outperform conventional growth firms by 2.350 per cent on a cumulative basis. However, because the net cumulative difference between the hedges is relatively smaller (0.866 per cent) than that identified for the earlier investigation (4.905 per cent), the results suggest that the mispricing of goodwill is more prevalent at extreme ends of the market-to-book value spectrum.

Despite this, both the conventional and adjusted hedge deliver mean abnormal quarterly returns which are significant at the one per cent level ($p < 0.001$) for which results are tabulated in Panel A of Table 3. This panel also shows that the return per unit of risk is similar across the various hedge definitions and firm selections. This suggests that the excess abnormal returns of the conventional Quintile 1 vs Quintile 5 hedge is not due to higher

underlying risk of value firms under this definition. By implication, this confirms that mispricing of goodwill, rather than higher risk, explains the difference in return.

Panel B of Table 3 shows that the higher return of the conventional Quintile 1 vs Quintile 5 hedge compared to the adjusted hedge is indeed due to the migration of firms into and out of the value category (i.e. quintile five). Mean quarterly abnormal returns on value stocks are 0.18 per cent higher under the conventional definition, which difference is significant at the five per cent level ($p = 0.048$). Similar to the results noted in Figure 2, however, the adjusted market-to-book ratio does not alter the returns of value firms within quintile four significantly ($p = 0.557$). Differences between growth firms are also insignificant at conventional levels.

Panel C of Table 3 reveals that the differences in mean quarterly returns between the conventional and adjusted hedge are not statistically significant. This implies that the outperformance of the conventional hedge is not due to large differences within quarters, but rather due to the compound effect of marginal outperformance over longer periods.

[INSERT TABLE 3 ABOUT HERE]

6. Additional analysis

To investigate the impact of the adjustment to the market-to-book ratio further, this section contains regression results from the following model specification:

$$Return_{i,t+20} = \alpha_0 + \beta_1 Size_{i,t0} + \beta_2 MTB_{i,t0} + \beta_3 Qdiff_{i,t0} + \varepsilon \qquad \textbf{(1)}$$

Where:

Return is the cumulative abnormal return over twenty quarters, calculated in the same manner as described in the preceding sections;

Size is the natural log of the market value of equity at the date of portfolio formation;

MTB represents the market-to-book ratio at the date of portfolio formation, alternatively calculated using the conventional and adjusted definitions; and

Qdiff is the change in quintile at portfolio formation date if *MTB* is alternatively calculated using the conventional and adjusted definitions. It is operationalised as *QdiffAC* (using the conventional definition as the base) and *QdiffCA* (using the adjusted definition as the base).

All variables, including the dependent variable, are winsorised at the 1 per cent and 99 per cent levels. As the model regresses returns over a substantial period of time, results are autoregression results from a GARCH-model using maximum likelihood estimation to compensate for serial correlation and heteroskedasticity caused by non-constant volatility. All sample firms, regardless of their *MTB*-quintile are entered into the regression.

Results from regressing model **(1)** are tabulated in Table 4 and reveal that, consistent with prior research (e.g. Fama & French, 2007), smaller firms (even within the S&P 500 index) outperform larger firms, as *Size* is consistently negative (-0.004) at the one per cent level of significance. Interestingly, market-to-book ratios at portfolio formation date do not have a significant relationship with cumulative abnormal returns regardless of whether the ratio was calculated using the conventional or adjusted definition. This implies, consistent with other results of this paper and prior research (Skinner & Sloan, 2002:298), that market-to-book ratios are more powerful in explaining extreme cross-sectional return differences than in flatter distributions.

The first column of Table 4 shows that the variable of interest, *QdiffAC*, is negative (-0.003) at the five per cent level of significance (p = 0.022) when a conventional market-to-book ratio is entered into the regression. This therefore confirms that cumulative abnormal returns are significantly lower for sample firms when recognised goodwill is removed from the calculation of the market-to-book ratio. Results when an adjusted market-to-book ratio is entered into the regression (the second column of Table 4) are qualitatively similar: the positive sign on *QdiffCA*, which is significant at the one per cent level (p = 0.006), continues to support the conclusion that cumulative abnormal returns are significantly higher using the conventional definition of the market-to-book ratio.

Although reported regression results are based on a robust regression method, some statistical concerns remain. However, the results support conclusions which are consistent with those of the main investigations discussed in previous sections of this paper.

7. Summary and conclusion

This paper investigates whether investors price the growth prospects of new acquisitions and the subsequent materialisation thereof accurately. Using returns from a sample of S&P 500 firms from 31 December 2002 to 31 December 2013 returns from a hedge based on conventional market-to-book ratios are compared to returns from a similar hedge based on market-to-book ratios adjusted for goodwill. Goodwill is used as a proxy, as it correlates strongly with both aspects of the research question.

Results show that cumulative returns for hedge portfolios based on adjusted market-to-book ratios underperform conventional hedge portfolios over a five year period. As the hedge returns differ, adjusting market-to-book ratios for goodwill does not have a random effect on hedge returns. It therefore implies that future growth prospects of new acquisitions and the subsequent realisation thereof (for which recognised goodwill is a proxy) are priced

by investors. However, the lower abnormal returns of the adjusted hedge mean that this pricing is inaccurate and that investors underrate (overrate) firms with (without) recognised goodwill. In other words, investors appear to underestimate the growth from new acquisitions and overestimate the degree to which this has already materialised.

In addition, the underperformance of the adjusted hedge must be due to lower returns for one (or both) of its comprising elements. Further investigations reveal that the underperformance of the adjusted hedge is mainly caused by weaker returns from firms classified as value firms under the adjusted definition. More specifically, it appears that investors overrate (underrate) firms who finance future growth with liabilities (cash or equity). In addition, a statistical analysis concludes that the comparatively weaker returns are not due to a reduction of risk. The overall conclusion of the study is therefore that investors extrapolate past growth rates into the future and are therefore frequently caught unawares by changes in earnings growth rates.

This study contributes to the value versus growth debate by revealing that a substantial portion of the phenomenon arises because investors do not value the growth prospects of new acquisitions and the subsequent materialisation thereof accurately. It lends support to the argument that irrational investor expectations are at least partially responsible for the outperformance of value stocks over growth stocks, given that there is no glaring increase in risk between sample firms of the two hedges. This suggests that further research is required on whether investor expectations could be improved by additional information. As this information could be accounting information, this study also contributes to the literature about the accounting treatment of goodwill. Lastly, the study highlights that the extrapolation of growth rates into the future is an important research area.

The findings of this study will be of interest to those who prepare valuations of firms with current or past acquisitions and those practitioners and researchers interested in the

causes of the value versus growth phenomenon. Findings will also be of interest to those involved in financial reporting, as they reveal that the accounting for and disclosure of goodwill, and the expected or realised growth prospects that it represents, could be improved.

Caution should, however, be exercised when attempting to generalise findings of this paper. The sample firms of this study represent only large firms in a specific setting and future research is needed to determine whether findings are equally applicable to firms of different sizes and in different circumstances. Future research could also consider, for example, how the age of goodwill impacts on results, as recently recognised goodwill and older goodwill have different implications for valuation. In addition, future researchers might want to consider whether the findings of this paper relates only to goodwill or also extend to other intangible assets.

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[1] The residual income model (Ohlson, 1995) is selected as the theoretical model for this paper, as the market-to-book ratio (used to identify value and growth firms) likewise implies a valuation of the book value of equity. However, Lundholm and O'Keefe (2001) show that the residual income model is equivalent to free cash flow valuation, provided the model is properly implemented.

[2] A free cash flow valuation would implicitly ignore recognised goodwill. To ensure that the residual income model produces an equivalent valuation, recognised goodwill must also be ignored for this valuation model.

[3] Although some studies adjust the book value for deferred tax and investment tax credits (e.g. Fama & French, 1992, 1993), such adjustments are not generally made within the literature. No previous studies adjust the book value for recognised goodwill.

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IASB – refer to International Accounting Standards Board

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Table 1: Descriptive statistics

	Mean $ Million	Median $ Million	Standard deviation $ Million	Minimum $ Million	Maximum $ Million
Panel A: At 31 December 2002					
MV	21 617	8 054	39 807	502	276 631
BVE	6 715	3 600	10 360	-341	74 597
Goodwill	2 466	853	4 911	0	39 138
MTB_{conv}	3.2	2.7	9.2	-99.2	80.7
MTB_{adj}	3.5	3.4	34.4	-277.4	316.1
Panel B: At 31 December 2013					
MV	43 013	20 685	64 952	3 601	500 740
BVE	13 724	6 071	22 180	-1 687	165 863
Goodwill	5 753	2 268	9 952	0	73 447
MTB_{conv}	9.3	3.3	79.2	-45.3	1 220.9
MTB_{adj}	5.4	4.6	35.6	-194.0	334.2

MV	Market value of equity
BVE	Book value of equity per latest annual financial statements at selection date
Goodwill	Book value of goodwill per latest annual financial statements at selection date
MTB_{conv}	Market-to-book ratio calculated using the unadjusted book value of equity (conventional market-to-book ratio).
MTB_{adj}	Market-to-book ratio where the book value of equity per the latest annual financial statements has been adjusted to exclude recognised goodwill (adjusted market-to-book ratio).

Table 2: Migration of firms between Quintiles at portfolio formation date

	Into / out of quintile 1	**Into / out of quintile 2**	**Into / out of quintile 3**	**Into / out of quintile 4**	**Into / out of quintile 5**
Mean	25	31	33	25	22
Median	25	29	33	25	21
Standard deviation	3	3	3	4	4
Minimum	19	24	28	20	18
Maximum	29	35	39	33	32
Total	613	764	831	626	554

Frequencies represent gross migration into or out of a quintile when market-to-book ratios are adjusted from the conventional calculation to one which excludes recognised goodwill from the book value of equity on portfolio formation date for a total of 25 portfolios.

Table 3: Comparison of the various hedge returns

Panel A: Hedge returns

	Cumulative	Mean	Standard deviation	t-stat	p-value	Return per unit of risk
Quintile 1 vs 5 hedge						
- Conventional	24.92%	1.05%	4.24%	5.514	<0.001	0.25%
- Adjusted	20.02%	0.87%	3.35%	5.818	<0.001	0.26%
Quintile 2 vs 4 hedge						
- Conventional	20.23%	0.95%	3.46%	6.147	<0.001	0.27%
- Adjusted	19.37%	0.88%	3.41%	5.775	<0.001	0.26%

Panel B: Comparison of returns under the conventional and adjusted definitions

	Mean difference	Standard deviation	t-stat	p-value
Quintile 1 vs 5 hedge				
- Growth stocks	0.01%	2.27%	0.059	0.953
- Value stocks	0.18%	2.02%	1.980	0.048
Quintile 2 vs 4 hedge				
- Growth stocks	-0.13%	1.96%	-1.449	0.148
- Value stocks	-0.06%	2.17%	-0.587	0.557

Panel C: Comparison of the adjusted and conventional hedge returns

	Mean difference	Standard deviation	t-stat	p-value
Quintile 1 vs 5 hedge	0.17%	3.20%	1.210	0.227
Quintile 2 vs 4 hedge	0.07%	3.01%	0.519	0.604

Portfolios are formed based on market capitalisation at quarter end and annual financial statement data available for at least three months prior to quarter end. Firms are grouped into quintiles based on conventional market-to-book ratios and market-to-book ratios adjusted for recognised goodwill. Hedge returns represent returns from being long Quintile 5 (4) and short Quintile 1 (2) firms, based on the alternative definitions of market-to-book ratios. 25 portfolios are tracked for 20 quarters after portfolio formation. Hedge returns represent buy and hold returns on a total return basis, adjusted for the average return of sample firms during each quarter. Reported p-values are based on two-tailed significance from single sample (Panel A) and paired sample (Panels B and C) ANOVA's.

Table 4: Regression results

$$Return_{i,t+20} = \alpha_0 + \beta_1 Size_{i,t0} + \beta_2 MTB_{i,t0} + \beta_3 Qdiff_{i,t0} + \varepsilon$$

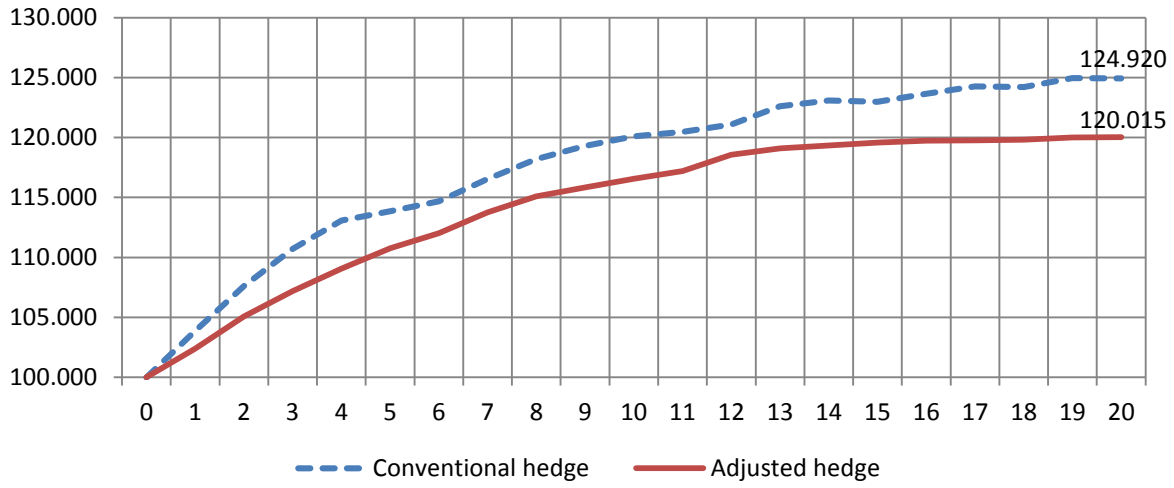
	Conventional	**Adjusted**
Size	***-0.004	***-0.004
	(0.003)	(0.004)
MTBconv	-0.001	
	(0.880)	
MTBadj		-0.001
		(0.410)
QdiffAC	**-0.003	
	(0.022)	
QdiffCA		***0.004
		(0.006)
N	5 950	5 950
R^2	16.2%	16.2%

Return	The cumulative abnormal return over twenty quarters. Abnormal returns represent buy and hold returns on a total return basis, adjusted for the average return of sample firms during each quarter.
Size	The natural log of the market value of equity at the date of portfolio formation.
MTB_{conv}	Market-to-book ratio calculated using the unadjusted book value of equity (conventional market-to-book ratio).
MTB_{adj}	Market-to-book ratio where the book value of equity per the latest annual financial statements has been adjusted to exclude recognised goodwill (adjusted market-to-book ratio).
QdiffAC	The change in quintile at portfolio formation date if *MTB* is alternatively calculated using the conventional and adjusted definitions, using the conventional definition as the base.
QdiffCA	The change in quintile at portfolio formation date if *MTB* is alternatively calculated using the conventional and adjusted definitions, using the adjusted definition as the base.

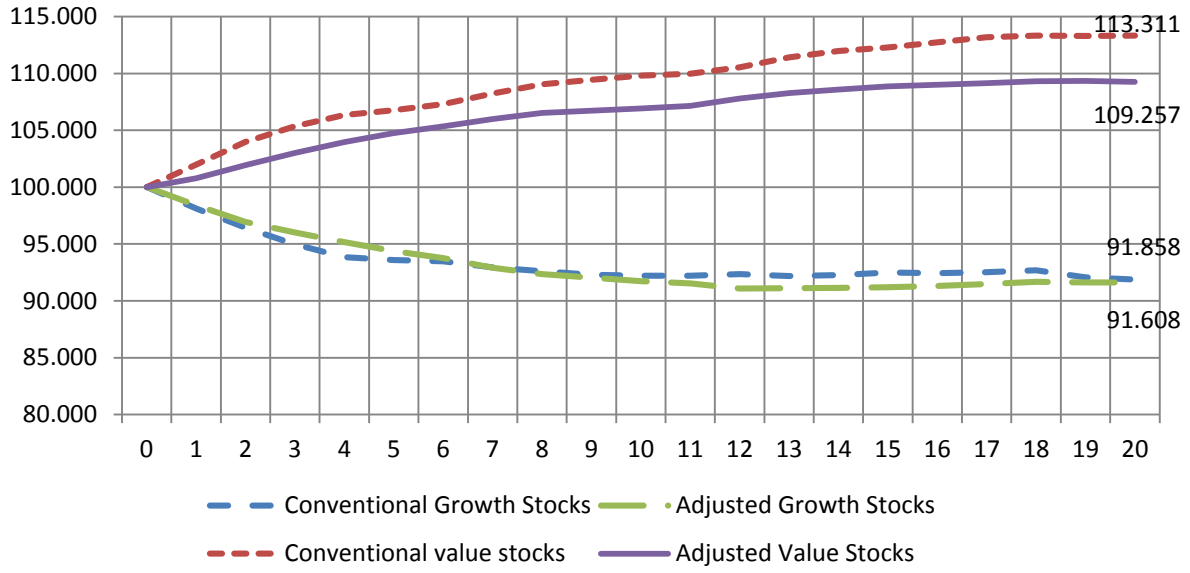
Regression results are autoregression results from a GARCH-model using maximum likelihood estimation.
p-values for two-tailed significance are indicated in brackets.
***; ** and * denote statistical significance at the one, five and ten per cent levels respectively.

Figure 1: Hedge returns from being long Quintile 5 and short Quintile 1

Panel A: Comparison of the conventional and adjusted hedge returns



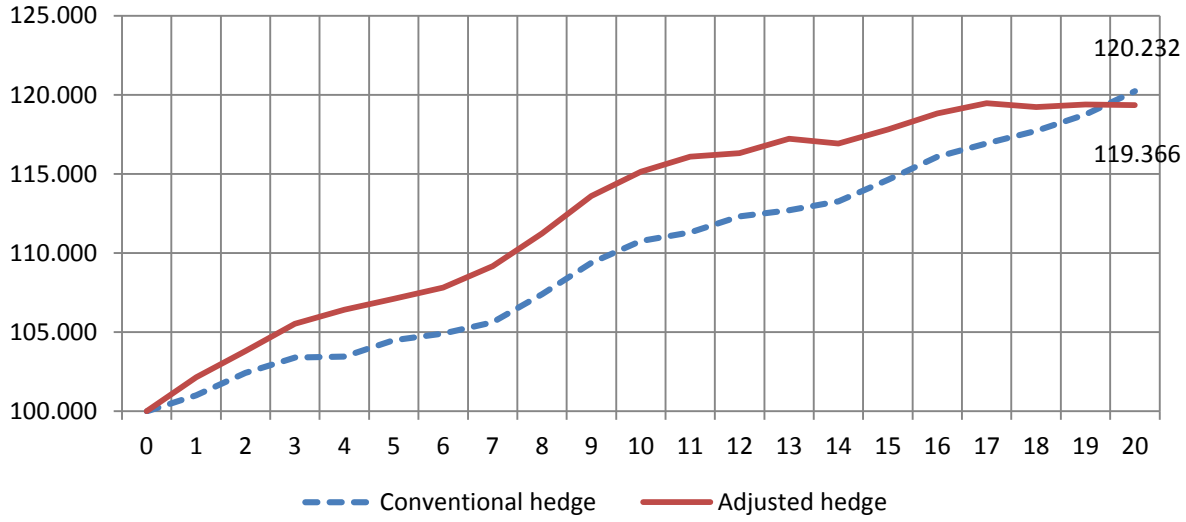
Panel B: Comparison of the returns of growth stocks and value stocks under the conventional and adjusted definitions



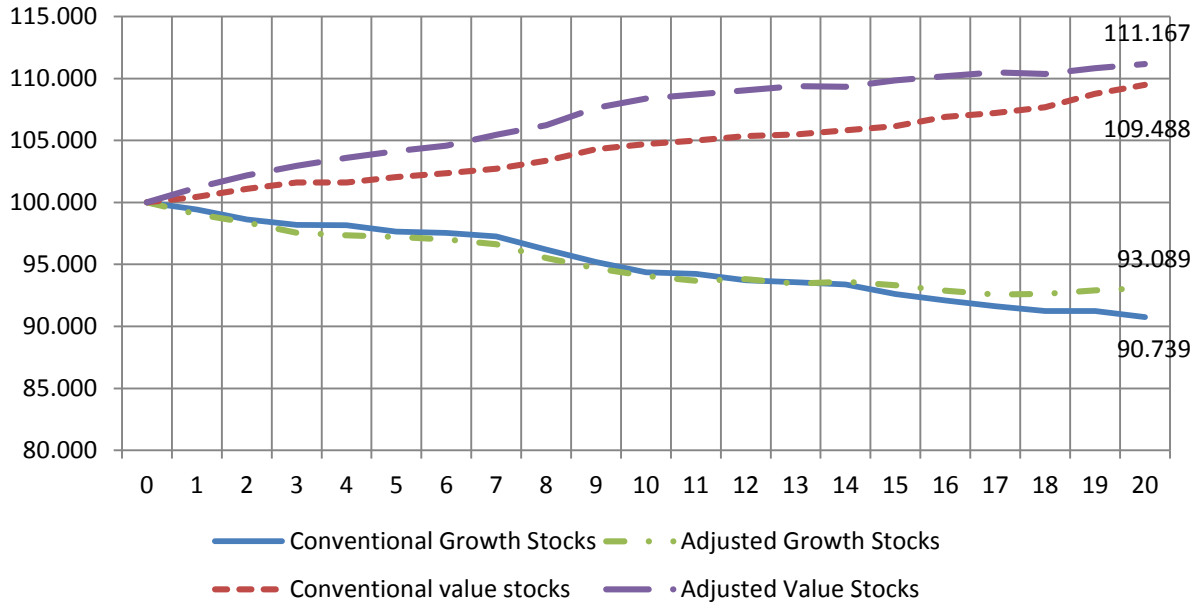
Portfolios are formed based on market capitalisation at quarter end and annual financial statement data available for at least three months prior quarter end. Firms are grouped into quintiles based on conventional market-to-book ratios and market-to-book ratios adjusted for recognised goodwill. Hedge returns represent returns from being long Quintile 5 and short Quintile 1 firms, based on the alternative definitions of market-to-book ratios. 25 portfolios are tracked for 20 quarters after portfolio formation. Hedge returns represent buy and hold returns on a total return basis, adjusted for the average return of sample firms during each quarter.

Figure 2: Hedge returns from being long Quintile 4 and short Quintile 2

Panel A: Comparison of the conventional and adjusted hedge returns



Panel B: Comparison of the returns of growth stocks and value stocks under the conventional and adjusted definitions



Portfolios are formed based on market capitalisation at quarter end and annual financial statement data available for at least three months prior quarter end. Firms are grouped into quintiles based on conventional market-to-book ratios and market-to-book ratios adjusted for recognised goodwill. Hedge returns represent returns from being long Quintile 4 and short Quintile 2 firms, based on the alternative definitions of market-to-book ratios. 25 portfolios are tracked for 20 quarters after portfolio formation. Hedge returns represent buy and hold returns on a total return basis, adjusted for the average return of sample firms during each quarter.