

Value and Prices of Intangible Assets: An Fundamental Point of View

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The title under which I was asked to speak at this conference might suggest that there is a particular American point of view on the valuation of intangibles to convey to you. The United States is a diverse culture and there are as many points of view on the valuation of intangibles as there are on anything else. Certainly the babble about intangible assets during the recent technology bubble would suggest so. Shying from the task of synthesizing the various positions, I lay out one particular point of view, at risk of just adding to the babble.

I deal with the issue from the perspective of a fundamental analyst in the tradition of Benjamin Graham, the Columbia University professor of yesteryear who is often recognized as the father on fundamental analysis. Of course, fundamental analysis has come some way since Graham's day – it has been placed on the same foundations as modern finance with more disciplined techniques – and much of what I have to say reflects recent developments in the area. But, in keeping with the principles of traditional fundamental analysis, modern fundamental analysis brings order to the analysis of information. The valuation of intangibles requires ordered thinking. The very notion of an intangible asset lends itself to speculation, as recent history attests. The fundamentalist's ordered analysis challenges speculative valuation of intangible assets.

Focusing on Intangible Assets: Joint and Separable Assets

I focus on the valuation of the shares of a firm that has intangible assets. As most firms have some form of intangible asset that is not on the balance sheet, my talk deals with the general principles of valuation when balance sheets are imperfect. I do not have much to

say about the valuation of specific intangible assets as stand-alone investments. Indeed, I have problems with the very notion. First, intangible assets do not come into clear focus; their identification is not easy. Ascribing value to “knowledge assets, “entrepreneurial capital,” “marketing technologies,” and “network externalities” (to name a few) is frustrated because we not really know what exactly these assets are. This point prompts a caveat for the valuation of intangibles: appeal to hazy notions is a recipe for speculative valuation. Second, intangible assets, even when identified, usually generate value jointly with tangible assets and the entrepreneurial idea that combines tangible and intangible assets in the business plan. Thus they do not have separable value in a going concern, just as tangible assets have separable value only in liquidation. This point prompts a another caveat in valuing intangible assets. Asking about the value of Dell’s direct-to-customer delivery system, part of its “structural capital,” is not a sensible question. One might ask what value is added by the addition of a specific intangible asset such as a marketing innovation, but that is a question of the incremental value to the whole firm that uses many assets jointly. In this case the evaluation involves the valuation of the firm with and without the innovation.

Some intangible assets – brand names and patents, for example – involve defined separable property rights that can be traded, but I do not profess to have the expertise for valuing these assets, surely less than others speaking at this conference. But note that brands and patent rights are often purchased in an acquisition of a whole company, presumably because they are employed synergistically with other assets.

Fundamental analysts always recognized that “competitive advantage” is an asset that is not on the balance sheet but which has to be valued. Intangible assets, so called,

are just another means of acquiring competitive advantage. So I see no difference in valuing a firm with intangible assets from valuing any firm with competitive advantage.

Bubble Bubble

The demand to value intangible assets intensified during the recent stock market bubble. At the same time, the fundamentalist view of valuation drew considerable criticism for not being up to the task. Many commentators dismissed traditional financial analysis based on balance sheets and income statements as a relic of the Industrial Age when value was embedded in tangible assets on balance sheets. In the Information Age, it was said, value is embedded in intangible assets that are not on balance sheets. The assets that now generate value are “knowledge assets,” “brand assets,” “structural capital,” “intellectual capital,” and the like. None of these are recognized on the balance sheet (at least under U.S. GAAP accounting). The internet and other technology firms for which the stock market attributed high valuations typically reported losses in their income statements. So, with omitted assets on the balance sheets and earnings giving little indication of value, how could analysis of balance sheets and income statements be of much help? Is this talk bubble froth or insight? In their statement responding to the Enron-Andersen debacle, the (then) Big-5 accounting firms blamed the “broken financial-reporting model.”¹ Joe Berardino, chief executive of Enron’s auditor, Arthur Andersen, claimed, in a “wake-up call,” that “Enron’s collapse, like the dot-com

¹ See *The New York Times*, December 5, 2001, page C9. See also comment by Stephen Butler, Chairman of KPMG LLP in PR Newswire, January 31, 2002.

meltdown, is a reminder that our financial reporting model is out of date.”² Are these defensive, self-serving reactions, or statements of substance?

With the bursting of the bubble, financial statements certainly were shown to be lacking in many respects. One must, of course, distinguish between poor accounting principles and the abuse of sound accounting principles encouraged by poor auditing. While a number of accounting principles in the U.S. – including those for off-balance sheet entities, capacity swaps, and stock options – have justifiably come into question, I know of no criticism that problems arose because of intangible assets were not on the balance sheet.³ Indeed, most of the post-bubble concern is over the *overstatement* of assets and the *understatement* of liabilities. Indeed, while commentators during the bubble claimed that traditional measures were uninformative, we see now, in retrospect, that the losses reported by dot.com firms in the late 1990s were good predictors of outcomes. At the time, internet analysts turned to untried metrics such as, “hits,” “eyeballs” and “page views,” all seemingly more attractive than “losses,” but not in retrospect.

It is much more likely, in my mind, that the bubble can be attributive to undisciplined speculative valuation of intangible assets that ignored the principles of sound accounting and valuation, rather than to problems with the accounting. One suspects that commentators imputed the value of intangible assets from the high share prices at the time: if prices are so high relative to book value, the accounting must be wrong, they insisted. Indeed, one even saw analysts calculating the value of intangible

² See *The Wall Street Journal*, op-ed page, A18, December 4, 2001.

³ I review the quality of accounting during the bubble in Penman, S., “The Quality of Financial Statements: Perspectives from the Recent Stock Market Bubble,” forthcoming *Accounting Horizons*, 2002.

assets as the difference between the market price of a firm and the value of tangible assets on the balance sheet (sometimes with a premium added to tangible assets for a normal profit). The separability issue aside, that calculation values hazy intangible assets from speculative market valuations of those assets.

Anchoring Value in the Financial Statements

Fundamental analysis recognizes that speculative analysis leads to speculative stock prices, so applies procedures that challenge speculative analysis. Fundamental analysis cuts across speculative bubbles. A good analyst exploits all information that bears upon the future, particularly indicators such as “hits” and “eyeballs” that bear on customers and growth in customers. But fundamental analysts are disciplined in the way that they use information. They follow the maxim: don’t mix what you know with what you don’t know. Don’t mix knowledge with speculation. Don’t give untested metrics the same weight as time-honored metrics. View new concepts like “structural capital” and new measures like “eyeballs” with caution; they lack concreteness and can be used by entrepreneurs, investment bankers, and cooperating analysts to promote stock market bubbles.

In order to be concrete, fundamental analysts anchor themselves in the financial statements. Far from discarding traditional financial statements, they take them as a starting point. They do so with very good reason. Accounting principles deliberately avoid using (possibly speculative) market prices in financial statements, with the exception of some financial assets where the “fair” market value is not in dispute. Accounting principles omit tangible assets from the balance sheet, not out of

carelessness, but as a matter of thoughtful procedure. Accountants apply the reliability criterion.

The reliability criterion demands that assets and liabilities are recognized only if they can be measured with reasonable precision and can be supported by objective evidence, free of opinion and bias. The reliability criterion distinguishes what we know from what we might speculate about. The reliability criterion rules out recognizing Dell's "direct-to-customer" marketing technology and its supply chain innovations on its balance sheet. Estimates of these assets are deemed to be too subjective, too open to manipulation. Indeed, most intangible assets are omitted from the balance sheet. Knowledge assets developed from research and development (R&D) are usually omitted. Only assets that the firm has purchased – like inventories, plant, R&D acquired by purchasing a patent, and acquired goodwill – are recorded, for then there is an objective market transaction to justify the measurement.

The reliability criterion also governs the income statement. Indeed, the revenue recognition principle invokes the reliability criterion: revenues are recorded only when there is reliable evidence of a customer buying the product. So accountants do not book revenue based on speculation that the firm may get customers in the future, only when they actually hook a customer.

The reliability criterion suits the fundamental analyst well. The reliability criterion is the accounting manifestation of the analyst's maxim: don't mix speculation with knowledge. Sales made in the current period, and the earnings derived from them after matching expenses, are something that we know with some reliability. Don't contaminate that knowledge by mixing it with speculation about future sales, for the

analyst wants to use that knowledge to test speculation. Further, don't mix hard assets in the balance sheet with speculative estimates about the value of unobserved intangible assets. There is some estimation in accounting, of course – allowances for bad debts, depreciation and warranties, to name just a few -- but it is usually backed up by persuasive evidence. One always has to be concerned about the quality of the accounting, of course, but typically the quality of the accounting suffers when accountants stray from that principle of unbiased measurement based on the evidence.

Valuation with Imperfect Accounting

If financial statements are restricted to relatively hard information, they must be imperfect, by design. The task of the fundamental analyst is to account for the value that is missing in the financial statements. The appendix has a primer on fundamental valuation based on financial statements.⁴ I outline just the main points here.

Anchoring Value on Book Value

Following the principle of anchoring the analysis in the financial statements, the analyst can anchor the valuation on the book value as hard information and then add extra missing value:

$$\text{Value} = \text{Book Value} + \text{Extra Value}$$

Book value is the carrying value of net assets. The extra value captures the value of the omitted (intangible) assets, the value of the tangible assets over their carrying value, and the value of the tangible and intangible assets used synergistically together.

⁴ See also, Penman, S, “What Matters in Company Valuation: Earnings, Residual Earnings, or Dividends? – Theory and Evidence.” Paper presented to the 56th Schmalenbach Betriebswirtschaftler-Tag, 2002.

The extra value over book value can be calculated using the residual income valuation framework:

$$\text{Value} = \text{Book Value} + \text{Discounted Future Residual Earnings}$$

(This valuation model is stated formally in the appendix.) The extra value is determined by forecasting residual earnings and discounting it at the required return (the cost of capital). Residual earnings is earnings for a period minus a charge (at the required return) on the book value at the beginning of the year. For year 2003, say, residual income, with a required return of 10%, is

$$\text{Residual Earnings}(2003) = \text{Earnings}(2003) - (0.10 \times \text{Book Value at the end of 2002})$$

So, if book value at the end of 2002 is 400 million euros and earnings for 2003 are expected to be 55 million euros, residual earnings for 2003 are 15 million euros. It is this number (along with residual earnings for subsequent years) that that must be forecasted to calculate value over book value. If the earnings rate is 10% on book value, residual income is zero: there is no extra value over book value.

This valuation approach embraces two principles. First, value may be missing from the balance sheet, but that missing value must ultimately show up in earnings. That is, book value may not capture the value of “soft” assets (such as intangibles) but, for soft assets to have value, they must produce earnings. The extra value is speculative value (because it involves forecasting), but that speculation is disciplined by the requirement that earnings must be in focus. There is no need to identify intangible assets; there is, however, the requirement that earnings be delivered in excess of those from applying the cost of capital to book value. This requirement, in turn, requires that the value of

intangible assets must be justified by modeling anticipated sales that the assets will generate, along with the expenses of delivering those sales. Second, the fact that intangible assets are omitted from the balance sheet (or tangible assets are mismeasured) is not of particular concern. If values are low on the balance sheet, expected residual income is higher, resulting in a higher value relative to book value. Value omitted from the balance sheet is picked up by forecasting.

In using this approach, the value over book value is assessed under a strict discipline that explicitly recognizes the imperfection in the balance sheet. That discipline says that, for an intangible assets to have value, there must be a scenario for earnings, and that scenario must produce a return on book value greater than the required return on the book value of those assets that are on the balance sheet. Speculation is checked.

Anchoring Value on Earnings

An alternative approach bypasses book value altogether and focuses directly on the future earnings that investors buy when they purchase stocks. Forward earnings are the starting point, then extra value is added:

$$\text{Value} = \text{Capitalized Forward Earnings} + \text{Extra Value not in Earnings}$$

(Capitalized current earnings can also be a starting point.) The extra value is determined by how much earnings are expected to grow after the forward year, that is, by abnormal earnings growth:

$$\text{Value} = \text{Capitalized Forward Earnings} + \text{Capitalized Discounted Abnormal Earnings Growth}$$

(Again, the valuation model is stated formally in the appendix.) For year 2003, abnormal earnings growth with a required return of 10% is:

$$\text{Abnormal Earn Growth (2003)} = \text{Earn}(2003) + 0.10 \times \text{Div}(2002) - 1.10 \times \text{Earn}(2002)$$

So, if earnings for 2002 were 12 euros per share and the firm paid 2 euros per share in dividends from those earnings, abnormal earnings growth for 15 euros of earnings for 2003 is $15 + 0.20 - 13.2 = 2$ euros. So abnormal earnings growth is growth at a rate in excess of the required rate, after counting earnings from reinvesting dividends. This model has recently been developed by Professors Ohlson and Juettner-Nauroth at New York University.

Under this approach, intangible (and other) assets are valued directly from the earnings they are expected to produce. Extra value is added to capitalized earnings only if the assets can generate an earnings growth rate in excess of the required rate. The requirement to develop credible scenarios for earnings growth disciplines speculative tendencies.

It has become fashionable of late to state that traditional analysis does not capture “real options,” another (hazy) intangible asset to which value was attributed during the bubble. This is not correct. The value of a real option arises from the value of a contingent path along which a firm might travel. The methods above are based on expected earnings over all contingent paths so include the (probability weighted) earnings on paths followed in the exercise of real options. Indeed, the contingent scenario analysis imbedded in the methods leads to the leads articulation of an (otherwise hazy) real option – and then to its valuation.

Protection from Paying too Much for Earnings

Speculative analysis typically overvalues earnings growth, and in speculative times investors pay too much for growth. A valid valuation method provides a check on overvaluing earnings growth. Both methods above build in protection from paying too much for earnings

There are two concerns. First, firms can increase earnings by increasing investments, but investments do not necessarily add value. With a book value anchor, earnings add value only if they cover the required earnings on book value. With a capitalized earnings anchor, earnings growth adds value only if the growth is in excess of the required rate of growth. So one is not deceived into applying high multipliers to the earnings growth generated by the serial acquirers, like Tyco and WorldCom, unless that growth is demonstrated to add value.

The second concern arises because earnings growth can be induced by accounting methods, but growth induced merely by accounting methods should not be paid for. Firms can create future earnings by writing down assets. A write-down of inventory, for example, results in lower cost of cost good sold subsequently and thus higher income. A restructuring charge against assets reduces subsequent depreciation expense and thus increases earnings—all the more so if a firm overestimates the charge and bleeds it back to earnings in the future. An investor needs to be protected from paying for earnings generated in this way. The residual earnings model does so, because the only way a firm can generate higher earnings with accounting methods is to write down book values. The write-down yields higher earnings and residual earnings, but also lower book values. By

using book values and earnings together, the net effect is zero; the model protects the investor. Similarly, if the method that capitalizes earnings, forward earnings created by the write-downs become the base for subsequent earnings growth and thus reduce subsequent growth; the net effect is again zero.

Disciplining Forecasting With Financial Statement Analysis

Calculating the “extra value” under these methods involves forecasting, so is speculative in nature. But we can again turn to the relatively hard information of the financial statements to help with the forecasting. Financial statement analysis elicits this information.

Laying out a complete financial statement analysis for forecasting and valuation cannot be done here. A comprehensive scheme must be followed, otherwise some aspect of the valuation creation may be overlooked.⁵ Here I give only an example that is pertinent to the valuation of intangible assets. Dell Computer, by any reasoning, has produced value for shareholders. Much of that value is not on the balance sheet; Dell trades at a price-to-book ratio of about 15 (it traded at 35 times book value during the bubble!). This premium is attributed to its intangible assets, to its brand name and also to the “organizational capital” or “structural capital” developed through its customer and supplier relationships. Its balance sheet (below) is very sparse. The operating assets listed are in accounts receivable, some plant (only \$996 million for a firm valued at \$65 billion), and (very low) inventory of \$400 million. The total of these assets is less than the \$7.856 billion it holds in cash and interest-bearing investments (financial assets).

⁵ Refer to my book, *Financial Statement Analysis and Security Valuation* (Mc-Graw-Hill, 2001) for a full treatment.

DELL COMPUTER CORPORATION
Balance sheet, February 2, 2001
(in millions of dollars)

| | |
|------------------------------------|----------------------|
| Cash and cash equivalents | 4,910 |
| Short-term investments | 528 |
| Accounts receivable, net | 2,895 |
| Inventories | 400 |
| Other | 758 |
| Total current assets | <u>9,491</u> |
| Property, plant and equipment, net | 996 |
| Investments | 2,418 |
| Other | 530 |
| Total assets | <u><u>13,435</u></u> |
| | |
| Accounts payable | 4,286 |
| Accrued liabilities | 2,257 |
| Total current liabilities | <u>6,543</u> |
| Long-term debt | 509 |
| Other liabilities | 761 |
| Total Liabilities | <u>7,813</u> |
| | |
| Stockholders' equity | <u>5,622</u> |
| | <u><u>13,435</u></u> |

This is a balance sheet for the Industrial Age, a critic might claim; it omits the intangible assets. However, appropriate financial statement analysis can give us considerable insight into the missing value. The following balance sheet simply reformulates the one above to highlight the economics of the business.

DELL COMPUTER CORPORATION
Reformulated Balance Sheet, February 2, 2001
(in millions of dollars)

Operating Assets

| | | |
|---------------------|--|--------------|
| Accounts Receivable | | 2,895 |
| Inventory | | 400 |
| PPE | | 996 |
| Other | | 1,288 |
| | | <u>5,579</u> |

Operating Liabilities

| | | |
|---------------------|------------|--------------|
| Accounts Payable | 4,286 | |
| Accrued Liabilities | 2,257 | |
| Other | 761 | 7,304 |
| | <u>761</u> | <u>7,304</u> |

Net Operating Assets (1,725)

Net Financial Assets 7,347

Shareholders' Equity 5,622

In this reformulated balance sheet, operating assets and operating liabilities have been grouped together to net to Net Operating Assets. These are the assets liabilities involved in business operations. Net Financial Assets are the financial assets (excess cash) net of the small amount of financing debt. The measure, net operating assets, recognizes that, if suppliers supply credit, the shareholders investment in operations is reduced. So, for example, if a firm holds \$400 in inventory, but there is an accounts payable for \$400 to the supplier of that inventory, the net investment in inventory is zero.

This inventory example is very much to the point when looking as Dell. It holds only \$400 in inventory – due to its “just-in-time” inventory management -- but has

\$4.286 billion in accounts payable (and another \$2.257 billion in accrued expenses). Dell is particularly adept in getting suppliers to carry costs, and it runs its days in accounts payable far longer than Compaq, for example. Indeed, the reformulated balance sheet shows that operating liabilities are considerably greater than operating assets: net operating assets are negative. Financial firms work on an operating float, but we rarely see a manufacturing firm doing so.

Does this “structural capital” add value? Dell reported \$1.284 billion in operating income after tax for the 2002 fiscal year following this balance sheet. Applying a residual income calculation with a 10% cost of capital charge against the net operating assets,

$$\text{Residual operating income} = \$1.284 - [(0.10 \times (-1.725))] = \$1.457 \text{ billion}$$

The net operating assets enter into this calculation negatively, yielding residual income greater than income. In effect, shareholders do not have to invest \$1.725 billion in the firm (because suppliers are doing it), so can invest that amount to earn 10% elsewhere.⁶ That’s value added from “structural capital.” The structural capital is recognized – even though it is not explicitly on the balance sheet – and indeed the amount of added value in 2002 can be calculated.

⁶ I refer to the amount of operating liabilities relative to operating assets as *operating liability leverage*. Like financial leverage, operating liability leverage can be favorable or unfavorable, and the drivers of the leverage can be analyzed. See *Financial Statement Analysis and Security Valuation (op.cit.)* and Nissim, D. and Penman, S. “Financial Statement Analysis of Leverage and How it Informs About Profitability and Price-to-Book Ratios” at http://papers.ssrn.com/sol3/delivery.cfm/SSRN_ID292725_code011208100.pdf?abstractid=292725

One need only to extrapolate these features out into the future to get the value of the structural capital. Suppose that one forecasted that Dell can grow the residual income from its structural capital by 7% per year. Then Dell's calculated value is its book value plus the value of the forecasted residual income:

$$Value = 5.622 + \frac{1.457}{0.10 - 0.07} = 54.189 \text{ billion}$$

The value of the intangible assets (Value – Book Value) is \$48.567 billion. With 2.602 billion shares outstanding, the per-share calculated value is \$20.83. At the beginning of 2002, Dell's shares traded at \$24 (about the same level as they are currently). Our analysis would conclude that we must forecast growth in excess of 7% to justify paying \$24 per share.

My point is that, traditional financial analysis, appropriately ordered, facilitates the valuation of intangible assets. During the bubble, this analysis would have disciplined the speculative valuations of Dell. Dell's shares traded at \$60 in early 2000, falling to \$18 by early 2001. The analysis here would not have supported the \$60 price. I submit that this analysis is more concrete than speculative valuations of Dell's intangible assets that might be placed on the balance sheet. Better to work with what we know.

Conclusion

My talk has been an apology for fundamental analysis for the valuation of intangible assets. Traditional financial analysis was incorrectly characterized during the stock market bubble as being out of date, not suited to an economy where value is in intangible assets. Modern refinements have updated traditional analysis, but under the same

philosophy of bringing an ordered analysis that distinguishes what we know from speculation. I submit that such an approach, if adopted, would have anchored the analyst and the investor during the bubble and would have challenged the speculative valuations we saw at that time. Some of that speculation concerned the value of intangible assets. The valuation of intangible assets is better served if it submits to the rigor of a thorough fundamental analysis.

Appendix

There is a basic rule in valuation: what works for equities and other securities must work for a savings account. If someone proposes an equity valuation model that does not work for a savings account, you know that there is something wrong with it. So we can illustrate valuation techniques alluded to in the body of the paper by showing that they don't work for a savings account, or that they only work in special circumstances. And we can demonstrate sound techniques.

The Valuation of a Savings Account

Consider an account with a balance of 100 euros earning at a rate of 10% per annum, terminating after five years. To value the account at date 0, the analyst produces the following pro forma for the five years into the future:

A Terminal Savings Account with Full Payout

| <i>Year</i> | <i>0</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> |
|----------------|----------|----------|----------|----------|----------|----------|
| Book value | 100 | 100 | 100 | 100 | 100 | 0 |
| Earnings | 10 | 10 | 10 | 10 | 10 | 10 |
| Dividends | | 10 | 10 | 10 | 10 | 110 |
| Free cash flow | | 10 | 10 | 10 | 10 | 110 |

You notice two things about this pro forma. First, it's for a terminal investment: the balance of the account is paid out at the end of year 5. Second, the earnings of 10 euros each year are withdrawn from the account, leaving 100 euros in the account to earn at 10%: this is a case of "full payout." Withdrawals are the dividends from the account. Free cash flow is cash left over after reinvesting in the account and, as there is no reinvestment of earnings in this example, free cash flow is also 10 euros each year, with a final cash flow of 110 euros in year 5.

As this is a terminal investment, we can value it by taking the present value of dividends, which in this case is also the present value of cash flows. The required return is 10%, so

$$\begin{aligned}\text{Value} &= 10/1.10 + 10/1.21 + 10/1.331 + 10/1.4641 + 110/1.6105 \\ &= 100\end{aligned}$$

The rule always holds: for terminal investments, one can always discount cash flows or dividends. This is because, with a terminal investment, we always capture the final

liquidating payoff. The model here is referred to, of course, as the *dividend discount model*. A similar calculation can be made by discounting the forecasted free cash flow in which case the model is referred to as the *discounted cash flow model*, well known to students of business schools. Free cash flow is always equal to dividends (for equities also) if there is no debt financing (the investment in the assets is not levered). When there is debt, discounted cash flow methods involve only a slight modification of dividend discounting; both involve forecasting of cash flows.

There are two other methods for valuing this savings account, however, and they don't involve cash flows. The depository bank accounts for the asset by preparing a bank statement that states a balance. In effect, the bank prepares a balance sheet with a book value. One can value the assets from the book value:

$$\text{Value} = \text{Book Value} = 100$$

The price-to-book ratio is one. We refer to this valuation as the *book value model*. An analyst can also value the account by forecasting one-year-ahead forward earnings rather than cash flows, and capitalizing those earnings at the rate for the required return:

$$\text{Value} = \text{Capitalized Forward Earnings} = 10/0.10 = 100.$$

The forward P/E ratio is 1/required return (that is, 10 for the 10% rate here). We refer to this model as the *capitalized earnings model*.

Businesses are going concerns. This introduces the problem that, unlike the savings account here, there is typically no liquidating payoff. But we can modify the example to consider a going concern. Suppose that this savings account is expected to continue indefinitely. The pro forma for the first five years is then as follows:

Going-concern Savings Account with Full Payout

| <i>Year</i> | <i>0</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> |
|----------------|----------|----------|----------|----------|----------|----------|
| Book value | 100 | 100 | 100 | 100 | 100 | 100 |
| Earnings | 10 | 10 | 10 | 10 | 10 | 10 |
| Dividends | | 10 | 10 | 10 | 10 | 10 |
| Free cash flow | | 10 | 10 | 10 | 10 | 10 |

There is no terminal payment in year 5 as the account continues indefinitely. There is full payout every year, as before. We can value the account by discounting the dividends or cash flows. The continuing value at year 5 (or $10/0.10 = 100$) is calculated as a 10 euro perpetuity.

$$\text{Value} = 10/1.10 + 10/1.21 + 10/1.331 + 10/1.4641 + 10/1.6105 + (10/0.10)/1.6105$$

= 100

The dividend discount model and the discounted cash flow model work. The book value model and the earnings capitalization model also work. Will that always be the case?

To get closer to what an investment in equity looks like, suppose that you do not expect to withdraw anything from the account for a very long time. You want the value to accumulate in the account for the benefit of your grandchildren. The five-year pro forma in this case is as follows:

Going-concern Savings Account with No Payout

| <i>Year</i> | <i>0</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> |
|----------------------|----------|----------|----------|----------|----------|----------|
| Book value | 100 | 110 | 121 | 133.1 | 146.41 | 161.05 |
| Earnings | | 10 | 11 | 12.1 | 13.31 | 14.64 |
| Dividends | 0 | 0 | 0 | 0 | 0 | 0 |
| Free cash flow | 0 | 0 | 0 | 0 | 0 | 0 |
| Return on Book Value | | 10% | 10% | 10% | 10% | 10% |
| Growth in Earnings | | 10% | 10% | 10% | 10% | 10% |

Here earnings each year are reinvested in the account, so free cash flows and dividends are expected to be zero. We now get to an important point: *forecasting dividends or cash flows over five years (or ten, or twenty years) won't work*. But the book value method and the capitalized earnings method still work:

Value = Book Value = 100

Value = Capitalized Forward Earnings = $10/0.10 = 100$

You could, of course, get a value based on forecasted dividends or cash flows if you forecasted your grandchildren's ultimate withdrawals and discounted them back to the present. But, to be as practical as possible, analysts want to work with relatively short forecast horizons. Forecasting cash flow for the year 2050 gives us serious problems. Forecasting the ultimate liquidation of the account two generations on requires a very long forecasting horizon and considerably more computation. It is much easier to value the asset based on the immediate book values and earnings rather than forecasting dividends 50 years hence.

Before leaving the savings account, note that the last pro forma has two lines added. The expected return on assets for this account is 10%. The expected growth in earnings is 10%. These forecast are particularly important as we come to the valuation of equities.

The Valuation of Equities

It is quite easy to see that, when it comes to equities, forecasting dividends is not going to work. Just like the no-withdrawals case for the savings account, Microsoft and many other firms “pay no dividends” (though they do have some stock repurchases). Firms in the U.S. typically pay few dividends. Indeed the average dividend yield in the U.S. has declined from 4% 20 years ago to just 1.3% now. We refer to the *dividend paradox*: the value of an equity investment is based on the expected dividends that it is likely to pay, but forecasting dividends over practical forecast periods does not help to value the equity.

It is not as easy to see that forecasting free cash flows can also be problematical. Look at the following numbers for Home Depot Inc., the successful U.S. warehouse retailer of home improvement products, from 1997 – 2001 (in millions of dollars):

Home Depot Inc.

| <i>Year</i> | <i>1997</i> | <i>1998</i> | <i>1999</i> | <i>2000</i> | <i>2001</i> |
|------------------------------|-------------|-------------|-------------|-------------|-------------|
| Operating earnings | 941 | 1,129 | 1,585 | 2,323 | 2,565 |
| Book value, operating assets | 6,722 | 8,333 | 10,248 | 12,993 | 16,419 |
| Free cash flow | (149) | (482) | (330) | (422) | (861) |

Suppose one were standing at the end of fiscal year 1996, attempting to make a forecast, and were offered a set of pro forma numbers for the five forward years, 1997- 2001 with the guarantee that these numbers would be the actual reported numbers. And suppose one had to choose between the accrual accounting numbers (forecasted operating income and net operating assets) or cash flow numbers. The choice, as with the savings account, is clear. The forecasted free cash flows are negative, so getting a valuation from forecasts for five years of cash flows is problematical indeed. Home Depot invests over and above the cash generated from operations, resulting in negative free cash flow. Those investments are likely to deliver positive free cash flows in the distant future, but an analyst wants to work with relatively short forecast horizon. The retailer, Wal-Mart generated negative free cash flows consistently for many years up to the late 1990s. Earnings and book value look like a better thing to focus on.

To do so, think of adapting the book value model and the earnings capitalization model for the savings account to equities. First recognize that the accounting for book value and earnings in the case of business firms is not as good as that for the savings account. It is rare that we can take the book value of shareholders’ equity as a measure of the value of their equity. Nor can we capitalize forward earnings in most cases. But the savings account example gives us the insight for the modifications.

Think of the book value model being modified as follows:

$$\text{Value} = \text{Book Value} + \text{Extra Value not in Book Value}$$

With the savings account, book value measures all of the value, so there is no extra value. But why does the book value measure all the value? Well, as the last pro forma for the savings account indicates, we expect a return on book value (a return on equity) equal to the required return of 10%. A fundamental principle states that, if a firm is expected to earn a return on equity equal to its required return (the cost of capital), it must be worth its book value; there is no extra value. The intrinsic price-to-book ratio must be one. Correspondingly, if one expects a return on equity greater than the required return, the firm must be worth a premium over book value; there is extra value. The intrinsic price-to-book ratio must be greater than one.

A model, the *residual earnings model*, incorporates this principle formally:

$$\text{Value} = \text{Book Value} + \text{Discounted Future Residual Earnings}$$

The extra value is determined by forecasting residual earnings and discounting it at the required return. Residual earnings is earnings for a period minus a charge (at the required return) on the book value at the beginning of the year. For year 2001, say, residual income, with a required return of 10%, is

$$\text{Residual Earnings} = \text{Earnings}(2001) - (0.10 \times \text{Book Value at the end of 2000})$$

The formal formula for the model is as follows:

$$\text{Value of Equity } (V_0^E) = B_0 + \frac{\overline{RE}_1}{r_E} + \frac{\overline{RE}_2}{r_E^2} + \frac{\overline{RE}_3}{r_E^3} + \dots$$

Here, B is book value, RE is residual earnings, and \tilde{n} is one plus the discount rate (1.10 for a required return of 10%). The valuation is for date 0 and the subscripts 1, 2, 3, ..., on the RE indicate forecast years ahead. The model is applied with continuing values at the end of the forecast period. In short, valuation involves forecasting earnings future book values (net assets) and the rate of return at which those assets are expected to earn. Just as the book value model gives the same valuation as forecasting dividends for the savings account, one can prove that the model here gives the same valuation as forecasting dividends in the very long run for equities.

The earnings capitalization model for the savings account can also be modified for equities:

$$\text{Value} = \text{Capitalized Forward Earnings} + \text{Extra Value not in Earnings}$$

For the savings account, capitalized forward earnings capture all the value, so there is no extra value. But why do earnings capture all the value? Well, as the last pro forma for the savings account shows, earnings are expected to grow at the required return of 10%. A

fundamental principle states that, if earnings are expected to grow at the required return, value must be equal to capitalized earnings and the forward P/E ratio must be 1/required return (10 for a 10% required return). Correspondingly, if earnings are expected to grow at a rate greater than the required return, one must add extra value and the forward P/E ratio must be greater than 1/required return. This nothing different to saying that P/E ratios are determined by growth in earnings, where the benchmark is growth at the required return.

There is just one twist. The earnings growth must be in earnings with dividends reinvested, sometimes referred to as cum-dividend earnings growth. One gets earnings from a firm in the future from the earnings it makes but also from reinvesting any dividends that the firm pays. Look again at the case of the savings account where 10 euros of earnings are withdrawn each year. Earnings do not grow in the savings account (as the assets are always 100) but one can reinvest the dividend in another savings account to earn at 10%. So the 10 euros of dividends for Year 1 would earn 1 euro in Year 2 if invested in another savings account, for total earnings of 11 euros in the two savings accounts, and the cum-dividend growth rate would be 10%.

A model, the *earnings capitalization growth model* incorporates this principle formally. The model, developed recently by Professors Ohlson and Juettner-Nauroth⁷ at New York University states:

$$\text{Value} = \text{Capitalized Forward Earnings} + \text{Capitalized Discounted Abnormal Earnings Growth}$$

The extra value is determined by forecasting abnormal capitalized abnormal earnings growth. For year 2001, abnormal earnings growth with a required return of 10% is:

$$\text{Abnormal Earn Growth (2001)} = \text{Earn}(2001) + 0.10 \times \text{Div}(2000) - 1.10 \times \text{Earn}(2000)$$

So, if earnings for 2000 were 12 euros per share and the firm paid 2 euros per share in dividends, abnormal earnings growth for 15 euros of earnings reported in 2001 is $15 + 0.20 - 13.2 = 2$ euros, as in the body of the paper. The formula for the valuation model is:

$$\text{Value of Equity, } V_0^E = \frac{\text{Earn}_1}{r_E - 1} + \frac{1}{r_E - 1} \left[\frac{\text{AEG}_2}{r_E} + \frac{\text{AEG}_3}{r_E^2} + \frac{\text{AEG}_4}{r_E^3} + \dots \right]$$

Here AEG is abnormal earnings growth.

Refer back to the point about anchoring a valuation. Both the residual income model and the earnings capitalization growth model have an anchor. The residual income

⁷ See Ohlson, J. and Juettner-Nauroth, B., “Expected EPS and EPS Growth as Determinants of Value,” unpublished paper, New York University, 2001.

model is anchored by the book value in the balance sheet. The earnings capitalization growth model is anchored in the earnings in the income statement. Earnings are generated by the assets that are represented by the book values. So the two approaches are complementary. In both cases, valuation is anchored in the financial statements.