COMMENTARY

Equity Valuation Models and Measuring Goodwill Impairment

AAA Financial Accounting Standards Committee

Robert H. Herz; Teresa E. Iannaconi; Laureen A. Maines; Krishna Palepu; Stephen G. Ryan (Chair); Katherine Schipper; Catherine M. Schrand; Douglas J. Skinner; Linda Vincent (Principal Author)

INTRODUCTION

The FASB faces two main issues in its project on business combinations. The first involves determining whether two separate methods of accounting for business combinations—purchase and pooling of interests—are justified, and the second is determining the appropriate method of charging to income the cost of purchased goodwill and other purchased intangibles. In December 2000, the FASB announced its tentative decision to require that acquisition goodwill be periodically tested for impairment and not be subject to systematic amortization. The following month, the FASB announced its tentative decision to eliminate the pooling of interests method of accounting.

In this article, we focus on the issue of goodwill impairment testing. There are two main points of discussion on this issue. The first is whether impairment testing rather than systematic amortization is the appropriate accounting treatment for acquisition goodwill. The second is whether impairment testing for goodwill is a feasible alternative; that is, whether one or more methods exist to assess the post-acquisition value of goodwill. The purpose of this commentary is to summarize the available valuation models and to discuss their potential application to the valuation and testing for impairment of acquisition goodwill.¹ We do not address the first open issue of whether impairment testing is more appropriate than systematic amortization of acquisition goodwill.

¹ There have been two presentations to the FASB advocating the use of equity valuation models for impairment testing of goodwill. The first presentation in May 2000, led by Trevor Harris of Columbia University and Morgan Stanley Dean Witter and by Gabrielle Napolitano of Goldmans Sachs, based its recommendation for impairment testing of goodwill on the advantages of the residual income model (RIM) over alternative equity valuation models. The second presentation in September 2000, led by Dennis P. Powell of Cisco Systems, advocated testing acquisition goodwill for impairment using a discounted cash flow (DCF) approach. These presentations are available on the FASB's web site at http://www.FASB.org.

Editor's Note: This paper is based on a letter written by the Committee in response to the FASB's request for comment on a goodwill accounting proposal made by several major investment banks and accounting firms. The paper reflects the views of the Committee and not those of the American Accounting Association.
BACKGROUND ON VALUATION MODELS

The dividend discount model (DDM) of Williams (1938) provides the basis for most equity valuation models. In the DDM model, the value of the firm's equity, \( V \), is equal to the present value of all expected future dividends, \( \text{DIV} \), discounted at the firm's cost of equity capital, \( r^e \), which is generally assumed constant through time:

\[
V_0 = \sum_{t=1}^{\infty} \frac{E_0(\text{DIV}_t)}{(1+r^e)^t}.
\]

(DDM)

Time periods are subscripted with \( t \) and the current date is denoted as time 0. The key ingredients necessary to apply the DDM are dividend forecasts and an estimate of \( r^e \). Both academics and practitioners generally agree that the DDM provides the appropriate conceptual basis for all equity valuation models.

Discounted Cash Flow Model

Despite its theoretical appeal, the DDM is difficult to apply, particularly over long horizons for firms that do not pay significant dividends. As a result, alternative forms of the DDM emerged with the goal of improved practical implementation. Both practitioners, such as investment banks issuing fairness opinions, and academics apply these models. The most commonly used model is the discounted cash flow (DCF) model because of its direct link to the finance theories of Modigliani and Miller (1958). Most specifications of the DCF model require estimates of free cash flow (FCF). FCF is the cash flow available for distribution to a defined set of capital providers after all operating and investing needs of the firm are met. Although the DCF model has many variants, FCF in the most commonly applied version is defined as the cash flow available for distribution to both debt and equity-holders, and the discount rate is the weighted average cost of capital (WACC). This model estimates the value of the sum of the debt and equity of the firm; the market value of the firm's debt net of the firm's excess cash must be subtracted from the total value of the firm to obtain the value of the equity.

Because of the inherent difficulty of projecting FCF indefinitely into the future, users of DCF models typically forecast FCF through a specified terminal date, and estimate the terminal value of the net debt plus equity, \( V_{\tau} + \text{net debt}_{\tau} \), separately:

\[
V_0 + \text{net debt}_0 = \sum_{t=1}^{\tau} \frac{E_0(\text{FCF}_t)}{(1+r_{\text{wacc}})^t} + \frac{E_0(V_{\tau} + \text{net debt}_{\tau})}{(1+r_{\text{wacc}})^\tau}.
\]

(DCF)

where \( r_{\text{wacc}} \) represents the WACC that is used as the discount rate. The standard approach to estimating the terminal value of the debt and equity assumes the firm reaches steady state by the terminal date, and computes the terminal value as a FCF perpetuity value

WACC is computed as \( \left( r^e \frac{e}{d+e} \right) + r^d \frac{d}{d+e} \) where \( e \) is the market value of equity, \( d \) is the market value of debt, \( r^e \) is the cost of equity, and \( r^d \) is the cost of debt.

Excess cash is defined as the cash or cash equivalents held by the firm in excess of the amount needed for working capital and investment purposes.
growing at a constant rate, $g$, $E_0 \left[ \frac{FCF_T (1 + g)}{(r_{wacc} - g)} \right]$. The key ingredients of the DCF model are forecasts of the FCF and an estimate of $r_{wacc}$, the weighted average cost of capital. WACC depends on the capital structure of the firm and changes whenever the capital structure of the firm changes. Users often assume a constant WACC based on the firm's target debt to equity ratio.\(^4\)

**Residual Income Model**

The residual income model (RIM) can be derived from the DDM with the assumption of clean surplus accounting.\(^5\) Clean surplus accounting holds when all transactions affecting the book value of equity during the period, other than transactions with equity holders, are recognized on the income statement in the same period.\(^6\) Residual income, $RI$, is defined as accounting net income less a charge for equity capital equal to the cost of equity capital times the beginning of period book value of equity:

$$RI_t = NI_t - r_e BV_{t-1}$$

In the RIM the market value of equity is estimated as the sum of the firm's current book value of equity, $BV_t$, plus the present value of the expected future RI. As with the DCF model, users of the RIM typically forecast RI only through a specified future terminal date, with the difference between the market and book value of equity at the terminal value date, $V_T - BV_t$, estimated separately:

$$V_0 = BV_0 + \sum_{t=1}^{T} \frac{E_0(RI_t)}{(1+r_e)^t} + \frac{E_0(V_T - BV_T)}{(1+r_e)^T}$$

Users of this model commonly assume that the firm reaches steady state by the terminal date. They compute the terminal value (TV) as a RI perpetuity growing at a constant rate, $g$, so $TV = \frac{E_0[RI_T (1 + g)]}{(r_e - g)}$. The key components for applying the RIM are forecasts of BV and accounting net income, and an estimate of $r_e$. In order to forecast book values, net dividends, defined as net inflows of contributed capital less outflows of retained earnings as dividends, also must be forecast.

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\(^4\) One of the widely used variants of the DCF model is the adjusted present value (APV) method (Brealey and Myers 2000). The APV model discounts the firm's FCF at the cost of capital of the unlevered firm, assumed constant through time, and adds the value of the tax savings due to the tax deductibility of interest payments as a separate flow item. This approach avoids recomputing the discount rate whenever capital structure changes.

\(^5\) The RIM is also referred to as the Edwards-Bell-Ohlson (EBO) model and as the abnormal earnings (AE) model.

\(^6\) Examples of U.S. GAAP items that violate clean surplus accounting include certain foreign currency translation gains and losses and unrealized changes in the market value of investments in marketable equity securities classified as "available for sale" under FASB Statement No. 115. FASB Statement No. 130 requires that all such items that would otherwise violate clean surplus be reported as comprehensive income effective in 1998.
Because of their theoretical equivalence, the DDM, the DCF model, and the RIM all provide the same valuations when the flows are projected consistently to infinity and consistent discount rates are applied. In practice, however, horizons over which the flows can be reasonably projected are limited and discount rates are estimated with error. These practical considerations cause some academics and practitioners to prefer one valuation model to another.

**DIFFERENCES BETWEEN THE RIM AND DCF MODEL**

The DDM is generally considered to be the core theoretical model and is the subject of less empirical testing than the DCF model or RIM. Both the DCF and RIM have many variants with adherents who perceive practical advantages of one specification over another. Although the DCF model is more popular both in the M.B.A. classroom and on Wall Street, the RIM is gaining acceptance in both settings.

The claimed conceptual advantages of the DCF model are based on its corporate finance roots that emphasize cash flows (Brealey and Myers 2000). Practical valuation "handbooks" such as Copeland et al. (1995) maintain that cash flows dominate accounting earnings for valuation purposes and thus advocate the DCF model over accounting-based models.

**Practical Advantages of the RIM**

The claimed practical advantages of the RIM are explained by Penman and Sougiannis (1998), among others. In their view, a shortcoming of the DCF model is the need to subtract long-term capital investment from operating cash flows to compute FCF. For growing firms, negative FCF often results for many years. RIM adherents maintain that accrual accounting eliminates the distorting effect of capital investment expenditure by placing it on the balance sheet as an asset. Depreciation and amortization then allocate this investment cost to expense over time, in principle matching it against the revenues that it generates. Penman and Sougiannis (1998) also demonstrate that the RIM's use of accrual accounting allows for more reasonable valuations than the DCF model from forecasted payoffs over relatively short horizons. On the other hand, the DCF's reliance on FCF may require many more years of forecasts to attain steady state and positive FCF. Academic accountants, such as Bernard (1995), advocate the RIM because of its direct ties to earnings and book values, central concepts in accrual accounting, whereas the DCF is founded in finance theory.

Another claimed RIM advantage is that the terminal value is measured as the difference between the market value and the book value of the firm's equity, $V_T - BV_T$. This difference is typically smaller than the sum of the firm's market value and its net debt, $V_T + \text{net debt}_T$, the terminal value in the DCF model. This is an advantage because the terminal value often constitutes a large percentage of the computed total value of the firm in both models and is the component estimated with greatest uncertainty; minimizing the influence of the terminal value reduces uncertainty in the valuation process.

Researchers also maintain that a practical advantage of the RIM is that accounting choices such as conservatism, expensing of R&D, and different depreciation methods, do not affect the computation of value, provided that clean surplus accounting is used (Penman and Sougiannis 1998; Lundholm 1995; Francis et al. 2000a). Likewise, the RIM is not sensitive to understated net asset value as long as net asset value and earnings are internally consistent. These statements imply that whether acquisition goodwill is amortized is irrelevant to the RIM. In other words, RIM advocates claim that
accounting rules do not matter to the RIM, provided clean surplus holds, whereas the DCF model requires the unnecessary additional step of adjusting accrual-based accounting measures to a cash flow basis.

Note, however, that accounting for noncash expenses such as depreciation and amortization has no effect on the DCF models. Furthermore, the statement of cash flows provides most adjustments to accrual-based accounting necessary to get to cash flows, minimizing the adjustment process from accrual to cash flow accounting.

Criticisms of Valuation Models

Both RIM and DCF models are affected negatively by inappropriate forecasts of future flows. For example, if the forecast understates the company's doubtful accounts, neither net income nor discounted cash flow forecasts reflect the future uncollectible accounts and both models overstate the intrinsic value of equity (Palepu et al. 2000).

Other standard criticisms of valuation models also apply equally to the RIM and the DCF model. These criticisms include difficulties with the appropriate specification of the numerator in the valuation equation, with determination of the appropriate discount rate, and with computation of the terminal value. Whereas the DCF model generally requires predicting free cash flow at the horizon date for computation of the terminal value perpetuity, the RIM generally requires predicting the firm's net income and book value at the horizon date together with a projected return on equity (ROE) in perpetuity. That is, ROE is derived from the definition of RI by dividing by BV:

\[
RI = NI - \frac{r_e}{BV} \times BV = BV \left( \frac{NI}{BV} - r_e \right) = BV(ROE - r_e)
\]

A claimed advantage to forecasting ROE rather than free cash flows is that conceptually ROE better links strategy with valuation. Even so, a complete set of pro forma financial statements should serve as the basis for both free cash flow and residual income forecasts and these pro formas must be consistent and reflect results of both accounting and industrial organization research on ROE.

In summary, there are more similarities than differences between the DCF model and RIM, a point made by Lundholm and O'Keefe (2000). The next question is whether the process of valuation, performed with the best tools available, provides sufficiently relevant and reliable estimates to serve as the basis for goodwill impairment tests and to justify abandoning systematic amortization.

ACADEMIC RESEARCH ON VALUATION MODELS

Several recent research studies compare the attributes of the dividend, cash flow and residual income models. These studies generally use statistical measures computed for large samples to evaluate the relative performance of two or more of the valuation models. The results from the models are compared with observed share prices to assess the models' accuracy and bias. Results consistently indicate that the RIM is more highly associated with stock price, which is assumed to reflect intrinsic value, than the DDM

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Francis et al. (2000a) find that the terminal value is not well specified in any of the three valuation models (DDM, DCF, RIM) that they test.
or DCF model. However, there is no evidence that these large sample results also hold for the firm-level assessments necessary for implementing financial reporting standards such as the proposed goodwill impairment testing.\(^8\)

**Large Sample Studies**

In one of the first of the recent empirical studies of the RIM, Bernard (1995) estimates intrinsic value for a large sample of firms during 1978–1993 using Value Line earnings forecasts for four years, in part to demonstrate the validity of the model over short horizons. Bernard (1995) reports that the RIM explains, on average, 68 percent of the variation in share price. Bernard (1995) advocates the RIM for its accuracy and for its reliance on earnings and book value predictions over relatively short time periods compared with the longer periods generally needed for the DCF model.

Penman and Sougiannis (1998) compare the DDM, RIM, and DCF valuation models using actual realizations of dividends, free cash flows and earnings as proxies for the forecasts. This approach minimizes the impact of different magnitudes of forecast errors for the three forecast variables. Penman and Sougiannis (1998) group the firms into portfolios to average out the effects of differences between market expectations and the realizations of the three forecast variables. They report that the RIM yields smaller valuation errors, as measured against current stock prices, than either the DDM or DCF model.

Lee et al. (1999) do not compare valuation models but use the RIM to estimate the intrinsic value of the Dow over 1963–1996. They use security analysts’ consensus earnings forecasts after 1979 when they became available and time-series projections of earnings before that. Their estimates of intrinsic value predict both the future value of the Dow and the future stock returns to the Dow. Based on these results, Lee et al. (1999) advocate use of the RIM over alternative valuation models.

Lee and Frankel (1998) use the RIM and security analysts’ consensus forecasts to estimate the intrinsic value of stocks at a point in time rather than over time as in Lee et al. (1999). Their estimate of intrinsic value is highly correlated with contemporaneous stock prices and the ratio of computed intrinsic value to actual stock price is a good predictor of long-term security returns. The estimated intrinsic values from the RIM explain more than 70 percent of the variation in stock prices over the period of their study, 1975–1993.

Francis et al. (2000a) compare the accuracy of the DDM, RIM, and DCF valuation models using Value Line forecasts five years into the future for firms during 1989–1993. They find that the RIM explains about 71 percent of the variance in stock prices, consistent with the results of Bernard (1995) and Lee and Frankel (1998). The RIM significantly outperforms both the dividend and the DCF valuation models in their tests. Their valuation benchmark is stock price, thus assuming market efficiency. They hypothesize that the greater accuracy of the RIM is due to the sufficiency of book value of equity as a measure of intrinsic value. None of their evidence supports claims that accounting practices such as expensing R&D and flexibility in accrual estimation result in inferior estimates of market value.

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\(^8\) The large sample studies use different inputs to the valuation models than are used at the individual firm level. For example, large sample studies cannot generate forecasts of the variables of interest using pro forma financial statements as is done at the individual firm level. In addition, the valuation benchmark in large sample studies is current share price, whereas the purpose of individual firm valuations is to determine the intrinsic value of the firm.
Dechow et al. (1999) test the RIM on a large sample of firms from 1976–1995 using analysts' earnings forecasts. They find that a simple valuation model capitalizing analysts' short-term earnings forecasts as a perpetuity provides greater explanatory power for current stock prices than does the RIM. Dechow et al. (1999) do not claim that the earnings capitalization approach is superior to other valuation models, but only that their simple benchmark model outperforms the RIM in explaining current stock prices.

With the exception of Penman and Sougiannis (1998), studies of the RIM or comparisons of the three valuation models use security analysts' forecasts for the projected values of the flows. Francis et al. (2000b) compare the results of the DDM, DCF model, and RIM using security analysts' earnings forecasts to results using mechanical earnings forecasts—forecasts generated by statistical models based on past earnings patterns. They find that the RIM with mechanical forecasts dominates the DCF model and DDM, explaining about 70 percent of the variation in observed stock prices during 1976–1997. Analysts' forecasts are significantly less biased but no more accurate than mechanical forecasts in this study and analysts' forecasts do not explain more of the variation in prices than do mechanical forecasts.

**Individual Firm Studies**

The above studies use large samples of firms and provide an average result across firms and/or through time. But the FASB's proposed testing for goodwill impairment must be accomplished at the individual firm level. The only research of which we are aware that examines the accuracy of any of the three models at the firm level is Kaplan and Ruback (1995). They compare the accuracy of the DCF model to the method of multiples (market to EBITDA) in valuing 51 highly leveraged transactions during 1983–1989 and find that the DCF valuations based on management forecasts of cash flows are within 10 percent of the realized transaction value and superior to the multiples approach.

In summary, many empirical academic studies conclude from large sample results that the RIM does a better job of explaining stock prices and stock returns than do alternative valuation models such as the DDM or DCF. These results are not directly applicable to the proposed test for goodwill impairment because such an impairment test is for a specific asset, purchased goodwill, within an individual firm or reporting unit within the firm. Moreover, the academic studies do not claim that any model is generally superior. Although many studies do claim that the RIM does a better job than other valuation models explaining stock prices, the sample firms have multiyear security analysts' forecasts of both earnings and dividends. Such firms are not representative of all firms. The academic studies described above use current stock price as the benchmark for assessing the explanatory power of the valuation models, implicitly assuming that stock prices reflect intrinsic value. Assuming the ability to match current stock price is the key criterion for judging superiority of a valuation model for use in assessing goodwill impairment, then the most direct approach is to base goodwill impairment testing on the firm's current stock price, when it exists, not on an estimate of the intrinsic value of equity provided by a valuation model.

**APPROPRIATENESS OF EQUITY VALUATION MODELS FOR IMPAIRMENT TESTING OF ACQUISITION GOODWILL**

We next discuss the potential application of the RIM and DCF valuation models to the impairment testing for purchased goodwill. As indicated above, the two models
share a common heritage in the DDM. The two models also employ a common procedure for estimating either the residual income or free cash flow used in the valuation analysis because both require a complete set of pro forma financial statements. Pro forma financial statements incorporate the strategy of the firm, expected current and noncurrent investment, and anticipated changes in capital structure. The firm's management may provide this information or security analysts may generate the pro formas.

A complete set of pro forma financial statements includes sensitivity analysis, such as the impact of a change in gross margins due to unanticipated competitive pressures, and scenario analysis, such as the development of a new product or the acquisition of a competitor. Analysts use these detailed, firm-level projections to estimate the intrinsic value of equity. The appropriate goal of the valuation process is not a point estimate but a range of reasonable prices. A wider range reflects greater underlying uncertainty in the estimation process. The valuation process is disciplined and structured but ultimately imprecise, remaining more art than science. Furthermore, firm valuation is often prompted by concern that the current stock price does not reflect intrinsic value, in contrast to the cited academic studies that use stock price as the valuation benchmark for their large samples.

Comparison of RIM and DCF Models for Goodwill Impairment Testing

Because the DCF model and RIM have the same theoretical basis and because the valuation estimates should be generated using the same set of pro forma financial statements, both models should provide reasonably consistent results at the firm level. This is, of course, an empirical issue. A potential advantage of the RIM for goodwill impairment testing is that it incorporates the book and market values of the firm's equity directly, not indirectly through discounted cash flows. This direct link is consistent with the measurement of goodwill at the acquisition date as the excess of market price paid over the fair value (new book value) of net assets. Under current accounting rules, however, subsequent tests for impairment of acquisition goodwill will not have fair values of net assets for comparison with the total estimated equity value and will generally not have an equity market value for the reporting unit to serve as a benchmark. That is, after the business combination is accomplished, the former target firm, with its separate stock price (if publicly traded), is usually merged with the acquirer and loses its independent identification and equity valuation.

Difficulties in Goodwill Impairment Testing

The FASB proposes that the fair value of goodwill be estimated as the difference between the estimated fair value of the reporting unit to which the goodwill is associated and the fair value of the reporting unit's recognized net assets, excluding goodwill. If the carrying amount of the goodwill is greater than the estimated fair value, then the goodwill is impaired and should be written down. This proposed test for impairment of acquisition goodwill faces several potential difficulties. Current accounting rules measure goodwill at the acquisition date as the residual or difference between the price paid for the target and the fair value of the target's net assets. If goodwill is subsequently measured as the total value of the acquired equity estimated by a RIM or DCF valuation model less the fair value of net assets, then goodwill continues to be measured as a residual.

Thus, both at acquisition and subsequently, goodwill is not a separable asset and must be measured as a residual under either current accounting standards or the proposed impairment approach. The residual nature of the calculation goodwill complicates
interpretation of its value. Any measurement error in computing the fair value of net assets affects the imputed value of the goodwill. Likewise, at the acquisition date any overpayment or underpayment for the target is reflected in the calculation of goodwill. There is currently no generally accepted method for measuring acquisition goodwill independently of the fair value of net assets.

Post-acquisition date measurement of goodwill is further complicated for at least two potential reasons. First, target firms are often merged into the parent firm or with subsidiaries of the parent, making separate performance evaluation and accounting measurement infeasible. In these cases, it appears impossible to measure acquisition goodwill separately from enterprise goodwill after the date of the business combination.

Second, even if the target retains its independent existence, changes in acquisition goodwill are indistinguishable from changes in post-business combination internally generated goodwill, precluding separate measurement and impairment testing of the two types of goodwill. If GAAP were a completely fair-value-based system, then such separation would not matter because both acquisition goodwill and internally generated goodwill would be fair valued. But under current GAAP, the proposed impairment test contributes to the existing inconsistent treatment of intangible assets—the costs of acquired intangibles are recognized as assets and the costs of internally developed intangibles are immediately expensed. Not only would purchased goodwill be capitalized, but also subsequent tests for impairment could implicitly capitalize internally generated goodwill, whereas firms with no externally acquired goodwill would continue to expense expenditures for internally generated goodwill as incurred.

Both of these problems with impairment testing hold regardless of the valuation model being applied and neither valuation model mitigates them more than the other.

**CONCLUDING COMMENTS**

We believe that the inability to separate acquisition goodwill from total enterprise goodwill in the post-acquisition period is a serious impediment to the adoption of an impairment testing approach to goodwill. Our position is based on the inherent theoretical equivalence of the two valuation models and their common need for pro forma financial statements at the firm level. We believe that both academics and practitioners agree that when the RIM and DCF model use internally consistent discount rates, growth rates, and steady states, the values based on the DCF model or RIM will be similar for any entity. The only issue is whether one or the other model's characteristics result in its being preferred in practical situations for individual firms. Thus far, there is no evidence that we know of on this issue. The academic evidence to date is based on large samples and is inappropriate for conclusions about individual firm valuation. Furthermore, the cited researchers do not claim that inferences about model superiority can be drawn from their work.

Research into valuation theory and model specification continues. For example, neither the DCF model nor RIM explicitly incorporates the valuation of real options, and the acquisition premiums in many business combinations could be driven by the value of real options. Real options represent opportunities to make a business decision other than a financing decision. Examples of real options include the option to abandon a project, the option to wait and learn before further investing, and the option to make additional investments if the immediate investment project succeeds. Such options are valued differently from the valuation methods discussed here.

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9 For an introduction to real options, see Brealey and Myers (2000).
We recommend that the FASB's decision on whether to test goodwill for impairment instead of systematically amortizing it, or in addition to systematic amortization, be based on criteria other than the claimed advantages of any valuation model. Both the RIM and DCF models employ estimates and both can provide a reasonable basis for estimating the value of aggregate goodwill, not acquisition goodwill. Limitations are imposed by the residual nature of goodwill, the inherent uncertainty of projecting pro forma financial statements, and the lack of precision in estimating discount rates and required rates of return.

If GAAP moves toward fair value accounting for intangibles, some of the goodwill valuation issues disappear. Under fair value reporting, measuring enterprise goodwill, including internally generated goodwill, at fair value is consistent with the accounting for other assets. The Committee believes that the proposal to value enterprise goodwill using either the RIM or the DCF model is a substitute for fair value accounting and, as such, could set a precedent.

REFERENCES