

Goodwill accounting and performance measurement

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Abstract

Purpose – The purpose of this paper is to outline the link between value creation, performance measurement and goodwill accounting according to the International Financial Reporting Standards (IFRS) and United States Generally Accepted Accounting Principles (US-GAAP). Since economic goodwill is identical to the present value of future residual income, the paper examines how accounting information gathered for impairment testing of goodwill according to International Accounting Standard (IAS) 36 and Financial Accounting Standard (FAS) 142 can be used for internal control purposes.

Design/methodology/approach – The paper adopts common assumptions in the literature of residual income-based valuation and analytically derives a periodic performance measure of both value creation and its realization based on information available from impairment testing.

Findings – This paper demonstrates that information required by IFRS and US-GAAP to evaluate a firm's goodwill can be used to design a performance measurement system which provides information about both value creation and realization of value.

Practical implications – From a practical perspective, the paper shows that appropriate adjustments of data used in impairment testing result in information which ideally fits the requirements of an optimal performance measurement system.

Originality/value – The paper presents a performance measure which provides information about the actual creation of value as well as its realization in a period and is superior to traditional residual income-based performance measures.

Keywords Goodwill accounting, Performance measurement (quality)

Paper type Research paper

1. Introduction

The impairment-only approach to goodwill accounting requires an annual determination of the value in use of the reporting units or cash generating units of a business. IAS (International Accounting Standard) 36.80 and FAS (Financial Accounting Standard) 142.30 require goodwill to be allocated to cash generating units, being the reporting units which benefit from the business combination and which represent the lowest level within the entity at which the goodwill is monitored for internal management purposes. Obviously, there is a link between goodwill allocation and internal management. Goodwill is monitored internally in order to achieve the benefits of the acquisition planned for initially. As the impairment-only approach is quite costly in its application, the issue arises whether the information gathered in this process can be used for managing the success of the acquisition and controlling the performance of these units in measuring and rewarding management performance.

From an economic point of view, goodwill is the surplus over a firm's net asset value and therefore identical to the net present value (NPV) of an investment. As such, goodwill is also identical to the present value of future economic rents or residual income (Ellis, 2001). Residual income is an important performance measure in value-based management. The value of goodwill is based on present values of future residual income, as is value-based management, and a close link between the two exists. In the process of impairment testing, goodwill is evaluated and this valuation is verified by

external auditors. As such, the resulting numbers may well be used for internal measurement and reward procedures. In this paper, we analyze how information gathered for impairment testing can be used for measuring and rewarding management performance in order to meet acquisition goals and preserve shareholder interests.

The main function of a performance measurement system is to provide information to managers in making economic decisions and inducing them to act in the interests of shareholders (Demski and Feltham, 1976). Managerial decision making not only requires forward-looking information, but also backward-looking performance measures which indicate the necessity as well as the direction of corrective action. A performance measure is used to evaluate the performance of a given period. It is used as an indicator of the success achieved during that period and is compared against earlier projections to reveal the necessity of corrective action. These measures are simultaneously used by principals to evaluate the performance of agents (stewardship function). Managers anticipate the way they are evaluated at a later point in time when making their decisions. Consequently, performance measures need to provide for this and induce the manager to act in the best interests of shareholders. This is why variants of residual income, such as economic value added (EVA[®]), a trademark of Stern and Stewart, play a prominent role: a manager will anticipate the expected future residual income generated by a particular decision, typically an investment decision. When the manager is evaluated or even rewarded based on residual income, he will make decisions which are dependent upon the present value of residual income, known to be identical to NPV (Preinreich, 1937)[1]. The manager's decision will therefore be consistent with the NPV rule, as long as his discount rate and time horizon are identical to the project's. This property of residual income is termed "goal congruence" in the literature (Reichelstein, 1997).

However, the residual income of a particular period does not by itself indicate the value creation of that period. Therefore, the use of residual income for rewarding purposes may lead to myopic behavior by managers (O'Hanlon and Peasnell, 1998) when their time horizon is shorter than the project's[2]. In addition, residual income does not provide information on the extent to which the initially planned value creation has been realized in the period. Since economic goodwill is identical to the present value of future residual income and therefore to value creation, a close relationship between goodwill accounting and value-based performance measurement exists.

In this paper, we outline the link between value creation, performance measurement and goodwill accounting. We demonstrate that information required by International Financial Reporting Standards (IFRS) and United States Generally Accepted Accounting Principles (US-GAAP) to evaluate a firm's goodwill can be used to design a performance measurement system which provides information about both value creation and the realization of value. Value creation means that the manager initiates projects with a positive NPV, which leads to increases in shareholders' wealth. In contrast, value realization describes the success in the later implementation and realization of the planned figures. From the perspective of value-based management, we conclude that this performance measure is superior to standard residual income performance measurement. As a consequence, the information needed for external reporting purposes can also be used for internal decision making. From a practical perspective, we demonstrate how appropriate adjustments to the data used for impairment testing result in information which ideally fits the requirements for an optimal performance measurement system. We contribute to the literature by establishing how financial accounting information can be used in performance measurement systems, from both a theoretical and a practical perspective.

The remainder of the paper is organized as follows: In the following section, we review related literature and outline the aim of the paper. In section 3, we analyze properties of optimal value-based performance measurement systems. In this context, we describe the link between residual income and value creation based on the analysis of O'Hanlon and Peasnell (2002). In particular, we develop a periodic measure which provides information about both value creation and its realization. In section 4, we discuss the use of goodwill accounting information according to IFRS and US-GAAP to calculate this measure. We conclude with a summary.

2. Related literature

According to the International Accounting Standards Board (IASB) framework, the principal objective of financial statements is "to provide information about the financial position, performance and changes in financial position of an entity that is useful to a wide range of users in making economic decisions" (IASB-F 12). Similarly, the major objective of financial reporting in the Financial Accounting Standards Board framework is to provide information "that is useful in making business and economic decisions" (CON 1.33). From a practical perspective, the question arises whether the information provided for financial accounting purposes can also be used for performance measurement.

The debate on the different functions of accounting and the use of financial accounting for management accounting purposes has a long tradition. Theoretical research has examined the stewardship vs valuation role of accounting information from the perspective of information economics. Specifically, the issue of whether the information needed for investors to value firms coincides with the information required for measuring performance is analyzed. Within an agency framework, Gjesdal (1981) shows that decision usefulness and stewardship are distinct functions of accounting. Consequently, the literature is critical about the use of information relevant for decision making in performance measurement systems used for stewardship purposes (i.e. Lambert, 2001).

Although theoretical research recommends the use of distinct accounting information for different purposes, this result is not empirically valid in practice. Bushman *et al.* (2006) find that valuation earnings and compensation earnings coefficients are related empirically – namely the information content of earnings from both a value relevance and a performance evaluation perspective is positively related. Additionally, based on the agency framework provided by Gjesdal (1981), Bushman *et al.* (2006) show that simple adjustments to the model assumptions lead to a scenario in which the information requirements of shareholders and managers coincide. They conclude that accounting information used by investors to value the firm can also be optimal from the perspective of stewardship. Consequently, researchers have started to analyze the links between financial reporting regimes and the informational properties of optimal managerial accounting systems (Hemmer and Labro, 2008; Scholze and Wielenberg, 2007).

Performance measures based on accounting information play an important role in both financial and managerial accounting. In theory as in practice, residual income is often seen as an indicator for value creation from the perspective of shareholders. Unfortunately, the residual income of a single period does not in itself provide an answer to the problems of decision making and stewardship. In this context, the question has been raised whether residual income is able to explain changes in stock values and therefore provide information about actual value creation. A number of studies examine the correlation between market values and EVA as well as other versions of residual income. However, their results are contradictory. For instance, Liang and Yao (2005) examine the value relevance of EVA[®] in Taiwan's Information

Electronic Industry resulting in a correlation of 13.47 percent between stock price and residual income as the performance measure. In contrast, in a ten-year study by O'Byrne (1996), EVA[®] exhibits a correlation to stock prices of 74 percent. As a consequence, Biddle *et al.* (1997) point out that earnings outperform EVA[®] in most cases. Residual income is therefore not an ideal periodic performance measure. Its connection to value does not exist in a single period, the link only exists in a dynamic context.

Consequently, the use of residual income in incentive schemes may lead to myopic behavior by managers. To incentivize managers to act in the best interest of the owners, a periodic connection between residual income and value is sought (so-called strong goal congruence). The literature analyzes accounting rules in their ability to achieve strong goal congruence (Baldenius and Reichelstein, 2005; Dutta and Reichelstein, 1999, 2002, 2005; Dutta and Zhang, 2002; Mohnen and Bareket, 2007; Pfeiffer and Schneider, 2007; Reichelstein, 1997, 2000; Rogerson, 1997; Wagenhofer, 2003). Special accounting rules, such as the relative benefit depreciation scheme, are required to achieve strong goal congruence. In general, accounting rules are considered goal congruent when a project with positive NPV results in a positive expected residual income in any period. The manager then has a strong incentive to accept the project. On the contrary, an accounting rule that results in negative residual income in earlier periods may lead to under-investment.

In this context, Schultze (2005) examines the information content of goodwill impairments under FAS 142. He concludes that impairment may be due to several reasons not related to a deteriorating economic performance. In particular, the adaption of information which results from impairment testing may have undesirable effects on management decisions. Due to its negative effect on income, the goodwill impairment may lead to a discrimination of economically viable projects. In particular, he shows that in some cases goodwill impairments result from purely technical reasons. An impairment loss will occur when investing activities, increases in the fair values of assets or newly created intangible assets, increase the fair value of net assets. Consequently, goodwill accounting information has to be treated carefully in the context of performance measurement.

As a consequence, the use of residual income for measurement as well as for rewarding purposes is critical. The reason lies in the missing connection between the value creation of a particular period and residual income of that period. In view of this deficit, O'Hanlon and Peasnell (2002) establish the "missing link" between residual income and value creation[3]. They present a joint measure of value creation and value realization, termed "excess value created" (EVC) as a measure of the managers' success in these tasks (Ohlson, 2002). EVC consists of two components, promised goodwill (GW) and realized goodwill. Promised goodwill is considered the result of an infinite series of excess returns (Johnson and Petrone, 1998) and therefore is equivalent to the present value of the expected future residual income. Realized goodwill is identical to all residual income (RI) earned and accumulated to date (t), accrued at the discount rate (r). EVC is formally given by:

$$EVC_t = \underbrace{\sum_{s=1}^t RI_s (1+r)^{t-s}}_{\text{"realized good will"}} + \underbrace{\sum_{s=1}^{\infty} E_t[RI_{t+s}] (1+r)^{-s}}_{\text{"promised good will"}}$$

EVC thus includes the value generation which has already been realized and the value creation which was initiated but is yet to be realized. In other words, a segregation of the past and the future part of value creation is achieved (Ohlson, 2002). In so doing, O'Hanlon and Peasnell (2002) provide the link between goodwill accounting and performance

measurement. Similarly, Ellis (2001) shows that a performance measure reflecting value creation is related directly to economic goodwill. However, a positive EVC does not imply that value was created in the period. EVC is not a periodic measure of value creation, and it also does not provide information about the afterward realization of value. For performance measures to indicate the necessity of corrective action, it needs to indicate the extent to which the initially planned value creation has actually been realized.

In the next section, we describe the design of a performance measurement system that links goodwill accounting and the desirable properties described above. In section 4, we critically discuss the use of accounting information gathered for impairment testing according to IAS 36 and FAS 142 for this performance measurement system.

3. Performance measurement based on goodwill

Here we present a measure which shows both the newly created value and the extent to which the initially planned value creation has been realized. We establish that this performance measure has two main components: residual income and goodwill. Since all figures are calculated on the level of reporting units or cash generating units, the resulting performance measure can additionally be used for the performance evaluation purposes of divisional managers. We apply our measure to a numerical example in order to demonstrate its properties.

3.1 Residual income, goodwill and value creation

As a starting point, we take on the perspective of shareholders. From their perspective, the outcome of the firm consists of increases in the share price, dividends, options, etc., i.e. the so-called “total return to shareholders (TRS)”:

$$TRS_t = D_t + \Delta S_t$$

where S_t denotes the stock price at date t . In case of distributing the profits, dividends can be approximated by free cash flows (FCF), which is operating cash flows less investments. The shareholder receives the FCF and has to accept a decrease in firm value. If earnings are retained, he does not receive dividends but an increase in firm value. Thus, both cases can be expressed by the TRS, i.e. the sum of the dividends (D) and the change in stock price (ΔS).

Consistent with O’Hanlon and Peasnell (2002), we assume that cash flows occur at discrete intervals at the end of each period. For simplicity, we abstract from debt financing[4]. Further, we assume the “clean-surplus-relation” to hold[5] – all changes in book values during a period are reflected in that period’s accounting income or in the period’s net distribution to shareholders:

$$B_t - B_{t-1} = I_t - D_t$$

where B_t denotes the book value of equity at date t . I_t is the accounting income and D_t denotes the net distribution to shareholders at date t . Residual income as a measure of accounting income in excess of a required return on capital employed is central to this discussion. As a consequence, it only answers the question whether profits exceed the firm’s cost of capital r . It is therefore given by:

$$RI_t = I_t - r \times B_{t-1}$$

The costs of capital are equal to the alternative investment opportunities of the owners. Thus, it is irrelevant to the investor if the surpluses are actually distributed and reinvested by him or if the firm retains and invests the surpluses. Consequently, if a value-based performance measure is to provide information about the additional value created from the perspective of shareholders, it needs to capture both the increase in firm value and the distributions to shareholders.

TRS as a performance measure is typically used for the external measurement of profitability of a share ownership, consisting of the gain in share price and the dividends. To make use of this measure internally, we need to replace external by internal measures, assuming that intrinsic valuation adequately represents the valuation on the capital market. The conversion of internally generated fundamental firm value into market value is influenced by additional effects. These effects, like capital market communication and information processing, require their own management. By comparing internal and external value generation, differences can be identified, which possibly result from a poor communication with the capital market. For internal control purposes, stock prices (S_t) are substituted by the intrinsic value (V_t) which is formally given by:

$$V_t = B_t + \sum_{s=1}^{\infty} E_t[RI_{t+s}](1+r)^{-s} = B_t + GW_t,$$

where GW_t denotes the economic goodwill. Thus, the externally measured TRS can be replicated by an internal measure commonly termed "economic income" (EI):

$$EI_t = FCF_t + \Delta V_t$$

Newly initiated investment projects increase economic income in the amount of their NPV. In addition, economic income is generated by the passing of time, when the interest on the present values is earned. This latter effect is often termed time effect. It is therefore advisable to control for interest yet to be earned, simply to provide an adequate return on the NPV of the beginning of the period. This leads to an adequate return on the firm value at the beginning of the period. This measure is denoted as residual economic income (REI):

$$REI_t = FCF_t + \Delta V_t - r \times V_{t-1}$$

The above formulation shows that a positive value for REI indicates that additional value was created, whereas the opposite holds true for value destruction. A value of 0 indicates that the original projections were met exactly and an adequate return was earned.

By applying the clean-surplus relation, the measure can be expressed in terms of residual income and goodwill. Given the equations above, we can redefine REI as follows:

$$REI_t = D_t + \Delta V_t - r \times (B_{t-1} + GW_{t-1})$$

By substituting $\Delta V_t = \Delta B_t + \Delta GW_t$ and by applying the clean-surplus relation, we get the following definition for REI:

$$\begin{aligned} REI_t &= D_t + I_t - D_t + \Delta GW_t - r \times B_{t-1} - r \times GW_{t-1} \\ &= I_t - r \times B_{t-1} + \Delta GW_t - r \times GW_{t-1} \\ &= RI_t + \Delta GW_t - r \times GW_{t-1} \end{aligned}$$

Since REI is directly related to value creation, it can be used as a performance measure to align managers' and shareholders' interests. This REI is directly related to EVC. EVC represents the accumulated generation of value over time. To capture the performance of a single period, changes of EVC need to be considered. An increase in EVC in the single period t (ΔEVC_t) is given by

$$\begin{aligned}\Delta EVC_t &= EVC_t - EVC_{t-1} \\ &= RI_t + r \times \sum_{s=1}^{t-1} RI_s(1+r)^{t-1-s} + \Delta GW_t \\ &= \sum_{s=1}^t RI_s(1+r)^{t-s} - \sum_{s=1}^{t-1} RI_s(1+r)^{t-1-s} + \Delta GW_t\end{aligned}$$

EVC will increase over time, even without initiating any new projects, at a rate equivalent to the cost of capital, solely due to the passing of time. Taking account of this time effect results in the following expression:

$$\begin{aligned}\Delta EVC_t - r \times EVC_{t-1} &= RI_t + r \times \sum_{s=1}^{t-1} RI_s(1+r)^{t-1-s} + \Delta GW_t - r \times EVC \\ &= RI_t + r \times \sum_{s=1}^{t-1} RI_s(1+r)^{t-1-s} + \Delta GW_t - r \times \left(\sum_{s=1}^{t-1} RI_s(1+r)^{t-1-s} + GW_{t-1} \right) \\ &= RI_t + \Delta GW_t - r \times GW_{t-1}\end{aligned}$$

The resulting performance measure equals the REI as defined above. We conclude that a one-period change in EVC less its capital costs is identical to the concept of REI described above. REI is an ideal measure of performance in that it informs about newly created value and about deviations between original plans and realized figures.

The above deviation demonstrates that EVC and REI are directly related to goodwill. REI can be calculated for each division based on the accounting information required for goodwill accounting purposes. Consequently, the information resulting from goodwill accounting can be used to calculate a measure of actual value creation of a specific period. The information gathered for impairment testing according to IAS 36 and FAS 142 will be analyzed in more detail in section 4.

3.2 Numerical example

In the following, we provide a numerical example to demonstrate the properties of REI and its connection to goodwill accounting. To keep the calculations as simple as possible, we abstract from taxes and debt financing and assume full distribution of free cash flows to the owners.

We consider a business where an initial investment of 1,000 at date 0 leads to free cash flows amounting to 400 for each of four periods. The cost of capital and therefore the marginal return of an alternative investment is 10 percent. Thus, additional value of 267.95 is created at date 0 (see Table I). We assume straight line depreciation. However, the results remain unaffected by altering the depreciation schedule. An

alternative investment of the investment outlay at cost of capital would result in a final value of 1,464.10. If no deviations occur, additional value amounting to 392.30 is created from the perspective of date 4. From the perspective of shareholders, a performance measurement system has to measure the initial value creation as well as the realization. The performance measurement system has to indicate whether the division earns accumulated value increases of 1,856.4 over four periods.

The concept of REI allows for performance-target comparisons and therefore provides information about both the additional created value and the realization of value. Further, the performance measurement system has to provide information about whether the goals of the acquisition are met in the future. Assume the division to be purchased at date 0 at its intrinsic value of 1,267.95 resulting in an acquired goodwill of 267.95. In the first part of the example, we assume that all projections are met in the future. As a consequence, no additional value is created for the acquiree since equivalent cash flows can be obtained by an alternative investment at capital costs.

The present value of the residual incomes equals the NPV or the goodwill of the division. During the overall project's life cycle, the total increase in value can be measured by EVC which consists of compounded realized residual income as well as of the present value of the expected future residual income (see Table II).

As the EVC indicates accumulated increases in value over time, information about increases of shareholders' wealth of a particular period are provided by looking at the changes of EVC of this period (ΔEVC). The changes in EVC can be obtained by considering the sum of residual income, the change of goodwill and the return of compounded residual incomes (see Table III).

As changes in goodwill result in an impairment loss, the useful life of acquired goodwill is determined as part of the business plan. For instance, in period $t = 1$ occurs an impairment of -23.21 . The impairment is the result of the progressing realization of the anticipated excess returns. It is not a consequence of unexpected events, and it is recurring in nature. Its character is equivalent to the amortization of a wasting asset. Hence, taking this impairment loss into account for performance evaluation purposes may lead to biased incentives for divisional managers (Schultze, 2005).

	t = 0	t = 1	t = 2	t = 3	t = 4
FCF	-1,000	400	400	400	400
Depreciation		250	250	250	250
Profit		150	150	150	150
Employed capital	1,000	750	500	250	0
Cost of capital		100	75	50	25
RI		50	75	100	125
NPV of RI in t = 0	267.95	45.45	61.98	75.13	85.38

Table I.
Residual income

	t = 0	t = 1	t = 2	t = 3	t = 4
GW	267.95	244.74	194.21	113.64	0
Compounded RI	0	50	130	243	392.30
EVC	267.95	294.74	324.21	356.64	392.30

Table II.
Increase in shareholder value over time

For control purposes, increases in shareholders' wealth form the target for performance evaluation. If no deviations between planned and realized figures occur, expected increases in shareholders' wealth are given by the expected change in EVC. Thus, only an increase in shareholders' wealth which exceeds this target performance indicates additional value creation. From the perspective of performance measurement, REI reflects this surplus over expected increases in shareholder value and therefore provides information about the success of the acquisition or the project (see Table IV).

As we abstract here from deviations between planned and realized figures, REI remains zero in all periods after initiation of the project in $t = 0$, which means that just the planned value-increase can be realized. In particular, Table IV shows that no additional value is created for the acquiree.

However, value-based management is supposed to provide incentives for managers to act in shareholders' interests. Divisional managers should be motivated to make operative and investment decisions leading to an additional surplus in shareholders' wealth. Hence, we allow in our example for deviations between realized and planned figures. For instance, we assume the division to make an additional investment at date 2 with an investment outlay of 500. This investment is expected to increase the division's free cash flow at date 4 (see Table V).

From the viewpoint of shareholders, this investment creates additional value amounting to 40.91. Since divisional managers strategize their decisions based on future performance evaluations, an optimal performance measurement system has to reflect this effect in order to align managers' and shareholders' interests (see Table VI).

Table VII shows that actual value creation can be measured by REI which consists of residual income and information resulting from the goodwill accounting.

	t = 0	t = 1	t = 2	t = 3	t = 4	
Table III. Internal realized value increases based on residual incomes	RI	50	75	100	125	
	ΔGW	-23.21	-50.53	-80.58	-113.64	
	Return of compounded RI		5	13	24.30	
	ΔEVC	267.95	26.79	29.47	32.42	35.66

	t = 0	t = 1	t = 2	t = 3	t = 4	
Table IV. Control calculation based on residual economic income	RI_t	0	50	75	100	125
	$+\Delta GW_t$	267.95	-23.21	-50.53	-80.58	-113.64
	$-r \times GW_{t-1}$	0	-26.79	-24.47	-19.42	-11.36
	REI	267.95	0	0	0	0

	t = 0	t = 1	t = 2	t = 3	t = 4	
Table V. Target-performance comparison in $t = 2$	Target CF (in $t = 0$)	-1,000	400	400	400	400
	Actual CF	-1,000	400	350	-	-
	Target CF (in $t = 2$)			500		400

In this example, we assume that only a cash flow of 420 is realized at date 3 (see Table VIII). Thus, the residual income is reduced from the initially planned 200 to 120. Since the negative deviation in period $t = 3$ is not compensated by an increasing future performance, value is destroyed in this period.

This example indicates that the REI ideally represents the project's progress and is therefore an optimal measure of the firm's or project's performance. Contrary to a simple residual income calculation, REI reflects actual value creation in each period.

As we have shown, an ideal performance measure can be calculated given the information about the development of goodwill over time. IFRS and US-GAAP requires the firm to evaluate its goodwill in each period. Since this is a very costly procedure, the issue arises whether this information can be used for internal control purposes. However, IFRS and US-GAAP exhibit clear regulation requirements regarding the determination of goodwill and the impairment process. Thus, we critically discuss the use of accounting information according to IFRS and US-GAAP for performance measurement in the following section.

4. Analysis of FAS 142 and IAS 36 as the basis for calculating residual economic income

FAS 142 and IAS 36 exhibit clear regulation requirements regarding the determination of goodwill and the impairment process. Goodwill is defined as the amount to which the purchase price exceeds the identifiable assets and liabilities measured to their fair

	t = 0	t = 1	t = 2	t = 3	t = 4
Firm value (in t = 0)	1,267.95	1,394.74	1,534.21	–	–
Firm value (in t = 2)	–	–	1,575.12	1,732.64	1,905.90
Value creation	267.95	0.00	40.91	0.00	0.00

Table VI.
Value creation in case of deviations of actual from target figures

	t = 0	t = 1	t = 2	t = 3	t = 4
CF		400	350	500	400
GW	267.95	244.74	285.12	113.64	0
RI	0	50	25	200	125
Δ GW	0	–23.21	40.38	–171.49	–113.64
$r \times$ GW		–26.79	–24.47	–28.51	–11.36
Total = REI	267.95	0	40.91	0	0

Table VII.
Residual economic income in case of a revision of the plan in t = 2

	t = 0	t = 1	t = 2	t = 3	t = 4
CF		400	350	420	400
GW	267.95	244.74	285.12	113.64	0
RI	0	50	25	120	125
Δ GW	0	–23.21	40.38	–171.49	–113.64
$r \times$ GW		–26.79	–24.47	–28.51	–11.36
Total = REI	267.95	0	40.91	–80	0

Table VIII.
Residual economic income in case of a revision of the plan in t = 3

value. The impairment test requires an annual reassessment of goodwill and is performed at the level of divisions. In particular, the impairment test requires the firm to apply the discounted cash flow method or a related method to determine the fair value of the divisions. In this context, IAS 36 and FAS 142 describe how cash flows and the discount rate shall be determined and how goodwill is allocated to business/reporting units. In the following, we discuss the use of the financial accounting data resulting from these regulations for measuring performance, calculating REI and managing the success of the acquisition as well as the business.

Under IAS 36, an impairment loss is recognized when the book value of equity exceeds the recoverable amount of the cash generating unit. IAS 36.18 defines the recoverable amount as the higher of a cash-generating unit's fair value less costs to sell and its value in use. However, in many cases it will not be possible to determine fair value less costs to sell in this context, as there is no basis for making reliable statements about the amount obtainable from the sale (IAS 36.20). In this case, IFRS allows firms to use the value in use as the recoverable amount directly. In this context, discounted cash flows resulting from the cash generating unit are used to calculate value in use. IAS 36 defines which cash flow components are to be included in the calculation. In particular, IAS 36.44 states that future cash flows shall be estimated for the cash generating unit in its current condition and thus, future cash flows shall not include future restructuring to which an entity is not committed. Further, future cash flows as well as the discount rate are determined pre-tax and before financing activities (IAS 36.50, 55).

According to US-GAAP, the fair value of the reporting unit is determined in accordance with FAS 142.23-25 and FAS 157. FAS 142.23 regards market values as the best approximation for the fair value of assets. As quoted, market prices are often not available and as share prices generally do not include control premia and are therefore not representative, the present value technique according to FAS 157 is considered the best approach for determining the value of a reporting unit. FAS 157.B3 requires cash flows and discount rates to reflect the assumptions market participants would use in pricing the asset or liability. They also need to be consistent internally. In contrast to IAS 36, FAS 157 allows for a pre-tax as well as for a post-tax consideration.

Shareholders evaluate their changes in wealth on a post-tax basis. For internal control purposes, an optimal performance measure needs to coincide with shareholders' interests. To ensure the equivalence between pre-tax and post-tax valuation, pre-tax discounting has to incorporate the effect of future cash flows into the discount rate and therefore, the pre-tax rate has to be continuously updated to reflect the tax positions of the balance sheet items. As a consequence, Kvaal (2007) advocates an amendment of IAS 36 such that value in use is measured by company-specific after-tax cash flows. Further, he requires the inclusion of deferred taxes in the impairment review. Thus, the present value of future cash flows for impairment testing according to IAS 36 may differ from data used in an optimal performance evaluation system and adjustments are necessary.

IAS 36 and FAS 157 require cash flows to be estimated for a cash generating unit or a reporting unit in its current condition reflecting market expectations about future performance. Accounting data which can be used for management decision making have to provide additional information regarding specific investment opportunities. For instance, a performance measurement system should indicate whether possible future restructuring investments may lead to additional value creation in order to improve economic decision making. Hence, several adjustments to cash flows determined for financial accounting purposes may be necessary for performance measurement purposes.

Further, the application of the discount rate required in IAS 36 and FAS 157 for performance measurement purposes may be critical. IAS 36.A17 and FAS 157.B3 requires the firm to estimate the entity's weighted average cost of capital (WACC) by using techniques such as the capital asset pricing model. In addition, IAS 36.A17 allows the firm to estimate the cost of capital based on the entity's incremental borrowing rate. However, this procedure requires appropriate adjustments which need to be based on the same data required to determine WACC (Husmann and Schmidt, 2008).

In this context, discount rates used for financial accounting purposes should reflect assumptions that market participants would use in pricing the asset. From the perspective of financial theory, investment decisions should be based on the internal rate of return of the best alternative investment (Brealey *et al.*, 2006). Therefore, one may argue that this interest rate differs from the cost of capital of shareholders. However, we argue that from the perspective of value-based management, the performance measurement system needs to reflect whether additional value was created from the perspective of owners. Hence, an investment decision has to be evaluated based on the marginal rate of return of an alternative investment from the perspective of shareholders. As a consequence, the rate of return which should be implemented in the performance measurement system to evaluate investment projects coincides with the cost of capital of shareholders.

In contrast to IAS 36, FAS 142.19-20 requires the impairment test to be performed in two steps. Step one: tests for a general need for a reduction in the carrying amount of goodwill. Step two determines the amount of the impairment loss. If the fair value of a reporting unit exceeds its carrying amount, goodwill of the reporting unit is considered not impaired, thus the second step of the impairment test is unnecessary and vice versa. The second step of the goodwill impairment test, used to measure the amount of impairment loss, compares the implied fair value of reporting unit goodwill with the carrying amount of that goodwill. Hence, a decrease of the implied fair value of the goodwill cannot only be the consequence of a decrease in the fair value of the reporting unit, but also a result from an increase in the fair value of its net assets.

In this context, Schultze (2005) shows that an impairment of goodwill according to FAS 142 can occur due to investment activities which increase the fair value of the reporting unit's net assets. In particular, this can be the case even when additional value is created from the perspective of shareholders. Due to the impairment charge to income, this effect will lead to suboptimal incentive effects, when divisional managers are evaluated based on divisional profit or residual income. However, this result depends on the design of the performance measurement system. When the manager is instead rewarded based on REI, the problem disappears due to the value creation being captured by REI. The resulting positive value of the measure will induce the manager to accept the project, even when there is a negative impact on profit from the impairment. The data provided for impairment testing can therefore be used to develop a superior performance measurement system from the perspective of value-based management.

Although some appropriate adjustments may be necessary, we conclude that the data gathered for goodwill impairment testing can generally be used to calculate REI on a divisional level.

In this context, a further question arises – whether and how value creation on a divisional level is linked to value creation on the firm level and therefore to value creation from the perspective of shareholders. An optimal performance measurement system needs to provide an answer to the question of whether the goals of shareholders could be attained. However, since divisions are often inter-dependent, the question arises whether

the maximization of the value of a single division is equivalent to a maximization of firm value. Thus, the organizational design of the firm and its divisions where goodwill is monitored has an immediate impact on goal congruence issues.

According to IFRS and US-GAAP, acquired goodwill is allocated to divisions (cash generating unit resp. reporting unit) according to the benefits to be received from the synergies of the combination, irrespective of whether other assets or liabilities of the acquiree are assigned to those units or groups of units (FAS 142.18, IAS 36.80). IAS 36.6 and FAS 142.30 defines a cash generating unit or a reporting unit as the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets. In particular, IAS 36.80 and FAS 142.30 define cash generating units as the reporting units of an organization for which divisional management reviews the operating results. Thus, the use of financial accounting data for internal control purposes is also indicated in IFRS and US-GAAP regulations. Since cash generating units are required to be largely independent from other divisions, change in the cash flow of one division is not supposed to affect cash flows of other divisions. In particular, value-increasing investment decisions of a single division are not compensated by other divisions' changes in value. As REI reflects the actual value creation of a particular division, we conclude that the use of this performance measure on the level of cash generating units leads to a performance measurement system which is congruent with the goals of shareholders. Thus, if divisional managers are evaluated on the basis of REI, their decisions coincide with the interest of the owners[6].

Since goodwill accounting results from a business combination, the additional question arises whether this information can be used to evaluate not only the ongoing performance of a division, but also the success of the acquisition. To answer this question, the performance measurement system needs to reflect whether the initially planned goals of the acquisition (business plan) were met and provide information about the realized value creation caused by the acquisition. Schultze (2005) shows that residual income-based performance measures including goodwill impairment charges have limited information content. The reason for this is that accounting goodwill reflects mixed information on both the success of the acquisition and the newly created goodwill in later periods. For analytical purposes this kind of treatment is unsatisfactory in that it mixes amortization, appreciation and impairment of different assets.

However, the use of REI as a performance measure mitigates these issues. Since REI can directly be derived from the business plan, a positive REI at the date of the acquisition indicates value creation caused by the acquisition. A negative REI, on the other hand, indicates overpayment. In subsequent periods, an REI of zero is a sign that the initially planned figures have been realized exactly. A positive REI reflects the build-up of new competitive advantages and therefore additional value creation from the perspective of shareholders. Hence, the use of REI as a performance measure provides the possibility to separately reflect the success of the acquisition and the creation of value from the perspective of shareholders.

In summary, we conclude that REI as an ideal performance measure can be calculated from the financial accounting information originated by goodwill accounting. From a practical perspective, we have shown that appropriate adjustments to the data used for impairment testing result in information which ideally fit the requirements for an optimal performance measurement system. Since the impairment testing procedure is costly and the information reliable in that it is verified by independent auditors, we recommend the use of this information in the performance measurement system described.

5. Conclusion

Value-based management is intended to increase shareholders' wealth. In this context, value-based performance measures are implemented to provide information on what extent this aim has been realized. The functions of value-based performance measures are two-fold: on the one hand, such performance measures are implemented in compensation schemes to provide incentives for managers to make optimal decisions from the perspective of shareholders. On the other hand, such performance measures have to provide information for investors to optimize their investment decisions. Consequently, value-based performance measures need to reflect both newly created value and the realization of *ex ante* planned figures. Residual income is central in this discussion. However, there is no theoretical connection between the creation of value and a residual income of a specific period.

In this paper, we show that goodwill accounting information can be used for measuring and rewarding management performance in order to meet the goals of the acquisition and preserve shareholders' interests. O'Hanlon and Peasnell (2002), as well as Ellis (2001), indicate that a performance measurement system reflecting value creation from a shareholder perspective is directly connected to goodwill accounting. However, they do not provide a periodic performance measure to capture actual value creation and its later realization. In view of this deficit, we provide the link between periodic performance measure and value creation by deriving the concept of residual economic income and demonstrate that this performance measure can be calculated on a divisional level based on information gathered for impairment testing according to IAS 36 and FAS 142.

This paper outlines the link between value creation, performance measurement and goodwill accounting. Ellis (2001) and Schultze (2005) show that the adaption of information resulting from impairment testing may have undesirable effects on management decisions if residual income is applied as a performance measure. Due to its negative effect on income, the goodwill impairment may lead to a discrimination of economically viable projects. In this context, we show that appropriate adjustments of the data used for impairment testing result in information which ideally fits the requirements for an optimal performance measurement system. Since the impairment-only approach is quite costly in its application, we conclude that this information should not go unused for performance measurement purposes, even if additional adjustments of financial accounting data for internal control purposes may be necessary.

Additional research is needed to analyze implications on the design of incentive schemes. As residual economic income includes prospective figures, incentives schemes in which bonus payments are based on residual economic income have to ensure that initially planned figures are realized in the future. We suggest that bonus banks may be an appropriate incentive system in combination with the concept of residual economic income to attain value-based decision making by divisional managers. Bonus banks, recommended by consulting firms, are typically based on residual income; however, a portion of the bonus earned is not paid out unless performance targets are met in subsequent periods. Thus, bonus banks are a special reward plan for bonus payments (Stewart, 1991). Further experimental and analytical research on this topic is indicated.

Notes

1. In line with Ohlson (1995) or O'Hanlon and Peasnell (2002), we therefore assume

$$E_t[B_{t+T}] = 0$$

for the finite case and

$$\frac{E_t[B_{t+T}]}{(1+r)^T} \xrightarrow{T \rightarrow \infty} 0$$

for the infinite case in order to achieve the equivalence between value creation and the present value of future residual income. This can be achieved by full profit distribution. $E_t[\cdot]$ marks the expected value to the state of knowledge in period t .

2. This situation is well known as the “problem of the impatient manager” resulting from different time preferences or time horizon of managers and owners (Rogerson, 1997).
3. Schueler and Krotter (2009) extend the analysis of O’Hanlon and Peasnell (2002) by explicitly including debt financing in the analysis.
4. The reason for this is that the link between value creation and residual income exists even by explicitly considering debt financing (Schueler and Krotter, 2009). Thus, simple adjustments to our derivation would lead to comparable results.
5. This is consistent with most theoretical research papers on both financial and managerial accounting. See, for instance, Ohlson (1995) or O’Hanlon and Peasnell (2002).
6. Krapp *et al.* (2009) show how this problem can also be mitigated by a special combination of divisional and firm-wide performance measures.

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