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GOODWILL MEASURING VALUE CREATION OF ACQUISITIONS: AN EMPIRICAL RESEARCH

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Abstract

The reason for this research is that at the beginning of the 21st century, some important changes were introduced in the international standards of accounting affecting reporting on goodwill. The intentions of the standard-setting bodies in drafting the new rules were that the financial statements would better reflect the underlying economics of the acquired goodwill.¹ In this research it is tested whether goodwill under the new accounting regime does reflect underlying economics and therefore provides information on expected value creation of the acquisition. The results of the research show that goodwill contains elements of value creation: characteristics of valuecreating acquisitions have a positive effect on purchased goodwill. However, also other characteristics determine the amount of purchased goodwill.

Keywords: Goodwill, Mergers and Acquisitions, SFAS 141, SFAS 142, Value Creation

JEL classification: G34, M41, M48

GOODWILL MEASURING VALUE CREATION OF ACQUISITIONS: AN EMPIRICAL RESEARCH

1. INTRODUCTION

This working paper is about goodwill as a measure of value creation. In 2001, some important changes have taken place in the US accounting regime [United States Generally Accepted Accounting Principles (US GAAP) 2001].¹ Due to the introduction of SFAS 141 “Business Combinations” and of SFAS 142 “Goodwill and Other Intangible Assets”², acquiring companies are obliged to provide more extended as well as more uniform information concerning the mergers and acquisitions in their annual accounts. Changed US GAAP (2001) require that all business combinations must be reported in the same way, namely through the purchase method. Moreover, the acquiring company must provide information about the reasons for the acquisition and must allocate the purchase price to the assets and liabilities of the target at their fair value. Purchased goodwill, then, should represent the purchase price of the acquired firm minus the fair value of its net assets. Besides, stricter regulation regarding the separate reporting on purchased identifiable intangible assets will further reduce the amounts of purchased goodwill, as these intangibles will no longer be accounted for as part of goodwill. In addition, an impairment test should lead to a comparison of the carrying amount of goodwill with its fair value, based on the present value of the future cash flows arising from the acquisition. This impairment test is performed annually, and whenever there is an indication that a reporting unit might be impaired.

As a result of these changes, the information content of purchased goodwill may have increased. More information on purchased goodwill may be available, and goodwill may have become a more concise term that contains relevant information about expected value creation or synergy of the acquisition. This would correspond to the intentions of the standard-setting bodies in drafting the new rules: they expect that under the new standards, the financial statements will better reflect the underlying economics of the acquired goodwill.³ The intention of this working paper is to gain an insight into the information content of purchased goodwill under the changed accounting regime with regard to the value creation of the acquisition for the business combination: does goodwill under the new accounting regime provide information on expected value creation of the acquisition?

The research is confined to mergers and acquisitions between US publicly quoted companies, to which US GAAP apply. It focuses on mergers and acquisitions that were announced and became effective in time period 2002-2005, thus after new regulation came into force.

This study into goodwill measuring value creation of acquisitions was conducted in three steps. First, correlations of purchased goodwill with stock excess returns were carried out. Second, bivariate analyses regarding correlations between purchased goodwill and

¹ Recently, accounting regulation regarding reporting on business combinations was further modified. In November 2007, FASB issued a revised SFAS 141 ‘Business Combinations’ (SFAS 141R). SFAS 141R is beyond the scope of this research. However, the changes resulting from these revised standards indicate that the trend of future-oriented fair value accounting and separate recognition and measurement of intangible assets is continued.

² SFAS 141 (2001) superseded APB Opinion No. 16 “Business Combinations” (1970). SFAS 142 (2001) superseded APB Opinion No. 17 “Intangible Assets” (1970).

³ SFAS 142, 2001, summary, 2.

characteristics of value-creating acquisitions, as well as other characteristics affecting goodwill, were carried out.

Third, multivariate regressions of purchased goodwill on these characteristics were performed. Characteristics of value-creating acquisitions (arising from the efficiency theory and relating to financial synergies, operating synergies, and improved management) and of other theories explaining goodwill were derived from literature concerning research on target stock returns and bid premiums.

The results of the research show that goodwill contains elements of value creation: characteristics of value-creating acquisitions have a positive effect on purchased goodwill.

Financial synergies and partly operating synergies explain purchased goodwill. Further, if it is proposed that improved management not only flows from acquirer to target but also from target to acquirer, improved management seems to be represented in purchased goodwill as well. These conclusions hold after controlling for other characteristics such as bargaining and agency motives.

This study adds to research literature in three respects. First, whereas most studies into acquisition theories are tested for these theories by using relationships between accounting reports and stock returns, in this research stock returns are replaced by purchased goodwill. The possibility of goodwill turning out to be an adequate alternative to stock returns when measuring value creation will be examined here. Second, thus far, most of the research into goodwill was about goodwill explaining market value or excess returns of the company.⁴ Market value and excess returns then were measured by stock prices or returns on stock prices. The studies were focused on the impact of the reported asset "goodwill" of a company on its market value (valuation analysis) or excess return (return analysis). An innovation of this dissertation is: (a) that it focuses on purchased goodwill in acquisitions instead of on the reported asset goodwill in the financial statements of a company created in the course of time, and (b) that it examines whether this purchased goodwill resembles the expected value creation by these acquisitions. So purchased goodwill is now used as a variable to be explained instead of as an explanatory variable. Third, the researchers believe that goodwill data on which the empirical research is based are unique. In current databases, no information regarding goodwill purchased in acquisitions can be found. Only information about goodwill as reported on the balance sheet of companies is available. The time-consuming search for purchased goodwill data in the notes to the consolidated financial statements of the acquiring companies makes this research the only one of its kind.

The structure of this working paper is as follows: section 2 provides some different definitions of goodwill. In section 3, the significant features of the changed US GAAP regarding financial reporting affecting goodwill are specified in more detail. Section 4 discusses acquisition theories and previous research into these theories that contribute to explain purchased goodwill. Moreover, here the hypotheses are formulated. In section 5, the estimation model is described. This is followed by the data in section 6. Section 7 contains a discussion of the results of the research. The working paper closes with the conclusions in section 8.

2. DEFINITIONS OF GOODWILL

Goodwill can be defined in various ways. Commonly, goodwill is regarded as the present value of the additional profits the acquiring company is expecting to gain in the future

resulting from the acquisition. These additional profits arise from a “favourable attitude towards the firm”, when the target firm has good advertising and service, a reliable reputation, an attractive place of business, interesting customer lists, or competent employees and management. Further, additional profits are derived from synergies, such as economies of scale or technical and managerial skill transfer. This approach of goodwill is called the economic concept of goodwill. Johnson and Tearney (1993, 59) describe it as the excess profits approach of goodwill. According to these authors, this concept is difficult to measure since future earnings have no certainty. Myers (1977) in this context speaks of economic goodwill, which can be described as that proportion of the market value of the firm that cannot be explained by assets-in-place. Besides the economic concept of goodwill, an accounting concept of goodwill can also be identified. From an accounting perspective, goodwill is the difference in valuation between the purchase price and the book value of the acquired firm. In other words, the accounting concept of goodwill can be described as the surplus value above the shareholders’ equity as shown in the balance sheet of the acquired company. Goodwill then is a leftover amount that cannot be identified, after a thorough investigation, as any other tangible or intangible asset. A synonym for the accounting concept of goodwill is the residuum approach of goodwill. Henning et al. (2000, 375-376) break down this accounting goodwill into four components: (1) write-up goodwill: the write-up of the target firm’s assets to their fair market value, (2) going-concern goodwill: the value of the target as a going-concern, or stand-alone entity, (3) synergy goodwill: the synergistic value created by the acquisition, and (4) residual goodwill: any overvaluation of consideration and/or overpayment for the target. An important characteristic of goodwill is that it should be inseparable from the business: it cannot be sold without selling the business that it is associated with. Johnson and Tearney (1993, 59) state that “if you can sell what you are calling goodwill, then it is something other than goodwill. It may be contract rights, a client list, distribution channels, or any number of other things and should be labeled as such, instead of lumped into the goodwill account.”

3. NEW REGULATION AFFECTING REPORTING ON GOODWILL: FEATURES AND ARGUMENTS

Below, the significant features of the changed US GAAP (SFAS 141 “Business Combinations” (2001) superseding APB Opinion No. 16 “Business Combinations” (1970) and SFAS 142 “Goodwill and Other Intangibles” (2001) superseding APB Opinion No. 17 “Intangible Assets” (1970)) regarding financial reporting affecting goodwill are specified in more detail. Further, the motives for these changes are discussed.

Whereas APB Opinion No. 16 had already reduced the number of methods of reporting on goodwill to two [namely no goodwill reporting when the new business combinations were classified as uniting of interests and thus applied the pooling of interests method, and entering purchased goodwill as an asset for all other business combinations that had to apply the purchase method, under SFAS 141, all business combinations must now be accounted for using the purchase method only, in which goodwill has to be entered as an asset. Other methods are no longer permitted. Business combinations can be described as the bringing together of separate entities or businesses into one reporting entity. An important characteristic is that one entity obtains control over the acquired entity or entities, either by acquiring net assets, or by acquiring equity interests. Requiring the purchase method as the

only method means that it is implicitly assumed that virtually all business combinations are acquisitions. The standard now prescribes for all business combinations that the acquirer recognizes the target's identifiable assets and liabilities at their fair values at the acquisition date, and also recognizes purchased goodwill. SFAS 141 even gives general guidance for determining the fair values of assets acquired and liabilities assumed, other than goodwill. Also intangible assets should be taken into consideration. Important reasons for allowing only the purchase method are (I) a better reflection of the investment made in an acquired entity, (II) an improvement of the comparability of reported financial information, and (III) provision of more complete financial information.

A major change concerning the reporting on purchased goodwill is the introduction of an annual impairment test, which replaces the annual amortization of goodwill. The old standards already required the company to conduct an impairment test whenever there was an indication that reported goodwill might be impaired. Under the new standards, amortization of goodwill and other intangible assets with indefinite useful lives is prohibited. Instead they must be tested for impairment annually, or more frequently if events or changes in circumstances indicate a possible impairment. As goodwill cannot generate cash inflows independently from those from other assets, the impairment test needs to be conducted for a larger reporting unit to which goodwill belongs. As soon as the carrying value of this reporting unit (US GAAP) exceeds its fair value (US GAAP), an impairment of goodwill against income is required. One of the objectives of the new standards regarding impairment of goodwill and the prohibition of amortization of goodwill is to improve the quality of the accounting for goodwill acquired in business combinations. The underlying thought is that it is no longer presumed that goodwill is a wasting asset: goodwill is assumed to have an indefinite life. The standard-setting bodies expect that under the new standards, the financial statements will better reflect the underlying economics of the acquired goodwill. It is assumed that users will now better understand the investments made in these assets as well as the subsequent performance of these investments.

When reporting on mergers and acquisitions, the acquiring company needs to recognize intangible assets of the target separately from goodwill, if they meet certain conditions. SFAS 141 addresses SFAS 142 'Goodwill and Intangible Assets', which has tightened up the requirements regarding the recognizing of acquired intangible assets in the financial statements of the acquiring company. The changes that have been made in the standards are primarily concerned with clarifying (a) the 'identifiability', and (b) the useful life and the related amortization of intangible assets and will be discussed below. Intangible items acquired in a business combination are to be defined as intangible assets if they meet three conditions: (1) they are identifiable, (2) the entity controls the intangible items, and (3) future economic benefits will probably flow from these items. An intangible item meets the identifiability criterion when it is separable from the firm, or when it arises from contractual or other legal rights. The firm is expected to control an intangible asset if it has the power to obtain the future economic benefits that flow from these items and if it is able to restrict the access of others to these benefits. Examples of future economic benefits following from an intangible asset may be revenues from the sale of products or services, or cost savings. Further, it is stated that an intangible asset shall only be recognized if it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity, and

the cost of the asset can be measured reliably. If an intangible asset is acquired as part of a business combination, the recorded cost of that intangible asset needs to be its fair value at the acquisition date. An important reason for tightening the standards concerning intangible assets is the notion of company boards and other users of financial statements that intangible assets are becoming an increasingly important economic resource for many firms and make up a larger proportion of the assets acquired in many transactions. They therefore requested the provision of more complete financial information on these intangible assets.

When the new SFAS 141 and 142 are applied well, more information on purchased goodwill will become available and the accounting concept of goodwill should move to its economic concept. Then, goodwill is no longer viewed as a 'wasting asset', but rather as an asset with an indefinite life. Now all business combinations must be reported in the same way, namely through the purchase method. Moreover, the acquiring company must provide information regarding the reasons for the acquisition and must allocate the purchase price to the assets and liabilities of the target at their fair value. Purchased goodwill then should represent the purchase price of the acquired firm minus the fair value of its net assets. As a consequence, the write-up component of goodwill should expire. Besides, the more strict regulation regarding the separate reporting on purchased identifiable intangible assets, as explained by a number of examples, will further reduce the amounts of purchased goodwill. These intangibles will no longer be accounted for as part of goodwill. In addition, the impairment test should lead to a comparison of the carrying amount of goodwill with its fair value (or recoverable amount), based on the present value of the future cash flows arising from the acquisition. Goodwill will be impaired whenever it turns out that there is a deviation between these two values. Therefore, in the event that it appears in retrospect that residual goodwill has been involved in the acquisition (indicating that the acquisition was overpaid, or that the acquiring company overestimated the additional future profits arising from the acquisition), an impairment of goodwill should be carried out, thereby taking into account the expected future additional profits arising from the acquisition. Through these changes, purchased goodwill as entered on the balance sheet of the acquiring company should at least theoretically have become a more accurate indicator of the extra value of the acquired firm above the fair value of all of its net assets. The accounting concept of goodwill then approaches its economic concept and more closely represents the expected value creation, as it appears from the present value of the additional profits that the acquiring company is expecting to gain in the future resulting from the acquisition. Moreover, when the new rules are put into practice well, an impairment of goodwill should show a downward adjustment of the expected value of the acquired firm.

Figure 1: Implications of new standards on the contents of reported goodwill

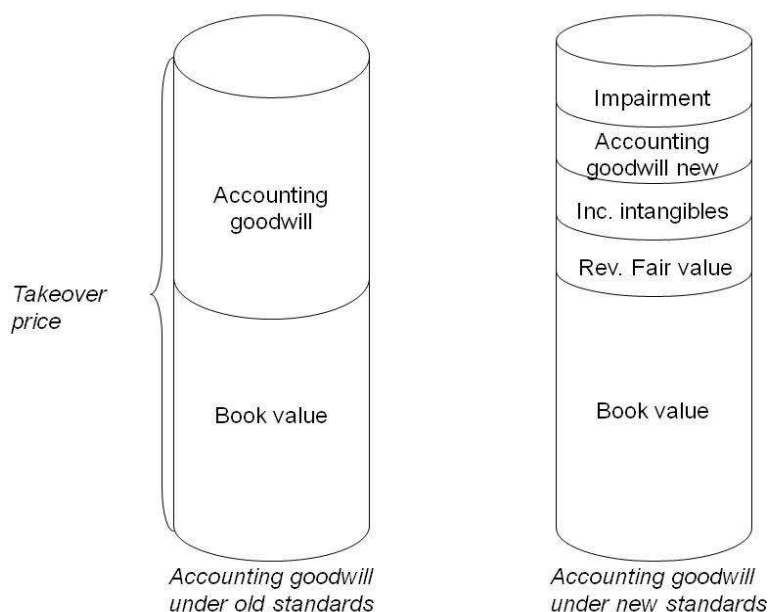


Figure 1 shows that due to the new regulation, accounting goodwill should have become a smaller component of the total purchase price for the acquisition. It is less of a residual, containing other intangible items and differences in valuation. Consequently, in ideal circumstances, the recorded goodwill should show the synergy component of goodwill and the going-concern component of goodwill. The FASB seemed to have had this in mind as well, when it formulated the new standards: after all, the FASB states that, by introducing the new regime, it aims for better reflection of the underlying economics of acquired goodwill and other intangible assets. SFAS 141 states that the explicit criteria for recognition of intangible assets apart from goodwill and the expanded disclosure requirements provide more information about the assets acquired and liabilities assumed in business combinations. This additional information should, among other things, provide users with a better understanding of the resources acquired and improve their ability to assess future profitability and cash flows.

4. GOODWILL EXPLAINED BY ACQUISITION THEORIES

This study focuses on goodwill as a measure of value creation. An acquisition theory that serves to explain goodwill from value creation is the efficiency theory. This theory, that arises from the neoclassical economic theory, has been demonstrated by previous studies. It states that merger bids are initiated by managers to obtain synergies that find expression in cost reductions and better performance and thereby create extra value to the combined company.⁵ In accordance with this theory, it is assumed that value creation flows from operating and financial synergies and improved management.

Previous studies show that in addition to the efficiency theory, other acquisition theories also take root. Among them is the empire-building theory. The empire-building theory states that

⁵⁵ See for instance Rappaport (1998) and Gaughan (1991).

acquisitions are planned and executed by the managers of the buyer's company in order to maximize their own utility instead of the shareholder value. This may appear in the event that there is a separation between management and ownership within the company (Trautwein, 1990). The empire-building theory flows from the agency theory, discussed by Jensen and Meckling (1976). Further, factors determining the bargaining position and misvaluation are demonstrated. These factors, together with empire-building, might affect purchased goodwill and are to be taken into account when explaining goodwill from value creation.

Studies that almost exclusively focus on the impact of the theories on target stock excess returns and bid premiums, and are therefore very useful for this research, as it will be shown that goodwill moves in line with them, are: Slusky and Caves (1991), Ismail and Davidson (2007), and Huang and Walkling (1987).

Slusky and Caves (1991) test two hypotheses regarding the creation of value by mergers on premia paid in acquisitions. They expect (1) that the value creation can be ascribed to synergies in the coordination of business assets, and (2) that the value creation can be attributed to gains from shifting control of assets into the hands of more effective managers. They state that the premium paid in a complete merger, PR, can be related to the target's stand-alone market value (MV) in the following expression:

$$PR = (BRES [X_i]/MV)B(Z_i)$$

where BRES is the reservation price of the acquirer. This reservation price depends on factors (X_i) that predict the increase in cash flows due to combining the assets or improving target's management's policies (in accordance with the efficiency theory), but also any factors that represent the acquirer's management's willingness to pay for the targets (in conformity with the empire-building theory). B then is a bargaining function that determines where the actual purchase price falls between the reservation price and the market value of the target, and Z_i represents the factors determining this bargaining position.

Making use of multivariate regression analyses (with bid premium as dependent variable), they test for their hypotheses. Their results show that premia increase with financial although not with real synergies and with the scope for managerial behaviour (= agency behaviour) in the target firms. The acquirers' willingness to pay also increases in relation to their scope for managerial behaviour. They further find that the presence of either actual or potential rival bidders has a powerful effect.⁶

Ismail and Davidson (2007) examine factors influencing announcement period stock excess returns for target banks in European bank mergers. Although their explicit focus is on the banking sector, some of their assumptions and results seem to be relevant while explaining goodwill. For instance, they examine whether the new business combinations are creating synergies by considering the effect of relative size on target excess stock returns. This effect turns out not to be significant in their research. Further, they study the effect of other factors on target stock excess returns, including the form of payment (cash, equity, or a combination) and the form of the acquisition on target excess stock returns. They find that cash deals and deals that are settled by a mix of cash, equity, and loans create significantly

⁶ Further, they ascertain that market gains (losses) to acquirers' shareholders do not distort the associations between acquisition premia and sources of value by substituting the market-adjusted change in value of acquirer divided by the stand-alone market value of the target (APR) for the bid premium (PR) in the models. The outcomes of this extra analysis confirm their earlier results.

higher target stock excess returns than equity transactions. They do not find a significant effect of the form of the acquisition on target excess stock returns.

Huang and Walkling's (1987) research mainly provides information about the other factors that may determine goodwill. They test three hypotheses about target firm announcement returns, namely that target stock excess returns will be higher (1) in tender offers than in mergers; (2) in cash offers than in stock offers, and (3) in resisted offers than in unresisted offers. Their results show that tender offers yield significantly higher returns than mergers. Tender offers, however, are generally for cash and are more likely to be resisted than mergers. After controlling for form of payment and degree of resistance, no significant difference remains between merger and tender offer. Resisted offers earn statistically insignificant higher returns than unresisted offers. Cash offers are associated with significantly and substantially higher returns both before and after controlling for type of acquisition and degree of resistance.

Other studies that are useful to be taken into consideration when explaining goodwill, as they not only consider the effects of acquisition theories on total returns or acquirer returns but also on target returns, are Bhagat et al. (2005), Dong et al. (2006), Lang et al. (both their 1989 and 1991 articles), Servaes (1991), Datta et al. (2001), and Gupta and Misra (2007).

Making use of the advanced probability scaling method, Bhagat et al. (2005) show that tender offers are value-creating. They further find evidence in line with the hypotheses for the effects of the form of payment, resistance to the offer, and relative size on target returns.

Dong et al. (2006), Lang et al. (1989), and Servaes (1991) focus on the so-called q hypothesis of takeovers. They test whether takeovers of bad targets by good acquirers tend to improve efficiency more than takeovers of good targets by bad acquirers.

Using Tobin's q or market-to-book value as a proxy for expected growth or managerial effectiveness, and making use of multivariate regression analyses, their results show that a higher target Tobin's q or market-to-book value is associated with lower bid premiums and target announcement period return. Apart from Servaes' study,⁷ they further show that a higher bidder's Tobin's q or market-to-book value is associated with higher target stock returns.

While testing for agency (empire-building), Datta et al. (2001) show that acquirers with a relatively low equity-based compensation pay a higher acquisition premium compared to acquirers with a relatively high equity-based compensation.

Gupta and Misra (2007) test for the relation between total returns, relative size, and bid premiums. Their results show that in value-reducing acquisitions, target returns are negatively influenced by both relative size of target to acquirer and stock payment.

To answer the question if goodwill under the new accounting regime provides information on expected value creation of the acquisition, it is examined whether the known characteristics of value-creating acquisitions as conducted by the efficiency theory and proved by excess returns analyses also apply to purchased goodwill. In these analyses, the effect of characteristics of other theories explaining acquisitions on purchased goodwill as shown by excess returns-analyses are taken into account.

⁷ In Servaes' study (1991), bidder's q ratio fails to enter the regression significantly.

Characteristics derived from earlier research into the efficiency theory that serve to explain goodwill from value creation, and their expected effect on goodwill, are shown in Table 1. The table shows that relatedness of business and relative size of target to acquirer are characteristics of operating synergies. From previous studies it flows that operating synergies are higher when acquirer and target are in the same industries. It further follows that operating synergy effects are higher when the target company is smaller in comparison to the acquiring company. A characteristic of financial synergies is the difference in leverage between target and acquirer. Discrepancy between the two firms' levels of financial stringency can make a merger valuable. In line with the results of Slusky and Caves (1991) in this research, a primacy in acquirer's slack is expected, although in theory it is stated that a merger can absorb the slack from either partner. Further, in line with the improved management hypothesis it is expected that the value potentially created by an acquisition and thus the maximum premium paid should increase with acquirer's management performance. It is further expected that the maximum premium paid should increase with the target's management underperformance, as management improvement opportunities can then be achieved. In accordance with other studies, the quality of management of both acquirer and target is expressed by Tobin's q.

Table 1: Goodwill and value creation: characteristics from the efficiency theory

Value creation from	Characteristics	Effect on goodwill
Operating synergies	Relatedness of business	Positive
	Relative size of target to acquirer	Negative
Financial synergies	Difference in leverage target to acquirer	Positive
Improved management	Acquirer Tobin's q or market to book value	Positive
	Acquirer Tobin's q or market to book value	Negative

From this state of the art of research on value creation by mergers and acquisitions, when applying the efficiency theory to purchased goodwill, hypotheses 1 to 3 are formulated. These hypotheses correspond to research question II and sub-question II a, and read as follows.

- Hypothesis 1: The more operating synergy that emerges from the acquisition, the higher the amount of purchased goodwill will be.
- Hypothesis 2: Financial synergy resulting from an acquisition positively influences the amount of purchased goodwill.
- Hypothesis 3: If target's management improves by the acquisition, a higher amount of purchased goodwill is paid.

To control for the effect of the characteristics of other theories explaining mergers and acquisitions, other acquisition theories and factors are also to be taken into account when analysing purchased goodwill as a measure of value creation.

Table 2 summarizes these theories or factors taken into account and the accompanying characteristics. These characteristics are derived from earlier research into the empire-building theory and bargaining.

Among the characteristics to test for the empire-building theory are the fraction of acquirer's shares and the fraction of the target's shares held by corporate officers and members of the board of directors. Regarding the effect these characteristics have on goodwill, Slusky and

Caves (1991) and Datta et al. (2001) are followed. They show that the acquiring firms fare worse the lower the fraction of shares their managers hold. With a lower fraction of shares, they are prepared to overpay for the acquisition, which leads to higher goodwill amounts. The bid premium will therefore decrease with fraction of shares held. A comparable line of reasoning can be employed on target firms. The incentive alignment hypothesis argues that target firms owners fare worse, the lower the fraction of shares target's managers hold. A higher fraction of share ownership will reduce empire-building and increase incentive alignment. As a result, fewer opportunities are available for acquiring companies for value creation, resulting in lower purchased goodwill amounts. It is further argued that debt financing disciplines management, leading to lower purchased goodwill amounts. The other factors taken into account mainly regard the bargaining position of acquiring and target company.

Table 2: Goodwill and value creation: control variables derived from other theories

Factors to control for	Characteristics	Effect on goodwill
Empire-building	Fraction of acquirer's shares held by corporate officers and members of the board of directors	Negative
	Fraction of target's shares held by corporate officers and members of the board of directors	Negative
	Acquirer's leverage	Negative
Bargaining	Form of payment: cash	Positive
	Form of acquisition: tender	Positive
	Number of bidders	Positive
	Resistance to the offer (hostile offer)	Positive

Regarding the form of payment, a positive effect of cash payment on purchased goodwill is expected: as gains on cash payments are taxed, relatively higher compensations when paying in cash are expected. Further, it is expected that a tender offer positively influences purchased goodwill, as higher control premiums are involved when compared to mergers. Finally, the number of bidders and target management's resistance to the offer are expected to positively influence purchased goodwill.

5. MODEL

The research into goodwill measuring value creation of acquisitions after new regulation affecting reporting on purchased goodwill came into force is carried out in three steps.

First, the relationship between goodwill and value creation of acquisitions is examined by correlating purchased goodwill to stock excess returns surrounding the acquisition announcement. The corresponding expression is as follows.

$$\rho(\text{goodwill}, \text{excess return amount}_x)$$

Here x stands for target, acquirer, or combination of target and acquirer.

In order to convince target shareholders to sell their shares to the acquiring company, share premiums need to be paid. Consequently, target stock excess return amounts are expected to be positive numbers. When acquiring companies aim at value-creating acquisitions and benefiting their own shareholders, the acquirers' excess return amounts surrounding the acquisition announcement are positive numbers, or at least add to zero, depending on the bargaining position of acquirer and target. The resulting combined stock excess return

amounts are positive numbers. The moment the combined stock excess return amounts turn into negative numbers, business combinations are destructing value.

It follows that correlation coefficients between purchased goodwill and target stock excess return amounts are expected to be positive. The signs of the correlation coefficients between purchased goodwill and acquirer stock excess return amounts and between purchased goodwill and combined stock excess return amounts are uncertain.

Positive signs or insignificant signs⁸ in the case of the correlation between goodwill and acquirer excess amounts are first indicators of relationships between goodwill and value creation of acquisitions. Regarding the correlation between purchased goodwill and acquirer or combined stock excess returns, negative signs point to relationships between goodwill and overpayment for acquisitions.

Correlations of goodwill and excess returns are performed for different event periods, varying from the day of the acquisition announcement (t=0) to an event period window of eleven days, starting from five days before the announcement and lasting until five days after (t=-5,+5).

Second, bivariate analyses between relative goodwill, characteristics indicating value-creating acquisitions, and other characteristics affecting purchase price and goodwill are carried out. This analysis gives an impression of the extent of the explanatory variables when explaining goodwill.⁹

The corresponding expression reads as follows.

ρ (*relative goodwill*, X_i)

Here X_i resembles the explanatory characteristics for goodwill.

Characteristics that are to be distinguished, and, between brackets, the sign of their expected correlations with relative goodwill amounts, are, regarding the efficiency theory:

- characteristics of operating synergies, represented by the relatedness of businesses of acquiring and target company (+), and by the relative size of the target company to the acquiring company (-);
- characteristics of financial synergies, represented by the difference between the debt-assets ratios of the target company and the acquiring company (+);
- characteristics of improved management, represented by acquiring company's Tobin's q (+), and target's company Tobin's q (-);

Other characteristics that are taken into account are:

- characteristics of empire-building, represented by the acquiring company's debt assets ratio (-), and the percentage of shares owned by the executives of the acquiring company (-);
- characteristics of other factors, representing the source of financing (+ in case of cash financing), and the form of the acquisition (+ in case of tender offer).

⁸ Bargaining factors may turn the correlation coefficient between purchased goodwill and acquirer stock excess returns into insignificance.

⁹ However, they will not provide information on cause and effect. Furthermore, it cannot report on whether these connections also hold in combination with other characteristics.

Third, multivariate analyses are carried out by performing multivariate regressions of purchased goodwill on characteristics indicating value-creating acquisitions, both with and without control variables for other characteristics. In the multivariate analyses three groups of regression models are used.

- I Models of goodwill as a measure of value creation explained from the efficiency theory (models 1 to 3);
- II Models of goodwill explained from the empire-building theory and bargaining (model 4 and model 5);
- III The final model of goodwill as a measure of value creation explained from the efficiency theory controlling for empire-building and bargaining, representing the general model 6.

To control for effects on goodwill by the industry the target is in, all models include an industry dummy, classifying the target companies into services industries (D=1) and other industries (D=0).

The corresponding expression is as follows.

$$\text{relative goodwill} = f(\text{efficiency theory, empire-building theory, bargaining, industry})$$

I. Goodwill explained from the efficiency theory

Regarding equations explaining goodwill as a measure of value creation without control effects, three models are available:

- Model 1 explaining goodwill from operating synergies;
- Model 2 explaining goodwill from financial synergies, and
- Model 3 explaining goodwill from improved management.

Model 1 contributes to answering hypothesis 1. Relatedness of business and relative size of the target to the acquirer are viewed as indicators of operating synergies: relatedness of business is expected to create value, whereas it is expected that relative size is negatively related to value creation.

Model 1: operating synergy

$$\text{relative_goodwill} = \beta_0 + \beta_1 * D_{\text{same_sector}} + \beta_2 * \text{relative_size} + \beta_3 * D_{\text{target_services}} + \varepsilon$$

relative_goodwill = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

$D_{\text{same_sector}}$ = dummy set to one if acquirer and target are in the same industry (first two digits of the four digits SIC code are the same);

relative_size = value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the fiscal year preceding the acquisition;

$D_{\text{target_services}}$ = dummy variable set to one if the target company is in the services industry.

Model 2 responds to hypothesis 2. The characteristic used to measure financial synergy is the difference in financial leverage between target and acquirer. This difference in financial

leverage is expected to be positively related to value creation, as it is creating chances for financial synergies. Adding a quadratic term results in more flexibility to the effect of difference in financial leverage on goodwill - either an increasing or decreasing positive marginal effect. The model is as follows:

Model 2: financial synergy

$$relative_goodwill = \beta_0 + \beta_1 * dif_debt_assets + \beta_2 * (dif_debt_assets)^2 + \beta_3 * D_{target_services} + \varepsilon$$

relative_goodwill = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

dif_debt_assets = the difference between the debt-assets ratios of target and acquirer;

D_target_services = dummy variable set to one if the target company is in the services industry.

Model 3 addresses hypothesis 3. It measures the effect of quality of acquirer's and target's management on relative goodwill. Quality of management is measured by Tobin's q.¹⁰ Acquisitions are classified into four groups, depending on the quality of acquirer's and target's management, three of which are included in the model: (a) low acquirer Tobin's q and high target Tobin's q, (b) high acquirer Tobin's q and low target Tobin's q, (c) high acquirer Tobin's q and high target Tobin's q, and (d) low acquirer Tobin's q and low target Tobin's q.¹¹ It is expected that the combination of high quality acquirer's management with low quality target's management is most value-creating when compared to the combination of low quality target's management with low quality acquirer's management, the former therefore leading to the highest relative goodwill. As it is assumed that the combination of low quality target's management with low quality acquirer's management is the least value-creating or even value-destructing, the other two combinations (low quality acquirer's management/high quality target's management and high quality acquirer's management/high quality target's management) are also expected to positively influence relative goodwill. Model 3 runs in the following order:

Model 3: management improvement

$$relative_goodwill = \beta_0 + \beta_1 * D_{low_thigh_tobin's_q} + \beta_2 * D_{ahigh_tlow_tobin's_q} + \beta_3 * D_{ahigh_thigh_tobin's_q} + \beta_4 * D_{target_services} + \varepsilon$$

relative_goodwill = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

¹⁰ To check the robustness of the data, additionally some sensitivity analyses are carried out, in which alternative measures of quality of management are used. Among them are (i) the average income growth of the acquiring company, (ii) the difference of average income growth between the target company and the acquiring company, and (iii) Tobin's q of the acquiring company and Tobin's q of the target company (ratios instead of dummies representing combinations).

¹¹ One of the four groups is not included as a variable in the equation, namely the combination of low quality target's management with low quality acquirer's management, and therefore serves as reference point for the other three groups.

$D_{low_high_Tobin's_q}$ = dummy variable set to one for the combination acquirer low Tobin's q target high Tobin's q;

$D_{high_low_Tobin's_q}$ = dummy variable set to one for the combination acquirer high Tobin's q target low Tobin's q;

$D_{high_high_Tobin's_q}$ = dummy variable set to one for the combination acquirer high Tobin's q target high Tobin's q;

$D_{target_services}$ = dummy variable set to one if the target company is in the services industry.

II. Goodwill explained from the empire-building theory and bargaining

As found in literature, other variables might also influence the purchase price of an acquisition and therefore goodwill. Among them are agency behaviour of acquirer's management and bargaining factors.

Model 4 concerns the effect of acquirer's management agency behaviour on relative goodwill. It measures whether management disciplining factors do limit management discretion, resulting in a lower purchase price and consequently in a lower goodwill amount. Variables involved are the debt-assets ratio of the acquirer, as debt may discipline management, and percentage of shares possessed by acquirer's management, as managerial share ownership may align managerial and shareholders' interests. The model is as follows:

Model 4: Empire-building

$$relative_goodwill = \beta_0 + \beta_1 * debt_assets_acquirer + \beta_2 * perc_shares_management_acquirer + \beta_3 * D_{target_services} + \varepsilon$$

$relative_goodwill$ = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

$debt_assets_acquirer$ = debt-assets ratio acquirer end of fiscal year prior to the acquisition;

$perc_shares_management_acquirer$ = percentage of shares possessed by acquirer's management;

$D_{target_services}$ = dummy variable set to one if the target company is in the services industry.

Model 5 measures how bargaining factors might influence relative goodwill. As it is argued that the method of payment has an impact on the purchase price, two forms of payment are added to the model: percentage of cash and percentage of financing by other means than cash or stock. Stock payment serves as the reference category. It is expected that cash payments positively influence goodwill when compared to stock payments. Furthermore, it is assumed that when compared to a merger, a tender offer will have a positive impact on purchased goodwill, as all target shareholders will then receive a control premium. This results in the following model 5.

Model 5: bargaining

$$\begin{aligned} \text{relative_goodwill} = & \beta_0 + \beta_1 * \text{perc_of_cash} + \beta_2 * \text{perc_of_other} + \beta_3 * D_{\text{tender_offer}} \\ & + \beta_4 * D_{\text{target_services}} + \varepsilon \end{aligned}$$

relative_goodwill = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

perc_of_cash = percentage of cash payment for the acquisition;

perc_of_other = percentage of payment for the acquisition other than cash or equity;

$D_{\text{tender_offer}}$ = dummy set to one if the acquisition is a tender offer;

$D_{\text{target_services}}$ = dummy variable set to one if the target company is in the services industry.

III. General model

All variables are gathered together in general model 6. General model 6 measures the effect of operating and financial synergies and of management improvement on relative goodwill, thereby controlling for agency and bargaining effects. General model 6 runs as follows:

General model 6: general model

$$\begin{aligned} \text{relative_goodwill} = & \beta_0 + \beta_1 * D_{\text{same_sector}} + \beta_2 * \text{relative_size} + \beta_3 * \text{dif_debt_assets} \\ & + \beta_4 * (\text{dif_debt_assets})^2 + \beta_5 * D_{\text{alow_thigh_tobin's_q}} + \beta_6 * D_{\text{ahigh_tlow_tobin's_q}} \\ & + \beta_7 * D_{\text{ahigh_thigh_tobin's_q}} + \beta_8 * \text{debt_assets_acquirer} \\ & + \beta_9 * \text{perc_shares_management_acquirer} + \beta_{10} * \text{perc_of_cash} \\ & + \beta_{11} * \text{perc_of_other} + \beta_{12} * D_{\text{tender_offer}} + \beta_{13} * D_{\text{target_services}} + \varepsilon \end{aligned}$$

relative_goodwill = goodwill related to (1) the purchase price or (2) the value of the transaction of the acquisition;

$D_{\text{same_sector}}$ = dummy set to one if acquirer and target are in the same industry (first two digits of the four digits SIC code are the same);

relative_size = value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the fiscal year preceding the acquisition;

dif_debt_assets = the difference between the debt-assets ratios of target and acquirer;

$D_{\text{alow_thigh_Tobin's_q}}$ = dummy variable set to one for the combination acquirer low Tobin's q target high Tobin's q;

$D_{\text{ahigh_tlow_Tobin's_q}}$ = dummy variable set to one for the combination acquirer high Tobin's q target low Tobin's q;

$D_{\text{ahigh_thigh_Tobin's_q}}$ = dummy variable set to one for the combination acquirer high Tobin's q target high Tobin's q;

debt_assets_acquirer = debt assets ratio acquirer end of fiscal year prior to the acquisition;

perc_shares_management_acquirer = percentage of shares possessed by acquirer's management;

perc_of_cash = percentage of cash payment for the acquisition;

perc_of_other = percentage of payment for the acquisition other than cash or equity;

D_{tender_offer} = dummy set to one if the acquisition is a tender offer;

$D_{target_services}$ = dummy variable set to one if the target company is in the services industry.

Some of the variables for value creation and the control variables that flow from the previous section cannot be taken into consideration in this research due to a low number of relevant observations or a low frequency of certain events. Among them are the percentage of shares owned by all executives in the target company, the number of bidders for the target company, and target management's attitude to the offer.

Although 239 out of 266 observations providing goodwill information also obtain information from Compustat for both acquirer and target, Compustat information is not equally extensive for all observations. When restricting the research to observations providing information on all Compustat data necessary to compose the explanatory variables needed to perform the regressions, the number of observations is further cut down to a minimum of 108.¹²

In this research, regressions are performed:

- (1) With the observations that provide information on the data (limited number of observations).
- (2) With all available observations, thereby correcting for missing data by means of dummy variables.

6. DATA

The initial sample of mergers and acquisitions was compiled from the Securities Data Company's (SDC Platinum) database. Mergers and acquisitions selected were between US publicly quoted companies to which US GAAP apply, with announcement dates as well as effective dates between January 2002 and December 2005 (time period 2002-2005).

This group concerns mergers and acquisitions after SFAS 141 and SFAS 142 were adopted. When selecting the observations, it was further required that the form of the deal was an acquisition, an acquisition of assets, or a merger. Mergers and acquisitions in which acquirer, target or both are financial companies (1-digit SIC code 6) were removed because of dissimilarities in regulation in the financial industry when compared to the other industries. Only mergers and acquisitions in which 100 percent of the shares were acquired were considered. The resulting sample consists of 389 observations on mergers and acquisitions. Information about purchased goodwill amounts was derived by accurately analysing the notes to the financial statements in the acquiring companies' 10-K form annual reports. These annual reports are available with the Securities and Exchange Commission's (SEC's) filings and forms (EDGAR filings and forms).

The search for information on data concerning these amounts and the removal of outliers eventually yielded 265 observations with usable data on goodwill.

Information on financial data from the annual reports of the companies and on managerial ownership was obtained from the Compustat North America Database.

Another provider of data for the in-depth research was the Center for Research in Security Prices (CRSP). CRSP reports on daily stock prices and stock returns. To gather the information that is required to calculate stock excess returns, listings were needed of acquirer and target on this database for 205 days before the announcement date and ten days after it. Table 3 lists the number of observations available for testing when these additional requirements were fulfilled.

Table 3: Number of observations available from CRSP and Compustat

Number of observations time period 2002-2005		
Combined with data about goodwill and purchase price from 10-K forms in EDGAR	265	
Combined with acquirer data available in CRSP	251	
Combined with target data available in CRSP	214	
Combined with both acquirer and target data available in CRSP	207	
Combined with Compustat data on acquirer and target	Max 239	Min 108

It turned out that of the 265 observations of mergers and acquisitions with data on goodwill and purchase price, 251 cases provided information about acquirer stock returns, 214 cases informed on target stock returns, and 207 cases reported on both acquirer and target stock returns in CRSP. Further, 239 observations also supply information from Compustat for both acquirer and target. Compustat information is not equally extensive for all cases. When performing multivariate regressions, this further lowers the number of observations to a minimum of 108.

To preclude the loss of observations in multivariate regressions in addition to the regressions with a lower number of observations, regressions will also be performed with all available observations, thereby correcting for missing data by means of dummy variables.

The dependent variables are the focus of the research. Data on goodwill were derived by own research work on the notes to the financial statements in the 10-K forms of the acquiring companies with EDGAR filings and forms. Thus collected data are unique in their kind, as in conventional databases no information is available on purchased goodwill amounts. The measure of relative goodwill was derived by dividing the amount of purchased goodwill by the value of transaction of the acquisition.

Table 4 provides information on the dependent variable and the explanatory variables that were selected for the analyses of the acquisitions.

Table 4: Descriptives full sample

Variable	N	Freq.	Mean	Std. Dev.	Min.	Max.
Dependent variables						
Goodwill*	265		602,821	1,312,062	57	12,343,000
Value of transaction*	265		960,730	1,869,600	2,278	14,732,640
Relative goodwill (divided by value of transaction)	265		0.598	0.362	0.007	2.346
Explanatory variables						

Variable	N	Freq.	Mean	Std. Dev.	Min.	Max.
Operating synergies						
Relative size	251		41.71%	50,22%	0,62%	278,51%
Same sector (2 digit SIC-code)	26513	96 169	0.638	0.482	0	1
<ul style="list-style-type: none"> • no • yes 						
Financial synergies						
Difference debt assets ratio target and acquirer	192		0.080	0.356	-0,626	2,655
Squared difference debt assets ratio target and acquirer	192		0.133	0.554	0	7,046
Management improvement						
Acquirer Tobin's q	250		2.180	1.349	0.674	11.199
Target Tobin's q	187		2.045	1.611	0.448	15.505
Dummy acquirer Tobin's q	250		0.504	0.501	0	1
Dummy target Tobin's q	187		0.535	0.500	0	1
Acquirer – target Tobin's q:	176	56 35 25 60				
<ul style="list-style-type: none"> • low - low • low – high • high – low • high – high 						
Empire-building						
Acquirer debt-assets ratio	253		0.451	0.282	0,043	2,708
Percentage of shares owned by executives acquirer	155		1.80%	4.67%	0,00%	38,41%
Bargaining						
Source of financing	265		50.86% 43.04% 6.10%	43.67% 43.58% 15.02%	0% 0% 0%	100% 100% 81,34%
<ul style="list-style-type: none"> • cash • stocks • other securities 						
Tender offer: yes/no	265	48 221	0.177	0.383	0	1
<ul style="list-style-type: none"> • tender offer • other 						
Merger: yes/no	265	256 9				
<ul style="list-style-type: none"> • merger • other 						
Industry						
Classification of industry target into	266	112 154				
<ul style="list-style-type: none"> • services • other 						
Classification of industry target into	266	132 134				
<ul style="list-style-type: none"> • technology • other 						

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005 and that provide information on purchased goodwill, purchase price, and value of transaction. The number of acquisitions providing information on the variables ranges between 155 and 265 per variable. The variables are categorized into dependent variables, and explanatory variables, divided into operating synergy, financial synergy, management improvement, empire-building, bargaining and industry. Relative goodwill is defined as goodwill divided by the transaction value of the acquisition. Relative size of target to acquirer is calculated as the value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the previous fiscal year. The same sector dummy refers to the relatedness of businesses of acquirer and target and

counts one if the first two digits of the four-digit SIC code of acquirer and target are the same. The difference between the debt- assets ratios of target and acquirer is derived by deducting acquirer's debt-assets ratio from target's debt-assets ratio. Acquirer and target debt-assets ratios were obtained by dividing total liabilities by the total assets, using book ratios. Tobin's q is calculated as market value of the assets divided by their book value. Dummy Tobin's q is a dummy variable set to one if the firm's Tobin's q is above its median value. Tobin's q is defined to be high if Dummy Tobin's q counts one. Acquirer – target to Tobin's q refers the combination of Tobin's qs of acquirer and target. Low-low refers to an acquisition where acquirer's Tobin's q and target's Tobin's q are both low. Target companies are classified into services industry and technology industry.

Source: Information on mergers and acquisitions, their value of transaction, source of financing, acquisition form, and acquisition technique is derived from SDC Platinum. Information on purchased goodwill is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Other balance sheet and income statement data of the acquiring and the target company in the year(s) preceding the acquisition are provided by Compustat North America.

Table 5 shows the stock excess returns surrounding the acquisition announcement of the acquiring company, the target company, and the combination of acquiring company and target company.

Table 5: Descriptives stock excess returns of acquisitions

Variables	N	Mean	Std.Dev.	Min	Max
Stock excess returns (event window)					
Acquirer stock excess return (0)	251	-0.66%	4.93%	-26.32%	.2080368
Acquirer stock excess return (-1, 1)	251	-1.14%	8.12%	-30.63%	.2621596
Acquirer stock excess return (-2, 2)	251	-1.37%	9.55%	-38.28%	32.49%
Acquirer stock excess return (-3, 3)	251	-1.40%	10.65%	-41.81%	41.40%
Acquirer stock excess return (-5, 5)	251	-1.20%	11.15%	-32.02%	28.07%
Target stock excess return (0)	214	5.13%	14.39%	-32.97%	91.05%
Target stock excess return (-1, 1)	214	16.20%	24.13%	-31.39%	117.74%
Target stock excess return (-2, 2)	214	22.65%	30.09%	-39.38%	237.67%
Target stock excess return (-3, 3)	214	24.96%	31.04%	-47.65%	242.61%
Target stock excess return (-5, 5)	214	26.45%	31.99%	-58.82%	248.56%
Combined stock excess return (0)	207	-0.68%	4.35%	-24.52%	24.58%
Combined stock excess return (-1, 1)	207	1.06%	7.49%	-22.70%	25.05%
Combined stock excess return (-2, 2)	207	1.09%	8.67%	-26.52%	28.50%
Combined stock excess return (-3, 3)	207	1.25%	10.00%	-35.30%	32.08%
Combined stock excess return (-5, 5)	207	1.77%	10.80%	-36.73%	31.39%
Stock excess return amounts (event window)*					
Acquirer stock excess return amount (0)	251	-598	230,694	-1,399,359	2,380,376
Acquirer stock excess return amount (-1, 1)	251	-27,178	442,920	-2,361,068	2,902,515
Acquirer stock excess return amount (-2, 2)	251	-35,881	705,628	-4,841,907	6,212,236
Acquirer stock excess return amount (-3, 3)	251	-92,107	940,006	-6,128,654	4,922,827
Acquirer stock excess return amount (-5, 5)	251	-78,391	987,068	-6,083,558	8,149,828
Target stock excess return amount (0)	214	17,538	87,866	-152,545	870,030
Target stock excess return amount (-1, 1)	214	68,119	181,168	-533,650	1,290,349
Target stock excess return amount (-2, 2)	214	81,855	179,207	-398,968	1,498,527
Target stock excess return amount (-3, 3)	214	92,880	192,388	-695,100	1,079,109
Target stock excess return amount (-5, 5)	214	86,671	195,298	-1,303,203	919,119
Combined stock excess return amount (0)	207	15,521	243,216	-646,834	2,403,052

Variables	N	Mean	Std.Dev.	Min	Max
Combined stock excess return amount (-1, 1)	207	27,113	485,112	-2,894,719	2,924,218
Combined stock excess return amount (-2, 2)	207	28,422	754,926	-4,730,850	6,238,901
Combined stock excess return amount (-3, 3)	207	-25,254	996,894	-5,124,976	5,633,762
Combined stock excess return amount (-5, 5)	207	-16,057	1,086,105	-5,376,946	8,876,613

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005. Of these acquisitions, 251 cases provided information about acquirer stock returns, 214 cases informed on target stock returns, and 207 cases reported on both acquirer and target stock returns.

Acquirer and target stock excess return amounts are derived by multiplying stock excess returns of the companies by their market capitalizations one day before the start of each event window. Combined stock excess return amounts are calculated by multiplying acquirer and target stock excess returns with their market capitalizations one day before the start of each event window time period.

Acquirer and target stock excess returns are measured using the ordinary least squares (OLS) market model. Stock excess returns are calculated according to OLS market model (parameters estimated over (-205-6) interval, using equally weighted market index returns. The event windows used to calculate the cumulative excess returns are one-day (0), three-day (-1,+1), five-day (-2,+2), seven-day (-3, +3), and eleven-day (-5, +5) time period, respectively). Combined stock excess returns were calculated by dividing the combined stock excess returns amount by the total market capitalization of acquirer and target one day before the start of each event window time period.

Source: Information on mergers and acquisitions is derived from SDC-Platinum, and information on goodwill is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Information on stock returns is provided by CRSP.

**Amounts are in \$1,000*

The excess returns were derived by using the the OLS market model. The parameters for the OLS market model are estimated over the (-205, -6) interval, using the CRSP equally weighted market index returns. The event windows used to calculate the cumulative stock excess returns are one-day (0), three-day (-1,+1), five-day (-2,+2), seven-day (-3, +3), and eleven-day (-5, +5) time periods respectively. Combined stock excess returns of acquirer and target were calculated by multiplying their stock excess returns with their market capitalization one day before the start of each event window time period, and by dividing this amount by their total market capitalization one day before the start of each event window time period.¹⁴ In addition, Table 5 provides information on the stock excess return amounts of acquirer, target, and the combination of acquirer and target. Stock excess return amounts are derived by multiplying stock excess returns of the companies by their market capitalizations one day before the start of each event window.

7. RESULTS

In this section, the results of the research into goodwill measuring value creation of acquisitions are discussed.

First, the outcomes of the correlations between purchased goodwill and stock excess returns surrounding the acquisition announcement are reviewed. Subsequently, the correlations between relative goodwill, characteristics indicating value-creating acquisitions, and other characteristics affecting purchase price and goodwill are examined. Thereafter, the results of the multivariate regressions of purchased goodwill are discussed

Results correlations goodwill and stock excess return amounts

Table 6 shows the correlation coefficients between goodwill and stock excess return amounts of the acquirer, the target, and the combination of acquirer and target.

¹⁴ In other words, one, two, three, four, and six days before the announcement day of the acquisition respectively.

Table 6: Correlation between goodwill and excess return amounts

Event period	Correlation goodwill and excess return amount target (p value)	Correlation goodwill and excess return amount acquirer (p value)	Correlation goodwill and excess return amount combination (p value)
event period (0) (one day)	0.056 (0.412)	-0.005 (0.942)	0.005 (0.945)
event period (-1, +1) (three days)	0.231*** (0.001)	-0.190*** (0.003)	-0.113 (0.105)
event period (-2, +2) (five days)	0.434*** (0.000)	-0.172*** (0.006)	-0.078 (0.263)
event period (-3, +3) (seven days)	0.682*** (0.000)	-0.409*** (0.000)	-0.298*** (0.000)
event period (-5, +5) (eleven days)	0.485*** (0.000)	-0.392*** (0.000)	-0.313*** (0.000)

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005. Of these acquisitions, 251 cases provided information about acquirer stock returns, 214 cases informed on target stock returns, and 207 cases reported on both acquirer and target stock returns.

Goodwill refers to the amount of purchased goodwill involved in the acquisition. Acquirer and target stock excess return amounts are derived by multiplying stock excess returns of the companies by their market capitalizations one day before the start of each event window. Combined stock excess return amounts are calculated by multiplying acquirer and target stock excess returns by their market capitalizations one day before the start of each event window time period. Acquirer and target stock excess returns are measured using the ordinary least squares (OLS) market model. Stock excess returns are calculated according OLS market model (parameters estimated over (-205-6) interval, using equally weighted market index returns. The event windows used to calculate the cumulative excess returns are one-day (0), three-day (-1,+1), five-day (-2,+2), seven-day (-3, +3), and eleven-day (-5, +5) time periods, respectively. Combined stock excess returns were calculated by dividing the combined stock excess returns amount by the total market capitalization of acquirer and target one day before the start of each event window time period.

The table reports correlation coefficient estimates and, in parentheses, p-values. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) respectively.

Source: Information on mergers and acquisitions is derived from SDC-Platinum, and information on goodwill is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Information on stock returns is provided by CRSP.

The results show that four out of five correlation coefficients of the target and acquirer stock excess return amounts with goodwill are highly significant (p -value <0.01). Only for the one-day event period are target and acquirer correlation coefficients not significant.

In the other four event periods, as expected the correlation coefficients of target stock excess return amounts with goodwill turn out to be positive. The correlation coefficients increase with the event period, until the highest correlation coefficient is reached in the seven-day event period.

The correlation coefficients of the acquirer stock excess return amounts with goodwill are negative. The coefficient is most negative in the seven-day event period. The negative coefficients may point at a relationship between goodwill and overpayment for acquisitions, although from these negative associations it cannot be concluded that acquirer shareholders' excess returns are negative when goodwill amounts are higher: they can also be less positive or zero, still indicating value creation for the business combination.

The correlation coefficients of the excess return amounts of the combination with goodwill provide relevant information. Although the coefficients are significant in only two out of five event periods¹⁵, the negative coefficients of the significant correlations imply that acquisitions with high purchased goodwill amounts are less value-creating. This negative association between purchased goodwill and excess return amounts of the combination might indicate

¹⁵ These are the event periods with the longest time horizons: seven days and eleven days.

that other factors than value creation alone explain goodwill. This argues for the inclusion of characteristics on empire building and on bargaining in the regression analysis.

Regarding the correlations of goodwill with target's excess return amounts, acquirer's excess return amounts, as well as with combined stock excess return amounts, it emerges that their significance increases with the length of the event period. This finding may indicate that in the case of a longer event window, stock prices resemble more information regarding expectations of the value creation of the acquisition.

Results correlations relative goodwill and explanatory variables

Table 7 displays the correlation coefficients between relative goodwill amounts and explanatory variables, as well as their significance.

Table 7: Correlation between relative goodwill and each of the explanatory variables

Variables	Relative goodwill Coefficients (<i>p value</i>)^{a)}
Operating synergy	
Dummy same sector (1=yes)	-0.109* (0.077)
Relative size target to acquirer	-0.157** (0.013)
Financial synergy	
Difference debt-assets ratio target and acquirer	0.228*** (0.002)
Squared difference debt-assets ratio target and acquirer	0.037 (0.611)
Management improvement	
Acquirer Tobin's q	0.025 (0.689)
Target Tobin's q	0.114 (0.120)
Dummy acquirer Tobin's q	0.023 (0.724)
Dummy target Tobin's q	0.166** (0.023)
Acquirer – target Tobin's q	
• low – low	-0.165** (0.028)
• low – high	0.200*** (0.008)
• high – low	-0.016 (0.838)
• high – high	0.006 (0.941)
Empire-building	
Acquirer debt-assets ratio	0.0278 (0.660)
Percentage of shares owned by executives acquirer	-0.0633 (0.434)
Bargaining	
Source of financing	
• percentage of cash	-0.0329 (0.5936)

	Relative goodwill
Variables	Coefficients (p value)^{a)}
• percentage of stock	0.108* (0.080)
• percentage of other	-0.217*** (0.000)
Dummy tender offer (1=yes)	0.0447 (0.469)
Dummy merger (1=yes)	0.1186* (0.054)
Other	
Dummy target services (1=yes)	0.186*** (0.002)

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005 and that provide information on purchased goodwill, purchase price, and value of transaction. The number of acquisitions providing information on the variables ranges between 155 and 265 per variable.

Relative goodwill is defined as goodwill divided by the transaction value of the acquisition. The variables are categorized into operating synergy, financial synergy, management improvement, empire-building, bargaining, and other. Relative size of target to acquirer is calculated as the value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the previous fiscal year. The same sector dummy refers to the relatedness of businesses of acquirer and target and counts one if the first two digits of the four-digit SIC code of acquirer and target are the same. The difference between the debt-assets ratios of target and acquirer is derived by deducting acquirer's debt-assets ratio from target's debt-assets ratio. Acquirer and target debt-assets ratios were derived by dividing total liabilities by the total assets, using book ratios. Tobin's q is calculated as market value of the assets divided by their book value. Dummy Tobin's q is a dummy variable set to one if the firm's Tobin's q is above its median value. Tobin's q is defined to be high if Dummy Tobin's q counts one. Acquirer/target Tobin's q refers to the combination of Tobin's qs of acquirer and target. Low-low refers to an acquisition where acquirer's Tobin's q and target's Tobin's q both are low. The percentage of shares owned by the executives of the acquirer resembles the summary of percentages of shares possessed by the different executives. The tender offer dummy counts one if the acquisition technique is a tender offer. The dummy of the target services is set to one if the target company is in the services industry.

*The table reports correlation coefficient estimates and, in parentheses, p-values. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) respectively.*

Source: Information on mergers and acquisitions, their value of transaction, source of financing, acquisition form, and acquisition technique is derived from SDC Platinum. Information on purchased goodwill is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Other balance sheet and income statement data of the acquiring and the target company in the year(s) preceding the acquisition are provided by Compustat North America.

With regard to the characteristics of management improvement, in addition to the four different combinations of acquirer's and target Tobin's q can also be found Tobin's q of acquirer and target separately as well as their dummies.

Many correlations are in line with the expectations. The negative relationship between relative size of target to acquirer and relative goodwill supports the theory that operating synergies are higher when the target company is relatively small when compared to the acquiring company, as there are more opportunities for synergy effects. The positive correlation with the difference between the debt-assets ratio of target and acquirer for both relative goodwill is as assumed and supports a positive relationship between financial synergies and goodwill. Furthermore, the negative relationship with relative goodwill when both acquirer's and target's management are of low quality (low-low, measured by Tobin's q) is in line with the assumption that when both acquirer's and target's managements perform worse, no value is created.

Unexpected, however, is the negative relationship between relative goodwill and the same sector dummy. Perhaps the effect of managers diversifying for their personal benefits and

thereby prepared to overpay for an acquisition, as raised by Morck et al. (1990), outweighs the effect of synergies created by acquisitions in the same industry.

Further, the positive relationship between acquisitions of high quality target's management by low quality acquirer's management (low-high Tobin's q) and relative goodwill is other than expected. This correlation may indicate that improved management not only flows from acquirer to target, but can also flow from target to acquirer.

In addition, the positive association between target Tobin's q and relative goodwill indicate that high quality management of target companies has its value.

The negative correlation between relative goodwill and the source of financing, when it is other than stock or cash, indicates that compensation effects, regulation effects, personal taxes, or accounting treatments seem to prevail over personal taxes and agency effects.

The positive relationship between the form of the acquisition being a merger and relative goodwill is not in line with the arguments of Bradley and Kim (1985) who assert that control premiums paid in tender offers are higher when compared to mergers, which would imply that the relative amount of goodwill would be lower in the case of mergers. The research of Jensen and Ruback (1983) and Huang and Walkling (1987) also show reverse outcomes. Perhaps the relatively high number of mergers in the sample (256, see Table 4) give a distorted view. As expected, the positive correlation with target's industry dummy indicates that higher amounts of goodwill are paid in the services sector.

Results multivariate analyses

Table 8 gives the results of the regression analyses of relative goodwill (goodwill divided by the value of transaction) with the observations that provide information on all data. This number of observations is limited and observations that do provide information on other variables are lost. Therefore, regressions are also performed with all observations, thereby correcting for missing data. Table 9 presents the outcomes of the regressions of relative goodwill 2 with all observations, thereby correcting for missing data (n=265). The outcomes are discussed below.

It turns out that in all regressions, the coefficient of the target services dummy is highly significant and positive, indicating that goodwill payments in the services industries are higher when compared to other industries.

Regressions of relative goodwill with observations providing information on the data: limited number of observations

Table 8 shows the results of the regressions of relative goodwill when the number of observations is limited. In regression 1a the impact of relative size on relative goodwill becomes significant (at a 10% level). As expected, the negative coefficient indicates that operating synergies are higher when the target company is relatively small when compared to the acquiring company. There are more opportunities for synergy effects in this case. This outcome is *supports hypothesis 1*. The coefficient of the same sector dummy is significant at the 5 percent level, but this coefficient is in another direction than expected. This gives support for the argument put forward by Morck et al. (1990)¹⁶ that agency behaviour of managers may result in diversifying acquisitions and may lead them to overpay for those acquisitions. This argument seems to overrule the supposition that an acquisition is creating

value when target and acquirer are in the same industry and therefore increases relative goodwill.

Regression 2a shows that financial synergies do matter: the difference of the debt-assets ratio between target and acquirer positively influences relative goodwill (jointly significant, p-value=0.0025). This effect *supports hypothesis 2*.

The results of regression 3a testing for hypothesis 3, stating that value creation is derived from improved management, show a statistically significant positive coefficient of acquisitions of high Tobin's q targets by low Tobin's q acquirers, when compared to 'low Tobin's q acquirer/low Tobin's q target' acquisitions. Strikingly, acquisitions of low Tobin's q targets by high Tobin's q acquirers do not generate the highest excess returns to acquirer and combination when compared to 'low Tobin's q acquirer/low Tobin's q target' acquisitions. This may indicate that improved management also flows from target to acquirer, resulting in value creation and represented by higher amounts of purchased goodwill. The outcome then *provides evidence for hypothesis 3*. From a separate F-test it turns out that Tobin's q combinations are not jointly significantly different from zero (p=0.492). Remarkably, no significant effect of management improvement can be found in regression 6a.

In regression 4a, no effect of the acquirer's debt-assets ratio is measured, whereas in regression 6a the coefficient of the acquirer's debt-assets ratio is positive and significant at a 10 percent significance level. The sign of this coefficient is not in line with the expectations: a higher acquirer's debt-assets ratio was assumed to reduce acquirer management discretion, thereby limiting overpayment for the acquisition, and resulting in a lower goodwill. An alternative explanation for the negative coefficient might be that as financial leverage limits acquirer management's discretion, acquirer's management is focused on value-creating acquisitions, represented by higher goodwill amounts.

The negative coefficients of the percentage of payment in cash (regression 4a) and the percentage of payment in other forms than cash or stock (regression 4a and 6a) indicate that compensation effects, regulation effects, personal taxes, or accounting treatments seem to prevail over personal taxes and agency effects when using cash instead of stock to finance the acquisition.

Table 8: Results of regression analyses explaining relative goodwill (n=108-265)

	1a	2a	3a	4a	5a	6a
Variables	Coefficients (t-values)					
Operating synergies						
Dummy same sector (1=yes)	-0.089** (-2.09)					-0.055 (-0.96)
Relative size target to acquirer	-0.071* (-1.74)					-0.040 (-0.47)
Financial synergies						
Difference debt-assets ratio target and acquirer		0.370*** (4.14)				0.506*** (3.83)
Squared difference debt-assets ratio target and acquirer		-0.153*** (-2.67)				-0.197*** (-3.06)
Management improvement						
Low q acquirer– high q target			0.200*** (2.93)			0.093 (1.22)

	1a	2a	3a	4a	5a	6a
Variables	Coefficients (t-values)					
High q acquirer– high q target			0.066 (1.11)			-0.018 (-0.26)
High q acquirer– low q target			0.057 (0.74)			-0.013 (-0.15)
Empire-building						
Acquirer debt-assets ratio				0.016 (0.15)		0.267* (1.72)
Perc of shares owned by executives acquirer				-0.005 (-1.07)		0.012 (0.80)
Bargaining						
Perc. of cash					-0.001** (-1.99)	-0.001 (-0.84)
Perc. of other					-0.005*** (-3.70)	-0.006** (-2.18)
Dummy tender offer (1=yes)					0.054 (1.04)	0.044 (0.61)
Other						
Dummy target services (1=yes)	0.122*** (2.95)	0.087* (1.94)	0.093* (1.91)	0.163*** (3.47)	0.125*** (3.13)	0.168*** (2.98)
Constant	0.634*** (15.70)	0.542*** (18.32)	0.490*** (10.77)	0.546*** (9.29)	0.614*** (17.76)	0.508*** (4.40)
Observations	251	192	176	154	265	108
F-statistic	6.07	7.16	3.25	4.25	6.48	2.90
p-value	0.001	0.000	0.013	0.007	0.000	0.002
Adjusted R ²	0.057	0.088	0.049	0.060	0.077	0.187

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005 and that provide information on purchased goodwill, purchase price, and value of transaction. The number of acquisitions providing information on the variables varies between 155 and 265 per variable.

Due to this availability of information on the variables, the number of observations differs from 108 to 265.

The dependent variable relative goodwill is defined as goodwill divided by the transaction value of the acquisition. The variables are categorized into operating synergy, financial synergy, management improvement, empire-building, bargaining, and other. Relative size of target to acquirer is calculated as the value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the previous fiscal year. The same sector dummy refers to the relatedness of businesses of acquirer and target and counts one if the first two digits of the four-digit SIC code of acquirer and target are the same. The difference between the debt-assets ratios of target and acquirer is derived by deducting acquirer's debt-assets ratio from target's debt-assets ratio. Acquirer and target debt-assets ratios were derived by dividing total liabilities by the total assets, using book ratios. Tobin's q is calculated as market value of the assets divided by their book value. Dummy Tobin's q is a dummy variable set to one if the firm's Tobin's q is above its median value. Tobin's q is defined to be high if Dummy Tobin's q counts one. Acquirer/target Tobin's q refers to the combination of Tobin's qs of acquirer and target. Low-low refers to an acquisition where acquirer's Tobin's q and target's Tobin's q both are low. The percentage of shares owned by the executives of the acquirer resembles the summary of percentages of shares possessed by the different executives. The tender offer dummy counts one if the acquisition technique is a tender offer. The dummy of the target services is set to one if the target company is in the services industry.

The table reports OLS regression coefficient estimates and, in parentheses, t-statistics. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) respectively.

Source: Information on mergers and acquisitions, their value of transaction, source of financing, acquisition form, and acquisition technique is derived from SDC Platinum. Information on purchased goodwill and purchase price is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Other balance sheet and income statement data of the acquiring and the target company in the year(s) preceding the acquisition are provided by Compustat North America.

Overall, Table 8 shows a significant effect of relatedness of business (negative in regression 1a), relative size of target to acquirer (negative at 10 percent in 1a), difference between target's and acquirer's debt-assets ratio (positive in regressions 2a and 6a), percentage of financing the acquisition other than cash or equity (negative), and acquirer's debt-assets ratio (positive at 10 percent). The outcomes indicate that goodwill is positively influenced by operating synergies (relative size) and financial synergies, even after controlling for other characteristics.

Concluding, the weakly significant relative size coefficient in regression 1a indicates *poor evidence for hypothesis 1*. *Hypothesis 2 is supported* by both regressions 2a and 6a. Further, the significance of 'acquirer low Tobin's q/target high Tobin's q' dummy in regression 3a seems to *support hypothesis 3*. The slightly significant coefficient of the debt-assets ratio in regression 6a may support hypothesis 3, although also other explanations for the sign of these coefficients are available.

Regressions of relative goodwill with all observations (corrections for missing data)

Table 9 shows the outcomes of the regressions of relative goodwill on the explanatory variables (regressions 1b to 6b), after the sample has been corrected for missing data. Compared to the other regressions, these regressions show the largest number of significant coefficients.

Also here, regression 1b attracts notice as relative size is a weakly significant characteristic with a negative impact on purchased goodwill, *supporting hypothesis 1* that operating synergies are higher when the target company is relatively small when compared to the acquiring company, as there are more opportunities for synergy effects in this case. The negative coefficient of the dummy representing the relatedness of business again supports the theory of Morck et al. (1990) that empire-building behaviour of managers leads to diversifying acquisitions.

As expected, regression 2b *provides evidence for hypothesis 2*. This flows from the high significances (at 1 percent) of the differences of the debt-assets ratio of target and acquirer (jointly significant, p-value = 0.019), indicating that financial synergies play an important role when explaining goodwill.

Regression 3b shows that, similar to regression 3a, the significance of the 'acquirer low Tobin's q/target high Tobin's q' combination (positive coefficient) increases from a 5 percent significance to a 1 percent significance level in regression 3b, which again indicates that management improvement may also flow from target to acquiring company. These outcomes *support hypothesis 3*.

In regression 4b the debt-assets ratio no longer turns out to be a significant characteristic. Regression 5b, testing for bargaining factors influencing purchased goodwill, further confirms that the impact of the percentage of financing by cash and the percentage of financing other than by stock or cash is significant. Significances of these financing forms are higher than in the preceding regressions on bargaining.

Table 9: Results of regression analyses explaining relative goodwill (n=265)

	1b	2b	3b	4b	5b	6b
Variables	Coefficients (t-values)					
Operating synergies						
Dummy same sector (1=yes)	-0.081*					-0.089**
	-1.94					(-2.29)
Relative size target to acquirer	-0.072*					-0.010**
	-1.76					(-2.22)
Financial synergies						
Difference debt-assets ratio target and acquirer		0.369***				0.457***
		4.06				(4.96)
Squared difference debt-assets ratio target and acquirer		-0.155***				-0.180***
		-2.65				(-3.15)
Management improvement						
Low q acquirer– high q target			0.198***			0.151**
			(2.89)			(2.38)
High q acquirer– high q target			0.062			0.060
			(1.04)			(1.07)
High q acquirer– low q target			0.054			0.058
			(0.71)			(0.82)
Empire-building						
Acquirer debt-assets ratio				0.053		0.235***
				(0.74)		(3.21)
Perc. of shares owned by executives acquirer				-0.005		0.003
				(-0.91)		(0.47)
Bargaining						
Perc. of cash					-0.001**	-0.001***
					(-1.99)	(-2.90)
Perc. of other					-0.005***	-0.006***
					(-3.70)	(-4.57)
Dummy tender offer (1=yes)					0.054	0.048
					(1.04)	(0.95)
Other						
Dummy target services (1=yes)	0.119***	0.120***	0.118***	0.127***	0.125***	0.118***
	(2.91)	(3.07)	(2.95)	(3.15)	(3.13)	(3.08)
Constant	0.631***	0.529***	0.482***	0.544***	0.614***	0.598***
	(15.67)	(18.65)	(10.79)	(11.69)	(17.76)	(8.393)
Observations	265	265	265	265	265	265
F-statistic	4.36	6.85	3.61	2.31	6.48	4.75
	0.002	0.000	0.004	0.044	0.000	0.000
Adjusted R ²	0.049	0.082	0.047	0.024	0.077	0.204

The sample comprises 265 acquisitions that were announced and became effective in the time period 2002-2005 and that provide information on purchased goodwill, purchase price, and value of transaction. The number of acquisitions providing information on the variables initially ranged between 155 and 265 per variable. Regarding variables with missing observations, new variables are created, resembling the values of the available observations and valuing 0 when no observations are available. Each of the new variables is combined with a corresponding dummy variable reporting 1 when no observations are available and 0 elsewhere. These dummy variables are not displayed in this table. The dependent variable relative goodwill is defined as goodwill divided by

the transaction value of the acquisition. The variables are categorized into operating synergy, financial synergy, management improvement, empire-building, bargaining, and other. Relative size of target to acquirer is calculated as the value of transaction of the target divided by the equity market capitalization of the acquirer at the end of the prior fiscal year. The same sector dummy refers to the relatedness of businesses of acquirer and target and counts one if the first two digits of the four-digit SIC code of acquirer and target are the same. The difference between the debt-assets ratios of target and acquirer is derived by deducting acquirer's debt-assets ratio from target's debt-assets ratio. Acquirer and target debt-assets ratios were derived by dividing total liabilities by the total assets, using book ratios. Tobin's q is calculated as market value of the assets divided by their book value. Dummy Tobin's q is a dummy variable set to one if the firm's Tobin's q is above its median value. Tobin's q is defined to be high if Dummy Tobin's q counts one. Acquirer/target Tobin's q refers to the combination of Tobin's qs of acquirer and target. Low-low refers to an acquisition where acquirer's Tobin's q and target's Tobin's q both are low. The percentage of shares owned by the executives of the acquirer resembles the summary of percentages of shares possessed by the different executives. The tender offer dummy counts one if the acquisition technique is a tender offer. The dummy of the target services is set to one if the target company is in the services industry. Information on mergers and acquisitions, their value of transaction, source of financing, acquisition form, and acquisition technique is derived from SDC Platinum.

The table reports OLS regression coefficient estimates and, in parentheses, t-statistics. *, **, *** Indicate statistical significance at the 10 percent, 5 percent, and 1 percent levels (two-tailed) respectively.

Source: Information on purchased goodwill and purchase price is derived from the 10-K forms of the acquiring companies that are available from Edgar database (SEC). Other balance sheet and income statement data of the acquiring and the target company in the year(s) preceding the acquisition are provided by Compustat North America.

When compared to regression 6a, regression 6b shows two new significant effects: the coefficient of the dummy for relatedness of business (negative), and the coefficient of the relative size of target to acquirer (negative) are now both significant at the 5 percent level. Whereas the first coefficient indicates agency behaviour of acquirer's management, the second relationship indicates operating synergies, thereby *confirming hypothesis 1*. Moreover, regression 6b shows that in most cases the significances of the coefficients of most of the other characteristics that were significant in the earlier regressions regression 6a have further increased. This relates to the significance of the coefficient of the difference between targets and acquirer's debt-assets ratio (positive). The coefficient of this ratio is now significant at the 1 percent level (jointly significant, 0.0186), which indicates financial synergies and *supports hypothesis 2*. Furthermore, the coefficient of the acquirer's debt-assets ratio (positive) is now significant at the 1% level. Also the significance of the coefficient of the percentage of financing of the acquisition other than cash or equity (negative) has increased to the 1 percent level. This significance is the same as the significance of the coefficient of the percentage of cash financing (negative at a 1 percent level). The significantly positive effect of the 'acquirer low Tobin's q/target high Tobin's q' combination on purchased goodwill in regression 6b may be an indication of value creation by improved management, as it may denote that improved management not just flows from acquirer to target, but also from target to acquirer. Assuming this relationship, this outcome *supports hypothesis 3*. Also the positive significance of the acquirer's debt-assets ratio on purchased goodwill may point to value creation, as it can also be argued that a high debt-assets ratio decreases managerial discretion and directs acquirer's management into value-creating acquisitions, represented by higher purchased goodwill amounts. However, other explanations for the sign of these coefficients are also available.

Concluding, *hypothesis 1* is slightly *supported* by the relative size coefficient in regression 1b and strongly so by its coefficient in regression 6b. Other than expected, relatedness of business does not seem to lead to higher relative goodwill amounts from operating

synergies. In both regressions 2b and 6b the coefficient of the debt-assets ratio as well as its joint significance *provide evidence for hypothesis 2*. The significance of 'acquirer low Tobin's q/target high Tobin's q' dummy in regressions 3b and 6b *supports hypothesis 3*. The significances of the negative coefficients for payment in cash and payment in other forms as well as of the negative coefficient of the dummy for relatedness indicate that other factors also such as bargaining may influence relative goodwill amounts. The results show that *hypothesis 1 to 3 stand* after controlling for other characteristics.

Sensitivity analyses

To check the robustness of the analyses, regression analyses with different specifications were carried out.¹⁷ *First*, using models 1 to 6, regression analyses of relative goodwill 1 and 2 were carried out with the lowest number of valid observations: 108. This relates to the number of observations representing information on all characteristics involved and equals the number of observations in regression 6a. The regressions show the same pattern, but as expected with rather lower significance levels.

Second, in addition to the linear regression analyses, regression analyses of the log of relative goodwill 1 and 2 were also performed. These analyses show similar outcomes, although the adjusted R squared with these logistic regressions are slightly lower. The results of these regression analyses show that similar outcomes are reached through different specifications, which confirms the robustness of the analyses: the logarithm approach shows no considerable changes in the effect of the explanatory characteristics on relative goodwill.

Third, additional regressions were employed with alternative measures of some of the characteristics of the models. With regard to operating synergies, different measures of relative size of target to acquirer were used, for instance by measuring target's size by its market capitalization instead of by its value of transaction, and by introducing a logarithm of relative size of target to acquirer in conformity with the research of Servaes (1991).

Furthermore, the relatedness of business of target and acquirer was measured more concisely by comparing all four digits of the SIC code.

Regarding financial synergies characteristics, leverage differences between target and acquiring company were also measured using market values instead of book values. Regressions on financial synergies were run both including and excluding the squared differences between the leverage ratios of target and acquirer.

Regarding improved management characteristics, alternative measures of quality of management are used. Among them are (i) the average income growth of the acquiring company, presented by (i a) growth percentages, and (i b) dummy variables counting one if the average income growth of the acquiring company is above average; (ii) the difference in average income growth between the target company and the acquiring company, and (iii) Tobin's q of the acquiring company and Tobin's q of the target company, as shown by (iii a) separate ratios, and by (iii b) separate dummies set to one if the company's Tobin's q is above average, instead of dummies representing combinations. Moreover, an alternative measure used to calculate acquirer and target's quality of management was represented by (iv) dividing the market value of equity by its book value.

¹⁷ The results of these regression analyses are available upon request.

In addition, concerning the bargaining factors, a dummy variable counting one when the company was fully financed with 100 percent cash was also used.

Although the significance levels are a little lower, the regressions of relative goodwill amounts on these alternative measures show the same patterns, which indicate the robustness of the structural models.

8. CONCLUSIONS

In this research it was tested whether goodwill under the new accounting regime provides information on expected value creation of the acquisition. The reason for this research was that at the beginning of the 21st century, some important changes were introduced in the international standards of accounting affecting reporting on goodwill. The intentions of the standard-setting bodies in drafting these new rules were that the financial statements would better reflect the underlying economics of the acquired goodwill.¹⁸

First, purchased goodwill was correlated to stock excess return amounts surrounding the acquisition announcement. Second, correlations between relative goodwill, characteristics indicating value creating acquisitions, and other characteristics affecting purchase price and goodwill were carried out. Third, multivariate regressions of purchased goodwill were performed on these characteristics.

The research focused on acquisition theories that may contribute to explaining goodwill: characteristics of value-creating acquisitions (arising from the efficiency theory and relating to financial synergies, operating synergies, and improved management) and of other theories explaining goodwill were derived from literature concerning research on target stock returns and bid premiums.

The results of the correlations between purchased goodwill and stock excess returns surrounding the acquisition announcement show that four out of five correlation coefficients of the target and acquirer stock excess return amounts with goodwill are highly significant (p -value $< 0,01$). As expected the correlation coefficients of target stock excess return amounts with goodwill turn out to be positive. The correlation coefficient of the acquirer stock excess return amounts with goodwill is negative. Although the correlation coefficients of the combined stock excess return amounts with goodwill are significant in only two out of five event periods, the negative coefficients of the significant correlations may imply that acquisitions with high purchased goodwill amounts are less value-creating. This negative association between purchased goodwill and excess return amounts of the combination might indicate that other factors than only value creation explain goodwill. These negative signs may point to a relationship between goodwill and overpayment for acquisitions apart from value creation. Therefore, the results indicate that apart from value creation, other characteristics also play a role when explaining purchased goodwill.

The bivariate correlations of relative goodwill with characteristics of value-creating acquisitions are often significant and in line with expectations. The negative relationship between relative size of target to acquirer and relative goodwill supports the theory that operating synergies are higher when the target company is relatively small as there are more opportunities of synergy effects. The positive correlation of goodwill with the difference

¹⁸ SFAS 142, 2001, summary, 2.

between the debt-assets ratio of target and acquirer is as assumed and supports a positive relationship between financial synergies and goodwill. Also the negative relationship with goodwill when both acquirer's and target's management are of low quality as measured by Tobin's q is in line with the assumption that when both acquirer's and target's management perform worse, no value is created. Some relationships regarding value creation and goodwill are other than expected. Among them is the negative relationship between relative goodwill and the same sector dummy, indicating that the effect of agency behaviour exceeds the effect of synergies here. Also, the positive relationship between relative goodwill and acquisitions of high quality target's management by low quality acquirer's management is other than expected, although the positive impact on goodwill of this 'low acquirer Tobin's q/high target Tobin's q' combination can still be interpreted as value creation. In addition to these characteristics of value creation, other characteristics also seem to affect goodwill. Among them are the acquirer's debt-assets ratio, the source of financing and the form of the acquisition. These significant correlations indicate that relative goodwill is not just related to value-creating characteristics.

From the regressions on financial synergies without control variables, it turns out that financial synergies are met by higher purchased goodwill amounts. Regressions also show that improved management, represented by a 'low acquirer Tobin's q high target Tobin's q' combination leads to higher purchased goodwill amounts. It is then assumed that improved management not only flows from acquirer to target, but can also flow from target to acquirer, although the agency theory can also explain this relationship between 'low acquirer Tobin's q/high target Tobin's q' combination and purchased goodwill. The expected positive effect of improved management as represented by a 'high acquirer Tobin's q/low target Tobin's q' combination on purchased goodwill did not appear. The regressions on operating synergies without control variables also show an effect of operating synergies as measured by relative size (at a 10 percent level) on relative goodwill. Although the same sector dummy is significant, the sign of its coefficient does not support the expected positive relationship between operating synergies by relatedness of businesses and purchased goodwill but rather indicates agency behaviour.

After controlling for other characteristics, financial synergies remain to lead to higher purchased goodwill amounts. The most significant characteristics are found in the regression with corrections for missing data. In this regression the positive effect of improved management as resembled by a 'low acquirer Tobin's q/high target Tobin's q' combination on purchased goodwill also remains. It further shows a significant effect of operating synergies as measured by relative size on relative goodwill.

The acquirer's debt-assets ratio deserves special attention . Although it was expected that a higher debt-assets ratio would limit management discretion, thereby limiting overpayment for the acquisition and resulting in lower purchased goodwill amounts, from the regressions it results that a competing theory - that financial leverage limits acquirer management's discretion and directs it into value-creating acquisitions, represented by higher goodwill amounts - overrules.

From the negative coefficients of the same sector dummy, and of the form of financing it emerges that the empire-building theory and bargaining also contribute to an explanation of goodwill.

From the results it can be concluded that financial synergies and partly operating synergies explain purchased goodwill. Further, if it is proposed that improved management not only flows from acquirer to target but also from target to acquirer, improved management seems to be represented in purchased goodwill as well. These conclusions hold after controlling for other characteristics such as bargaining and agency motives. The results show that goodwill contains elements of value creation. Characteristics of value-creating acquisitions have a positive effect on purchased goodwill. Goodwill might be a measure of value creation. However, also other characteristics determine the amount of purchased goodwill

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