Merrill Lynch

GLOBAL

May 2005

iQmethod℠

Our Approach to Global Equity Valuation, Accounting, and Quality of Earnings

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Highlights

- In this report, we update our basis for company financial valuation and analysis. We continue to refine our systematic approach to maintaining consistency in a global context – what we call ***iQ****method*℠, part of our suite of ***iQ****analytics*℠ offerings. The key features of ***iQ****method* are:
  - A consistently structured, detailed, and transparent methodology, with data sourced directly from our analysts' models.
  - Guidelines to maximize the effectiveness of the comparative valuation process, and to identify some common pitfalls.

- The ***iQ****method* framework focuses on standard measures under three broad headings:
  - Business Performance – judging management effectiveness.
  - Quality of Earnings – assessing the sustainability of business performance, and the attendant risks.
  - Valuation – making the connection between business performance and market value. We look at the common metrics in fine detail to maximize consistency and highlight possible false signals.

- Our global ***iQ****database*℠ facilitates this analysis:
  - The ***iQ****database* is designed to provide both breadth and depth of data; and to effectively obtain, organize, and present consistent, detailed, and explicit financial information, in a manner most useful to investor investment priorities.
  - More than 100 detailed line items for each of the 2,500+ stocks in our global equity research coverage universe are available.

- A suite of products is available to access and manipulate the rich content of the ***iQ****analytics* platform. These include:
  - The ***iQ****toolkit*℠, which presents sector and regional analysis via our MLX web portal, Bloomberg, and coming soon, Reuters Knowledge for Investment Management platforms, leveraging the power of the database, including the metrics presented in this work.
  - ***iQ****works*℠ software, which further exploits the power of the ***iQ****database*, enabling us to create custom reports and charts including user-defined ratios and calculations based on the detailed data in the ***iQ****database*.

Quick Reference

We summarize below the definitions of our standard measures under three broad headings: Business Performance, Quality of Earnings, and Valuation. A more detailed explanation of how these metrics can be used (and misused) is given in the body of this report.

Business Performance

These measures essentially provide a checklist to judge management; Return on Capital Employed tests the effective deployment of resources across the enterprise in general, Return on Equity considers the rate of return to equity in particular. The Operating Margin indicates pricing power, while EPS Growth and Free Cash Flow give a feel for future value.

Table 1: Business Performance

Standard Measure	Numerator	Denominator	Units	Page
Return on Capital Employed	NOPAT = (EBIT + Interest Income) * (1 - Tax Rate) + Goodwill Amortization	Total Assets – Current Liabilities + ST Debt + Accumulated Goodwill Amortization	%	5
Return on Equity	Net Income	Shareholders' Equity	%	11
Operating Margin	Operating Profit	Sales	%	11
EPS Growth	Expected 5-Year CAGR From Latest Actual	N/A	%	12
Free Cash Flow	Cash Flow From Operations – Total Capex	N/A	Mn	15

Source: Merrill Lynch

Quality of Earnings

Not all earnings are equal! "High-quality" earnings should be viewed with greater confidence and, by implication, others treated with more caution. These metrics are intended to test the underlying security of the business performance.

Table 2: Quality of Earnings

Standard Measure	Numerator	Denominator	Units	Page
Cash Realization Ratio	Cash Flow From Operations	Net Income	X	17
Asset Replacement Ratio	Capex	Depreciation	X	18
Tax Rate	Tax Charge	Pre-Tax Income	%	19
Net Debt/Equity Ratio	Net Debt = Total Debt, Less Cash & Equivalents	Total Equity	%	20
Interest Cover	EBIT	Interest Expense	X	22

Source: Merrill Lynch

Valuation

These measures connect the economic performance of the business to its market value in various ways. The Price/Earnings Ratio is a payback indicator; the Price/Book Ratio reflects the valuation of the company's equity. The Dividend Yield and Free Cash Flow Yield reflect tangible and potential monetary rates of return, respectively. Enterprise Value/EBITDA is a general "structure-neutral" cash-generation multiple, and Enterprise Value/Sales indicates "volume leverage."

Table 3: Valuation

Standard Measure	Numerator	Denominator	Units	Page
Price/Earnings Ratio	Current Share Price	Diluted Earnings Per Share (Basis As Specified)	X	23
Price/Book Value	Current Share Price	Shareholders' Equity/Current Actual Shares	X	31
Dividend Yield	Annualized Declared Cash Dividend per Share	Current Share Price	%	31
Free Cash Flow Yield	Free Cash Flow	Market Cap. = Current Share Price * Current Actual Shares	%	33
Enterprise Value/EBITDA	Enterprise Value = Market Capitalization + Minority Equity + Net Debt + Other LT Liabilities[1]	EBIT + Depreciation + Amortization	X	34
Enterprise Value/Sales	Enterprise Value	Sales	X	35

[1] Pension liabilities, deferred taxes, capitalized lease, and other post-retirement benefits are explicitly included in other non-current liabilities. However, this item is not limited to these factors, as new and inventive forms of funding are always emerging and need to be captured.

Source: Merrill Lynch

CONTENTS

■ Section			Page
Quick Reference		**Standard Measure Definitions** At a Glance	**2**
First Principles	**1.**	**Steps in Measuring the Investment Process** Business Performance Quality of Earnings Valuation	**4**
Business Performance	**2.**	**A Checklist for Management** Return on Capital Employed Return on Equity Operating Margin EPS Growth Free Cash Flow	**5**
Quality of Earnings	**3.**	**Measures to Test Resilience of Business Performance** Cash Realization Ratio Asset Replacement Ratio Tax Rate Net Debt/Equity Ratio Interest Cover	**17**
Valuation	**4.**	**Connecting Market Value With Business Performance** Price/Earnings Ratio Price/Book Value Dividend Yield Free Cash Flow Yield Enterprise Value/EBITDA Enterprise Value/Sales	**23**
The Good DCF Guide	**5.**	**A Best Practice Guide to Discounted Cash Flow and Its Limitations** What (and How) to Discount Different Approaches to the Residual	**36**
Appendix		**The *iQdatabase* Global Template**	**44**

1. First Principles

The common thread between all equity investments is that investors commit capital to enterprise management in the expectation that this will produce *leveraged* returns. That leverage acts in two stages – first: that the *enterprise* earns a rate of return on its capital in excess of its cost; second: that its *market* value reflects that economic return.

In updating our ***iQ****method*, we have revisited (but not changed) a set of measures that in our view can best serve as the basis (and only the basis) for comparative assessment for both of these stages. Prudence requires that we test the confidence of our assessments, so we include measures to provide an indication of "quality of earnings."

Criteria for Selection

There is a particularly long list of metrics that could be included in our standard list, and almost as many ways of defining each metric. We continue to use the following criteria in to determine our standard measures:

Relevance: our key aim is to gather information from all directions; the metric should add incremental information, rather than complement an existing signal.

Simplicity: the concept should be explicitly understandable by all users.

Applicability: the metric should be meaningful across the entire spectrum of commercial/industrial sectors.

Forecastability: some definitions, while intellectually rigorous, are of limited practical use owing to the difficulty of forecasting some of their inputs. Where necessary, we have modified the "business school" definition in favor of a more pragmatic approach.

Our Sixteen Standard Measures

Business Performance

- Return on Capital Employed
- Return on Equity
- Operating Margin
- EPS Growth
- Free Cash Flow

Quality of Earnings

- Cash Realization Ratio
- Asset Replacement Ratio
- Tax Rate
- Net Debt/Equity
- Interest Cover

Valuation

- Price/Earnings Ratio
- Price/Book Value
- Dividend Yield
- Free Cash Flow Yield
- Enterprise Value/EBITDA
- Enterprise Value/Sales

2. Business Performance

These measures essentially provide a checklist to judge management: **Return on Capital Employed** tests the effective deployment of resources across the enterprise in general, **Return on Equity** considers the rate of return to equity in particular. The **Operating Margin** indicates pricing power and the ability to control production costs, while **Earnings Growth** and **Free Cash Flow** give a feel for potential value.

Return on Capital Employed

Concept

ROCE is an indicator of how effectively resources are used within the enterprise. If the rate of return on capital exceeds its cost, management is producing positive economic returns for shareholders.

The expression *capital employed* (the denominator) refers to all resources used in the business on which someone is expecting a return.

The *return* (the numerator) represents the total fund from which all required returns, dividends, interest paid, etc., will be met.

Use after-tax approach for valuation

This ratio is sometimes presented at the pre-tax level. We think this approach severely limits the value of the measure for two reasons. Tax is a critical element of the cost of capital, so pre-tax ROCE cannot be used as a value indicator. In addition, international comparison is rendered meaningless because of the wide range of tax rates across the globe. Accordingly, we use an after-tax approach.

Critical to consider write-offs

As it is possible to inflate the ratio merely by writing off resources, usually as goodwill, we add back the cumulative total of all such write-offs, amortization, etc., to the denominator, and the annual charge to the numerator.

And also operating leases

Because significant inconsistencies can arise where a company makes extensive use of assets that are leased, as opposed to owned, where applicable, total assets should be adjusted upward to reflect the notional value of assets provided under operating leases. Because there are many payment schedule permutations and, as yet, no definitive set of rules to determine such values, the calculation can be on a simplified basis only – perhaps grossing up the annual cost of lease payments by a yield factor based on interest rates.

Definition

Return on Capital Employed

NOPAT = (EBIT + Interest Income) * (1 - Tax Rate) + Goodwill Amortization

———————

Average of opening and closing Capital Employed = Total Assets – Current Liabilities + ST Debt + Accumulated Goodwill Amortization

Numerator: Net Operating Profit After Tax (NOPAT). This is calculated as: EBIT (consolidated operating profit, plus fixed-asset income such as associates), plus interest income, less *adjusted* tax, plus goodwill amortization *charge*.

Interest income is included, being part of the fund available to provide returns, but interest payments are not deducted, being a claim to be met from that fund.

To maintain consistency, the tax charge is adjusted to reflect the shield effect of interest paid; this is best achieved by applying the appropriate tax rate (actual, or where anomalous, long term) to the sum of EBIT and interest income.

Goodwill write-offs arising from impairment, or amortization (where it is still charged), are then added back, ignoring the (normally minimal) tax impact.

Denominator: total assets, less non-interest-bearing current liabilities, plus *cumulative* goodwill amortized and/or written off. Non-interest-bearing current liabilities being calculated as Total Current Liabilities less Short-Term Debt. We recommend this approach, rather than the classic exercise of adding up the relevant components of either side of the balance sheet. It is simpler, and focuses on the *concept* of capital employed, and more practically, it is considered more robust in that all components, including items such as special provisions, are included unless they are specifically excluded.

The asset base almost always changes between the opening and closing of the financial year; which data should be used?

In strict economic terms, it is the opening (previous) capital on which the return is earned. In measuring business performance, however, because the numerator is

essentially a flow over a period of time, the denominator should represent the *average* capital over that period. It is, however, definitely inappropriate to use the year-end capital alone; we use the average of the year-end and previous year-end values.

Use the average of opening and closing balance sheet values

The most rational approach, which we adopt as a standard, is to take the average of the opening and closing balance sheet values, excluding the first year. It is also sometimes appropriate to *weight* these points if, for example, a significant transaction occurs early or late in the year.

The expressions "Return on Capital Employed" and "Return on Invested Capital" are *almost* synonymous, but strictly speaking, ROIC refers to the *opening* capital rather than the average.

Interpretation

A test of management

Sustaining a high level of ROCE is a broad test of management. Because the ratio can be decomposed into the product of *margin* (profit/revenue) and *asset turnover* (revenue/assets) it can be viewed as a composite indicator of both pricing power/cost control (the *margin*) and management's ability to position the enterprise and assign capacity (the *asset turnover*). Ideally, both of these should be maximized, but where margins are low or declining, management should demonstrate that asset turnover is either high, or at least rising.

And a basis for valuation

ROCE is also the starting point for many other valuation concepts and techniques in wide use today. Two in particular are worth noting:

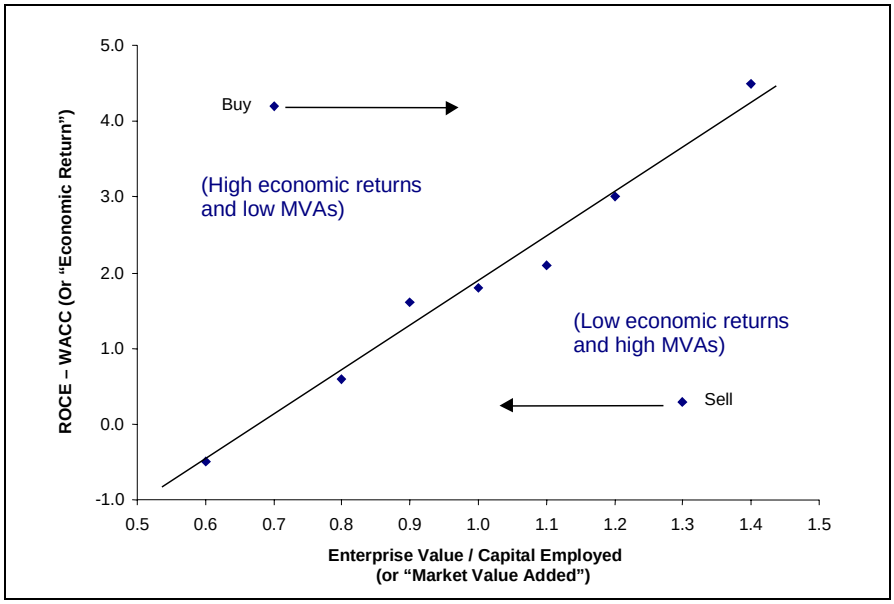
Economic Return/Economic Value Added/Market Value Added

ROCE measures the *extent* of a company's accounting rate of return on capital, but the *value* of that return also depends on the *cost* of that capital (which is defined and discussed in the next section on page 10).

The difference between a company's ROCE and its weighted average cost of capital (WACC) is known as the *Economic Return***.** This can, of course, be positive or negative. Multiplying the economic return by the capital employed indicates the total amount of value that has been generated for shareholders, known as the *Economic Value Added* (EVA)®.

This can then be compared to the premium or discount that the market applies to the value of the company's capital; the *Market Value Added* (MVA), which is defined as enterprise value/capital employed. Enterprise value is the market value of the company's capital: market capitalization plus net debt and other long-term liabilities and minority equity. This relationship is usually illustrated by plotting the economic spread against the MVA across a peer group, as in Chart 1.

Chart 1: Valuing Economic Returns by Comparing to MVA



Source: Merrill Lynch

Outliers of Interest

- **Buys** – with **high Economic Returns** and **low MVAs** (where mean reversion would imply a higher market value in future).
- **Sells** – with **low Economic Returns** and **high MVAs** (where below-average returns point to possible drops in market value).

Two types of outliers are of potential interest: those with *high* Economic Returns and *low* MVAs (where mean reversion would imply a higher future market value), and the opposite, where below-average returns point to possible drops in Market Value.

Another way of illustrating this effect in a single number is the *Rating of Economic Profit* ratio (REP). The REP is defined as: (Enterprise Value/Capital Employed) divided by (ROCE/WACC).

In simple terms, a REP greater than unity implies a premium valuation, suggesting that either the stock is overpriced, or that there will be an offsetting increase in ROCE relative to WACC. Symmetrically, a REP under one indicates either potential price appreciation, or declining future Economic Returns.

Cash Flow-Based Measures

Limitations of ROCE: Fails to reflect the age of assets

One key limitation of basic ROCE analysis is that it is effectively limited to *accounting* returns, rather than economic returns or cash flows.

In particular, ROCE fails to reflect the age of the assets involved, which can lead to distortions – flattering the rate of return for companies with an older, long-depreciated plant, for example. Although such businesses may produce acceptable returns at their current level of activity, *incremental* returns may be significantly lower, reducing the value of future growth.

CROCE attempts to account for this by using replacement cost

The concept of *Cash Return on Capital Employed* (CROCE) attempts to account for this; in effect, trying to estimate the "replacement cost" return on capital in terms of cash flow. In general terms, this involves replacing fixed (non-current) assets in the capital employed calculation as follows:

First: estimate the average age of the assets in years as:

asset life = (gross fixed assets – net fixed assets)/annual depreciation

Then: obtain the replacement cost fixed assets at an assumed x% inflation rate as:

repcost fixed assets = gross fixed assets * (1+x%) ^ asset life

where *gross* refers to the historical cost, and *net* to the book value

The numerator in the ROCE calculation must also be amended, with EBIT replaced by *replacement cost* EBITDA (EBIT plus the implied depreciation associated with assets at replacement cost).

We should be aware of two proprietary techniques that attempt to refine the basic concepts of ROCE:

Cash Flow Return on Investment (CFROI)

Developed by Holt Value Associates (now owned by Credit Suisse First Boston), CFROI seeks to connect accounting and economic returns *by treating the firm as a single economic project*, comprising a series of outward investments and inward cash flows, and calculates the Implied Internal Rate of Return (IRR).

CFROI assumes that over a certain period (depending on the nature of the business) returns on investment will inevitably trend back to the firm's cost of capital. The value of this approach is that it avoids having to make assumptions in perpetuity for the residual cash flows in the IRR calculation. CFROI also attempts to indicate a real, rather than nominal, return that requires assumptions for both asset life and replacement cost.

Cash Return on Capital Invested (CROCI)

CROCI is Deutsche Bank's equivalent valuation technique. As with Holt, it evaluates a cash flow return on capital, adjusting both assets and depreciation charges for inflation in different ways.

Soup-to-Nuts Example

Table 4 exhibits the key inputs and Table 5 is a step-by-step worked example to evaluate the Return on Capital Employed, both on a plain vanilla historical cost basis, and also on a cash basis. In this (hypothetical) example, the historical cost ROCE is good, but the cash returns less impressive, highlighting that capex is no substitute for improving margins or asset turnover.

The starting point for the numerator is EBIT, plus interest and investment income, but not interest expense. We also need the tax rate and – where applicable – goodwill amortization.

To evaluate the cash-based returns, we need details of the historical cost non-current assets, and the depreciation charge.

Conceptually, the denominator represents "all the resources on which the provider is expecting a return." The numerator is "the flow available to provide those returns."

Returns are normally calculated on a book-value basis, but a full approach would also consider cash returns on historical cost assets, or on their estimated replacement cost.

Table 4: Summary Financial Data

Company A	**2002**	**2003**
Revenue	4,050	4,350
- Cash operating costs	-3,000	-3,150
= EBITDA	1,050	1,200
- Depreciation	-1,200	-1,350
= EBITA	900	1,050
- Goodwill amortization	-100	-100
= EBIT	**800**	**950**
-Interest expense	-200	-220
+ Interest income	30	25
+ Investment income	20	20
= Profit before taxation	650	775
- Tax expense	-228	-271
Non-current assets at cost	**12,000**	**13,500**
Property, plant & equipment	9,000	10,500
Goodwill	2,000	2,000
Other non-current assets	1,000	1,000
Non-current assets at book value	**7,500**	**7,550**
Property, plant & equipment	6,000	6,150
Goodwill	900	800
Other non-current assets	600	600
Current assets	**666**	**715**
Inventory	222	238
Receivables	333	358
Cash	111	119
Current liabilities	**921**	**975**
Short-term debt	333	358
Payables	388	417
Other current liabilities	200	200

Source: Merrill Lynch Imagination

Table 5: The Spreadsheet

	Book Value		Historical Cost		Replacement Cost	
	2002	**2003**	**2002**	**2003**	**2002**	**2003**
Denominator: Average Capital Employed						
PPE	6,000	6,150	9,000	10,500	10,168	12,288
Goodwill	900	800	2,000	2,000	2,000	2,000
Other intangibles	600	600	1,000	1,000	1,000	1,000
Current assets	666	715	666	715	666	715
Total assets	**8,166**	**8,265**	**12,666**	**14,215**	**13,833**	**16,003**
- Current liabilities	-921	-975	-921	-975	-921	-975
+ Short-term debt	333	358	333	358	333	358
+ cumulative goodwill amortization (see below)	1,100	1,200				
= Year-end capital employed	**8,677**	**8,848**	**12,077**	**13,598**	**13,245**	**15,386**
Capital invested (opening balance)		8,677		12,077		13,245
Capital employed (average)		**8,763**		**12,838**		**14,315**
Cumulative goodwill amortization calculation						
- Goodwill at book value	*-900*	*-800*				
+ Goodwill at cost	*2,000*	*2,000*				
= Cumulative goodwill amortization	***1,100***	***1,200***				
Replacement cost calculations						
Historical cost PPE					*9,000*	*10,500*
- Book value PPE					*6,000*	*6,150*
= Accumulated depreciation					*3,000*	*4,350*
/ Depreciation charge					*1,200*	*1,350*
= Average age (years)					*2.5*	*3.2*
^ (1+Inflation)					*5%*	*5%*
= Replacement cost escalator (applied to historical cost)					***113%***	***117%***
Numerator: NOPAT						
EBIT	800	950	800	950	800	950
+ Interest income	30	25	30	25	30	25
+ Investment income	20	20	20	20	20	20
Subtotal	**850**	**995**	**850**	**995**	**850**	**995**
Tax rate (%)	35	35	35	35	35	35
- Nominal tax	-298	-348	-298	-348	-298	-348
+ Adjust for goodwill amortization	100	100	100	100	100	100
NOPAT	**653**	**747**	**653**	**747**	**653**	**747**
+ Depreciation			1,200	1,350	1,200	1,350
- Nominal tax on depreciation			-420	-473	-420	-473
Cash NOPAT			**1,433**	**1,624**	**1,433**	**1,624**
Return on capital employed (%)		**8.5**		**5.8**		**5.2**

Source: Merrill Lynch Imagination

Add up the various components of non-current assets – the values may alter according to the basis – add the current assets, deduct total current liabilities but add back short-term debt. This may seem convoluted, but does ensure full capture. Also add the cumulative goodwill amortization to get the year-end capital employed. This is the "capital invested" (the opening balance) for the *next* year. "Capital employed" is the average of the opening and closing levels.

Replacement cost is estimated by first establishing the average age of the assets (accumulated depreciation as a multiple of the annual charge) and compounding the historical cost PPE by the assumed inflation rate.

The numerator, NOPAT, applies nominal tax to the sum of EBIT, interest, and investment income, adding back the annual goodwill amortization charge where applicable (not generally being tax deductible, it is recredited in full).

Cash NOPAT adds back depreciation as well, but as this is tax deductible, it is taxed in this calculation, to ensure that only the net equivalent is added back.

Watch Out for...

Thoroughly check the definition – in particular, if the return is pre- or post-taxation and whether the effect of goodwill has been reflected.

Give the WACC a thorough "reality check" – especially if the argument is driven by a "low" Beta.

"Artificial" balance sheet valuations. There are some situations in which balance sheet items, typically asset valuations, while fully compliant with GAAP, could vary significantly from their "open market" levels. This reflects the hybrid nature of balance sheet valuations: some items are recorded at historical cost (property and equipment); some at market value (marketable securities held for sale); some at lower of cost or market, amortized cost, or some other valuation method (inventory, equity investments); and others not at all (internally developed patents). In addition, assets acquired through a business combination are written up to market value at the date of acquisition. Examples of companies whose balance sheets may not reflect current open market values very well include regulated utilities, real estate companies, and enterprises created as a result of corporate reconstruction. The effect, usually, is to overstate ROCE.

Defining the Cost of Capital

Defining the WACC

A company's *Cost of Capital* is defined as the weighted sum of its cost of equity and debt. The weights are determined in line with the definition of Enterprise Value on page 34, in that the *equity* component includes the minority interest in equity, and the *debt* component includes other non-current liabilities, such as any shortfall between projected assets and liabilities of funded pension schemes, or the explicit liabilities of unfunded schemes (especially in Germany).

Cost of Debt: In simple terms, the cost of debt is determined by the effective interest rate, but in practice, this can be difficult to establish.

Both of the widely used determinants: using the yield on quoted bonds, or dividing the average debt by the interest paid, present difficulties in practice; we strongly suggest that all assumptions be rigorously tested. One useful approach is to compare the company's peer group, by ranking both cost of debt and financial leverage. There should be strong correlation between the two hierarchies.

Because interest is tax deductible, the effective cost of debt is lower than the interest rate (net cost = interest rate * [1 – tax rate]). It is also very important that unrealistic tax rates are not inadvertently applied to the tax shield. A "standard" rate, based on the average of local marginal rates, should be used where the actual rate is distorted by anomalous factors.

Cost of Equity: The cost of equity involves three components: the Risk-Free Rate of Return, the "Equity-Risk Premium," and the systematic risk (usually known as Beta).

Three Components of Cost of Equity:

- Risk-Free Rate of Return
- Equity-Risk Premium
- Beta

(1) The Risk-Free Rate is usually – but not necessarily – taken as the yield on long-term paper issued by the relevant central bank.

(2) The Equity-Risk Premium is the difference between the expected returns on equities as an asset class and the risk-free rate. The return on equities is determined as the internal rate of return generated from the aggregate expected dividends – which is a formidable calculation undertaken regularly by the Global Valuation and Analytics Research Team.

A company's cost of equity is calculated as the Risk-Free Return plus the product of the Equity-Risk Premium and the stock's specific risk, or Beta.

(3) The Beta is a concept that is easy to misapply; there is a very real risk of generating a flatteringly positive value where it *appears* low. The Beta is the systematic risk of investing in a particular security; it is usually *estimated* by calculating the slope of the regression line obtained by plotting price movements of the stock against those of the reference index.

The misunderstanding arises because the slope of the regression line is *only an estimate*, and even for liquid stocks, the lack of precision (measured by the standard error) is usually far greater than appreciated. For example, if the slope of the regression line is 0.9, and the standard error 0.3, there is a one-in-ten chance that the actual Beta is greater than 1.5 (0.9 + 2 * 0.3).

Return on Equity

Return on Equity

Net Income

Shareholders' Equity

Concept

The accounting rate of return on shareholders' contributed capital.

Definition

Net income as a percentage of shareholders' equity.

Shareholders' equity is issued and fully paid capital, plus other paid in capital/share premium account/reserves, plus retained earnings and preferred stock. This represents the base of equity attributable to the company's shareholders; minority interests in equity are not included.

As with the definition of Return on Capital Employed, we take the average of the opening and closing balance sheet values in the denominator.

Interpretation

The link between the P/E and P/BV

Just as the Return on Capital Employed measures the rate of return on the enterprise in general, the Return on Equity indicates the accounting returns to the shareholders in particular.

The connecting factors are the level of financial leverage and the cost of debt. If the Return on Capital exceeds the cost of debt, the Return on Equity will rise with increasing leverage.

In valuation terms, the ROE is useful as a crosscheck between the Price/Earnings Ratio and the Price/Book Value. These three metrics are closely connected, in that the Price/Book is equal to the product of the ROE and the P/E. For example, where the Price/Book is average but the P/E is relatively high, so must be the ROE.

Watch Out for…

Inadequate equity. Where shareholders' funds have been depressed by unusual factors, such as write-offs, this ratio can send a false-positive signal. Ensure that the P/E, Price/Book, and ROE are internally consistent.

Operating Margin

Operating Margin

Operating Profit

Net Sales Revenue

Concept

This is a composite indicator of management's pricing power and cost control, of which the former is more important; successful businesses supply goods or services that their customers want, and they sell them on their own terms. Successful managers build a portfolio of such businesses. Low-margin activities can produce positive economic returns (if asset turnover can be sustained), but their lower visibility generally depresses valuation.

Definition

Pricing power is critical

Operating profit as a percentage of net sales (after returns, allowances, and discounts). Note: strictly, operating profit rather than EBIT, and sales rather than total revenues.

Although it is often used as such, operating profit is not a synonym for EBIT. This can include the group's share of profits from associates, but these are not reflected in consolidated sales. In practice, the impact is rarely significant, but it is not impossible for distortions to arise where associates, joint ventures, etc. represent a significant portion of the business. Where this arises, it is worthwhile comparing EBIT to proportionate sales (consolidated sales plus the attributable portion of associates, etc.) as a cross-check.

Similarly, the distinction between *sales* (which are revenues from trading activities) and *total revenue* (which includes other revenue) may seem arcane, but our essential focus is on core trading activities here, so sales is the more appropriate measure.

Interpretation

Peer group hierarchy

The operating margin is generally used as a relative indicator, building up a hierarchy across a peer group. Higher margin businesses demonstrate a possible combination of good positioning, pricing power, and cost control – and the key word is *demonstrate*. Good margins are highly visible, and valuations reflect this.

Watch Out for...

False Positives – Where high gross margins arise from (possibly transient) market power, a strong operating margin can disguise weak cost control.

Anomalies – These are usually credits, such as gains on fixed-asset sales included in operating profit. There is some debate about whether these should be stripped out of the calculation. Are they *exceptional* in character, and so excluded, or do they arise purely because of prudent book values, and so should be included as *actual* profits? Similar arguments apply to restructuring costs, which have a habit of acquiring perennial status in some cases. There is no correct answer to this question; the best practice is to evaluate both the reported and the adjusted figures, and explain any significant variation explicitly.

Inconsistent Depreciation Rates – Occasionally, variations across a peer group arise because of different depreciation/amortization policies; this issue can be resolved by cross-checking the equivalent EBITDA margins.

Changes to the Business Mix – Another question is the extent to which margin change is driven by the business mix. It is positive that management adjusts the portfolio to maximize returns, but gains achieved by eliminating problems are by definition unsustainable, and so less valuable than like-for-like progress.

EPS Growth

The expected five-year CAGR from the last actual EPS

Or, if this is not meaningful,

The sustainable trendline growth rate = ROE * (1 – DPS / EPS)

EPS Growth

Concept

The *trendline* growth rate expected for the business over the medium term.

This is connected to, but not necessarily the same as, the *sustainable* growth rate that the business, in its mature, steady state, is expected to deliver over the long term.

Definition

Five-year CAGR

The expected five-year Compound Average Growth Rate (CAGR) in EPS from the last actual year, *where meaningful*.

Because the brackets have to be exact in Excel, it is worth recapping the formula:

$$CAGR = (((EPS_{Y5}/EPS_{Y0}) \text{ ^ } (1/5)) - 1) * 100$$

There are many ways of defining EPS. Whichever is used in calculating the P/E Ratio should be used again here.

"Sustainable" growth

Where the five-year CAGR is not useful (where it is negative, or at cyclical turning points) we should alternatively use the analyst's assessment of the sustainable growth of the business. For a mature business, in steady state, this can be determined objectively by multiplying the Return on Equity (where appropriate, averaged over a cycle) and multiplying by the Earnings Retention Ratio (1 – dividend/earnings).

Interpretation

This is a critical driver for a wide range of valuation metrics and techniques.

Key determinants of EPS growth

DuPont Analysis

The components of EPS growth were definitively decomposed in the 1920s by the then-CFO of the General Motors Corporation (which at the time owned DuPont). In very simple terms, it can be shown that the product of the asset turnover and the EBIT margin generates the ROCE. Grossing this up by the Net Debt/Equity Ratio leads to the ROE, and the growth in EPS is the ROE multiplied by the Earnings Retention Ratio.

So the key drivers of EPS growth are:

- Capex (investment in productive assets)
- Asset Turnover
- EBIT Margin
- Net Debt/Equity Ratio
- Dividend Payout Ratio

Note that EPS growth is always an *increasing* function of the first three drivers, and always a *decreasing* function of the Dividend Payout Ratio. The Net Debt/Equity Ratio is usually an increasing function, unless the ROCE is lower than the cost of debt!

Watch Out for...

Meaningless Answers

The calculated CAGR may not be meaningful, either because earnings move from negative to positive (or vice versa), or because the base earnings are close to zero. Equally, the CAGR may be arithmetically valid but misleading if the opening or closing periods are near turning points in the earnings cycle (trough to peak effects, or vice versa). In all of these cases, we should specify an estimate of the underlying projected growth, rather than the calculated CAGR.

How to calculate the CAGR:

This can be evaluated in various ways:

Logarithmic regression. This is the most rigorous approach, taking full account of the impact of compounding.

In Excel, the growth rate in percent (the slope of the regression line) is given by the expression:

= (INDEX (LOGEST (Range) , 1) – 1) * 100

Where *range* is the range of cells holding the EPS values.

It suffers from the drawback, commonplace in practice, that any negative or zero EPS value will render the calculation impossible (because logarithms are not defined for negative numbers, or zero).

Linear regression. This is less valuable, being equivalent to the average of the annual growth rates, but ignoring compounding. It does have the advantage that it will always return a meaningful number, and so can be used where the logarithmic approach fails because of a negative or zero value.

The Excel formula is:

= INDEX (LINEST (Range), 1)/AVERAGE (Range) * 100

Again, where *range* refers to the cells holding the EPS values.

Weighted averages. For those with long memories, the Wells Fargo (Sharpe) method used a good protocol to estimate sustainable growth. This was a weighted average of: the last three years' actual growth (50%); the next two expected (30%); and the Return on Equity multiplied by the Earnings Retention Rate (20%).

Over-optimism

Long-term growth is rare

In reality, exponential growth is very hard to sustain. Very few companies have actually maintained high double-digit growth for a decade. Even where growth is well established, there are ceilings in every market place – and as that ceiling is approached, growth becomes harder to sustain and eventually fades.

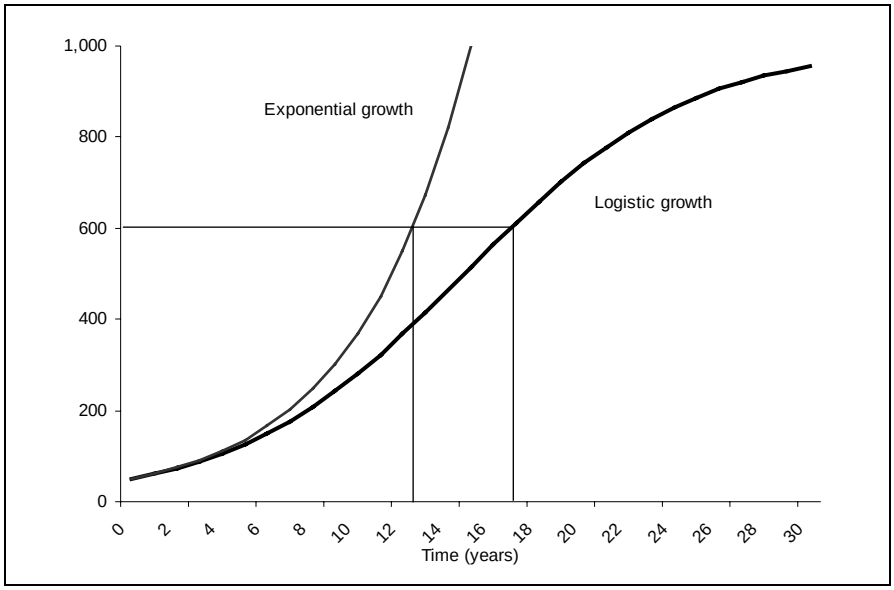
This logistic growth pattern is intuitively consistent with many real world situations. In botany, it can be applied to how tall plants can grow, and in economics, to market shares. The issue for us, in terms of valuation, is that we sometimes fail to appreciate just how quickly this effect can come into play, especially where initial rates of growth are impressive.

To illustrate this, Chart 2 plots a hypothetical series (for example, sales of a new must-have consumer product) against time. Initial sales are 50 units, growing at 20% a year, and research suggests this could ultimately rise to 1,000 units. The difference between *exponential* growth (constant 20%) and *logistic* growth (which slows as the ceiling is approached) is dramatic; if our valuation model assumed sales of 600 units, the exponential assumption would hit that level at year 13, but logistic growth not until year 17. At higher assumed growth levels, the effect is even more spectacular.

The difference between *exponential* growth and *logistic* growth:

If our valuation model assumed sales of 600 units, the exponential assumption would hit that level at year 13, but logistic not until 17

Chart 2: Exponential Versus Logistic Growth



Source: Merrill Lynch

An excellent reality check is to consider the *absolute* level of earnings implied by extending our growth forecast out as far as the P/E in years…

Quality of Growth

Compare the CAGR and ROE

The CAGR in EPS can be distorted by arithmetic, by cyclicality and by overoptimism; one test that can screen for all three effects is to compare the expected CAGR to the "sustainable" growth rate: ROE * (1 – EPS/DPS). Where this ratio is equal to unity, all of the expected growth is explainable on fundamentals. Where it is less than one, it suggests either that positive cyclical or recovery effects dominate the medium-term prospects, or that high expectations may need more supporting evidence. Equivalently, the opposite holds true where the ratio exceeds unity.

Visible Is Valuable!

Growth coming from recovery factors (EBIT restructuring, interest savings, tax-loss carryforwards) is usually ephemeral. Similarly, margin growth from costcutting is harder to sustain than revenue expansion, and organic (or internal) growth is more visible than hoped-for acquisitions.

Where revenue growth is concerned, price increases are much more valuable than volume gains because they involve no increase in costs, and have a much greater impact on profits.

Growth at Any Price?

Growth is not a goal in its own right; there is a major difference between achieving growth efficiently, in terms of investing in high-return projects, or diluting the firms' overall economic returns by inefficient investment. Where expansion dilutes the ROCE, it is less valuable.

Free Cash Flow

Cash flow from operations, less all capital expenditure

Free Cash Flow

Concept

The extent to which the enterprise generates cash in excess of its essential spending. Equivalently, the cash that could be withdrawn from the business without damaging its structure or prospects.

Definition

Strictly defined as cash flow from operations less maintenance capex.

Cash flow from operations is defined as:

Net income

plus: depreciation, amortization, and deferred taxes

plus/less: any other non-cash charges/credits to the income statement

plus: minority interests, less dividends to minorities

less: the difference between dividends received from associates and the profit from them included in net income

plus: the net change in provisions

less: the net change in (non-cash) working capital.

The problem comes in defining *maintenance capex* in an objective manner. The textbook definition is *the minimum capital investment necessary to maintain the business in its current condition*. It is virtually impossible, however, to distinguish between the essential capex necessary to sustain the business in its current state, and that which is directed toward future expansion. Moreover, our valuation often assumes that the structure will change; in this respect, planned growth is essential to the argument, so all the forecast capex is essential.

On these grounds, our definition of Free Cash Flow is *cash flow from operations less total capex*.

Dividends: in or out?

The issue of dividends often crops up in debate, and our view is clear: *if it is possible for management to avoid payment, it is not essential spending, and does not represent a reduction in free cash flow.* Thus dividends paid to minority holders, which are authorized by the subsidiary board, and preference dividends, which are a fixed commitment, are both deducted in the calculation.

On the other hand, dividends paid to ordinary shareholders – regardless of precedents or expectations – *can* be cut or cancelled by management if necessary, so ordinary dividends *do* represent discretionary spending, and – as such – are not chargeable against free cash flow.

Interpretation

How much to take out

Free Cash Flow to a business is analogous to an individual's *net* salary, less committed expenditure.

Because all essential spending has been deducted, Free Cash Flow indicates the discretionary spending power of management; in investment terms, it represents option value, allowing management to either reward shareholders with dividends or buybacks, expand the business by raising capex, or alternatively, reduce risk and interest costs by repaying debt.

Symmetrically, free cash flow is also a good measure of financial flexibility, which has multiple strategic implications.

Watch Out for...

Traps

Although intuitively appealing, this measure can send a dangerous false-positive signal when a company is stagnating or contracting. It is essential to use this measure in conjunction with the Asset Replacement Ratio (page 18) to ensure that Free Cash Flow is sustainable, and not merely flattered by declining capex.

Equally, the option value of positive free cash flow may be illusionary if debt reduction is an over-riding priority.

As with many other metrics, a high free-cash-flow yield is an indicator of *potential* value. In practice, a catalyst (such as a change of management) is needed to release that value.

Quantification Issues

Hard to quantify

Although historical figures based on actual data are extremely useful, forecasts of Free Cash Flow are subject to an even wider margin of error than other accounting projections. The reason is that they depend on changes in working capital, which are notoriously difficult to forecast. This is a structural issue, arising from the fact that working capital essentially represents the difference between two large numbers. Even if the analyst were successful in forecasting the components with reasonable precision, the potential error in the difference will always be significantly higher.

Some suggest that the change in working capital should arbitrarily be set at zero, others that it be omitted altogether. We disagree: the problem is difficult, but not insurmountable. It is, however, critical to bear in mind that forecasts are far less valuable.

3. Quality of Earnings

Not all earnings are equal! We believe that "high-quality" earnings should be viewed with greater confidence, and by implication, others treated with more caution. These metrics are intended to test the underlying security of the business performance.

Defining High-Quality Earnings

Changing perceptions of quality

When the bull market was raging, investors viewed high quality rather differently than today. The priority then was earnings momentum; investors prized stocks that delivered regular, visible growth in EPS or EBITDA, and in general, were happy to focus solely on that issue, as long as expectations were met or exceeded. Times have indeed changed, and a broader range of issues needs to be addressed in the current climate. We suggest that high-quality earnings be defined as those that meet the following criteria:

- Substantially realized in cash
- Sustainable, in that the productive asset base is maintained by adequate investment
- Do not arise from potentially transitory tax benefits
- Are not prejudiced by over-aggressive, financial leverage
- Interest payments are adequately covered

Cash Realization Ratio

Cash Realization Ratio

$$\frac{\text{Cash Flow from Operating Activities}}{\text{Net Income}}$$

Concept

The proportion of profit that is realized in cash.

Definition

Cash Flow from Operating Activities divided by Net Income, where Net Income is positive.

Interpretation

Profitability measures firm performance over a period, and differs from cash flow in that it measures the completion of the transaction cycle when products are delivered (or services are performed), not necessarily when cash is received. Cash Flow measures the collection of cash. Thus, Cash Flow involves a longer cycle than profitability because it typically takes longer to collect cash. *Net Income* can be thought of as the sum of Cash Flow and Accruals. The former is intuitively more valuable, and this ratio effectively measures the balance between the tangible and intangible aspects of economic performance.

Cash Flow from Operating Activities represents the Cash Flow from trading activities, as opposed to investing and financing. In broad terms, this amounts to Net Income, *plus* Depreciation and Amortization, Deferred Taxation, *minus* Increases in Working Capital, so this ratio is essentially driven by the balance of these factors. A positive (high value) would be consistent with conservative depreciation policies, high reinvestment (hence deferred tax), and effective working capital management. Equivalently, a number below unity could indicate the contrary.

Note the qualified language here: *consistent with* does not mean *implies*. There may be perfectly valid reasons for cash and profit to be misaligned in the short term, but the trend should iron these out. The relation between Net Income and CFFO is also dependent on the current stage of the company's life cycle.

Watch Out for…

False positives arising when the calculated ratio is boosted purely because net income has collapsed; low net income is not positive!

Asset Replacement Ratio

■ Concept

The rate at which productive assets are replaced.

Asset Replacement Ratio

$$\frac{\text{Capital Expenditure}}{\text{Depreciation}}$$

■ Definition

The Asset Replacement Ratio is equal to Capital Expenditure divided by Depreciation.

In this context, both "capital expenditure" and "depreciation" refer exclusively to investments in productive, tangible fixed assets (property, plant & equipment).

■ Interpretation

Bottom line: Is the asset base growing or shrinking?

If the value of this ratio is less than unity, the asset base is shrinking. This is essentially a reality check on growth expectations and Free Cash Flow. Although it is possible for a business to expand while simultaneously shrinking its asset base (by increasing asset turnover), and equally that Free Cash Flow can be lifted by underinvestment, both of these effects have clear limits, and are intrinsically unsustainable. As with so many ratios, it is worth comparing current levels to previous trends, as well as across peer groups.

■ Watch Out for…

In practice, depreciation rates do not always reflect the actual life of underlying assets. The Asset Replacement Ratio could send a false-negative signal if the depreciation rate is conservative. Equally, an inadequate charge will flatter the result.

Disparities between assets' historical costs could significantly affect this relation. Acquisitions that require the acquired entity to be consolidated at the market value of assets and liabilities on the date of acquisition could also affect the comparability and interpretation of this number.

The classic test is to divide the historical cost (or gross) book value by the depreciation charge; this multiple is the effective average write-off period, and should be compared to an intuitive assessment of the assets' expected economic life.

Another clue can sometimes be found in the notes to the accounts under *other operating income*, this often includes gains or losses arising from disposal of fixed assets. A pattern of regular gains suggests that assets were written down to levels below their market value, that depreciation was higher than necessary, or vice versa.

Cross-check the age of assets

Where the ratio is sending a strong signal, say under 0.5 or above 1.5, and for peer group comparison, it is well worth cross-checking on the average age of the assets. This is calculated by dividing the accumulated depreciation (historical cost minus book value) by the annual depreciation charge. Where assets are approaching the end of their lives, a high replacement ratio should carry far less weight, as it represents catching up rather than expansionary investment.

These two effects are highlighted in Table 6 for three similar companies. Stocks A and B have similar asset replacement ratios (both in the positive zone), but stock B's assets are significantly younger than A's. In reality, B could have invested rather less than A and still have had a comparable asset base. On the other hand, stock C has a low ARR, but solely because it depreciates over a shorter period. Again, its asset base could be in perfectly adequate condition, despite its low nominal replacement rate.

Table 6: The Impact of Asset Life and Depreciation Policy

	Fixed Assets		Depreciation		Write-off	Average	Age/WoP	Cap	
	Gross	Net	Accum	Charge	Period	Age	%	Ex	ARR
A	3,000	1,000	2,000	300	10.0	**6.7**	67	350	1.2
B	3,000	2,000	1,000	300	10.0	**3.3**	33	350	1.2
C	3,000	2,000	1,000	400	7.5	**2.5**	33	350	0.9

Source: Merrill Lynch

Tax Rate

Tax Rate

Tax Charge

Pre-Tax Income

■ Concept

At first inspection: "The proportion of profit claimed by the state." More subtly: "How much of a company's profit are its shareholders able to keep?"

■ Definition

The tax charge in the income statement, as a percentage of the pre-tax income, where pre-tax income is positive.

■ Interpretation

Defining a low tax rate?

Corporate tax rates vary considerably around the world. In particular, some countries (such as Ireland and the UK) have relatively low taxes, while others such as Germany and Japan impose significantly higher rates.

For multinationals, the effective rate can be thought of as the average official rate (weighted by the proportion of its profits in each fiscal center), less the extent to which it is able to take advantage of concessions. A "low" tax rate in this context is where the effective rate is significantly lower than the average official figure.

We need to draw the distinction between companies that are lightly taxed because they are based in favorable fiscal regimes, and those that depend upon manipulation to save tax. In practice, where this ratio sends a warning signal, we must consider the geographical mix of earnings before assuming that there really is risk.

The risks of a low tax rate

The idea of minimizing tax payments is intuitively appealing, but there are valid reasons why apparently low tax rates should ring warning bells about valuation.

Underlying profit may be lower than the reported figures suggest.

Many businesses, quite properly, take advantage of financial engineering to minimize the tax payable on their underlying activities. In one sense, reported profit can be thought of as the sum of real earnings and artificial tax maneuvers. Where a tax rate appears low, this is consistent with a higher proportion of artificial profits, and underlying profits that fall short of the headline number.

Tax-driven benefits can prove transitory.

Tax benefits rarely last forever. Many tax benefits are timing differences that simply shift the payment of taxes into later periods, rather than permanent GAAP/tax law differences. Loss carryforwards become exhausted, and fiscal loopholes are eventually closed. Even if new tax-sparing opportunities subsequently arise, a significant element of volatility is unavoidable when an existing concession is withdrawn (or threatened), for example, US proposals to limit Tax Inversion earlier this year.

■ Watch Out for…

This is an asymmetric indicator, in that even though a low tax rate can be grounds for caution, a tax rate above the expected rate does not necessarily imply prudence, or high quality.

As with many other quality of earnings measures, a single year's data may be out of line for valid reasons, but a consistent trend of apparently low rates is a strong danger signal.

Net Debt/Equity Ratio

Net Debt/Equity Ratio

Debt less Cash and Equivalents

———————

Total (Shareholders + Minority) Equity

■ Concept

The proportion of capital provided by lenders, compared to that provided by owners; internal capital compared to external.

■ Definition

Net Debt expressed as a percentage of equity capital.

In this context, *debt* is defined as all interest-bearing liabilities to banks, credit institutions and capital markets; finance leases; and all non-equity capital instruments such as redeemable Preferred shares, or equity-linked instruments (such as convertibles), including those issued by subsidiaries.

Similarly *Net Debt* is debt less cash and equivalents. Cash equivalents are marketable securities, or claims that are readily convertible into cash at three months or less.

Include all equity

Equity consists of issued and fully paid capital, plus all reserves, retained earnings, and additional paid-in capital. The consolidated figure (shareholders' plus minority) is taken because, on the debt side, that proportion of borrowings attributable to minorities is usually neither explicitly identifiable, nor stripped out.

■ Interpretation

How long is the lever?

The Net Debt/Equity Ratio is the most commonly used measure of financial leverage. It indicates both financial risk and capital efficiency (in that the cost of debt is generally lower than the cost of equity). In the current, subdued climate, the former predominates. High levels of debt or low levels of equity lead, at worst, to bankruptcy and, at best, to the curtailment of strategic ambitions. In more buoyant economic environments, capital efficiency – using cheap debt rather than expensive equity – is also indicated by this ratio, with a higher figure suggesting a lower cost of capital. Whatever the merits of using financial leverage to optimize returns, it is certainly the case that low debt levels have an implicit option value relative to high leverage.

Finally, this measure must always be placed in context: we must have data on Interest Coverage, Free Cash Flow, and ROCE to pass judgment on whether a given level of financial leverage is appropriate.

■ Watch Out for...

Significant holdings of cash

Although Net Debt/Equity is a generally valid measure, we must be cautious where net borrowings differ materially from the gross. There are four key reasons:

- **Debt and cash are seldom offsettable at par.** It is rarely true that a dollar of cash can extinguish a dollar of debt, because most loans have a fixed component and a term structure, and redemption will invoke cost penalties (especially when rates are falling).
- **It might seem obvious, but most businesses hold cash in order to spend it**. Just because the last balance sheet showed cash at high levels, it does not necessarily follow that those reserves are still available. That cash might have been the proceeds from an IPO or bond offering that have been put to work since the balance sheet date.
- **Some businesses need to maintain high levels of liquidity to deal with lumpy cash flows.** The effect is to flatter underlying net debt, because that cash is essential to the operation of the business; it is not actually available to reduce debt.
- **Certain sectors (contracting is the classic example) receive significant proportions of their turnover in advance.** Although the money is *legally* theirs, these deposits really represent an interest-free loan from the customers. Again, not all the money is available to reduce debt, as it is required to meet future commitments or costs. It may well be that similar deposits are received to maintain the pipeline, but if the flow of new orders dries up, liquidity will dry up as well.

Prepayments from customers are actually debt

Cash equivalents: marketable securities, or other claims that can be readily converted into cash at three months or less

Debt: all interest-bearing liabilities to banks, credit institutions and capital markets, and finance leases. Includes non-equity capital instruments (redeemable preference) and equity-linked instruments (convertibles)

Equity: the total of all classes of capital + reserves + retained earnings = common; common + Preference = shareholders'; shareholders + minority interest = total

Payments in advance: customers' payments for goods and services not yet provided. Belongs to the company legally, but not economically.

Soup-to-Nuts Example

Table 7 exhibits the key inputs, Table 8 is a step-by-step worked example to evaluate the Net Debt/Equity Ratio for this (hypothetical) example, and demonstrates two ways in which a misleading situation can arise.

Table 7: Summary Financial Data

Company B Year to April (EUR mn)	2002	2003
Current assets	2,120	2,380
Inventory	620	650
Receivables	450	480
Cash and equivalents	**1,050**	**1,250**
Current liabilities	1,785	1,857
Short-term debt	**330**	**360**
Payables	405	417
Payments in advance	850	880
Other current liabilities	200	200
Non-current liabilities	1,900	1,915
Long-term debt	**1,200**	**1,200**
Provisions for risks and charges	100	105
Other long-term liabilities	600	610
Equity	**6,150**	**6,505**
Contributed capital	1,000	1,000
Reserves	3,200	3,400
Retained earnings	1,250	1,400
Preference stock	500	500
Minority interest	200	205
Interest expense	-200	-220

Source: Merrill Lynch Imagination

Note that, at first inspection, financial leverage appears modest; the numbers show the latest reported Net Debt/Equity Ratio at 43%. But our attention was drawn to the high level of cash, relative to debt, and a closer look at the accounts reveals that most of this cash appears to flow from customer payments in advance, and is not – in practice – available to repay debt. Taking this into account, the adjusted Net Debt/Equity Ratio rises from 43% to 57%.

Our suspicions aroused, we decided to conduct further tests. Averaging the opening and closing total debt levels, and matching this to the interest expense incurred over the latest year, it seems that the company has been paying interest at an effective rate of 14%. This compares to a typical borrowing cost of, say, 7%. It is possible, of course, that the company has made a bad bargain with its bankers. It is more likely that actual borrowings over the year were much higher than at the year-end, which in this hypothetical exercise was clearly selected to coincide with the peak of the annual cash cycle.

If we gross up the annual interest expense by a more realistic interest rate, the impact on the implied level of financial leverage is substantial: 43% rises to 68%, and allowing for the payments in advance, 82%.

Leverage looks reasonable, but note that cash is two-thirds of debt; why should this be? That cash is actually inflated by high levels of customer payments in advance, which are not, in reality, available to offset debt. Adjusting for this shows the effective leverage to be higher.

The company appears to be paying 14% interest; why? Clue is the year-end, picked to coincide with peak of trading cash cycle for this industry. Gross up the interest paid by an estimated market rate to get a measure of the *average* debt over the year; implied leverage soars.

Table 8: The Spreadsheet

	Raw Basis		Adjusted Basis	
Year to April	**2002**	**2003**	**2002**	**2003**
Calculation of net debt/equity				
Short-term debt	330	360	330	360
+ Long-term debt	1,200	1,200	1,200	1,200
= Total debt	**1,530**	**1,560**	**1,530**	**1,560**
- Cash & equivalents	1,050	1,250	1,050	1,250
+ Payments in advance			850	880
= Net debt	**2,580**	**2,810**	**3,430**	**3,690**
/ Total equity	6,150	6,505	6,150	6,505
= Net debt/equity	**42%**	**43%**	**56%**	**57%**
Calculation of implied interest rate				
Interest expense		220		220
/ Average total debt		1,545		1,545
= Implied interest rate		**14%**		**14%**
Calculation of implied average net debt/equity				
Interest expense		220		220
/ Estimated interest rate		7%		7%
= Implied average total debt		**3,143**		**3,143**
- Average cash & equivalents		1,150		1,150
+ Average payments in advance				865
= Implied average net debt		**4,293**		**5,158**
/ average total equity		6,328		6,328
= Implied average net debt/equity		**68%**		**82%**

Source: Merrill Lynch Imagination

Interest Cover

Interest Cover

$$\frac{\text{EBIT}}{\text{Interest Expense}}$$

■ Concept

The ratio of operating profit to interest cost. As with all cover metrics, it essentially compares the size of a claim on resources to the funds available to meet that claim.

■ Definition

Net interest not enough

EBIT divided by interest paid. Please note: we should not use "net" interest (interest expense less interest income), for two reasons. First: a reduction in the denominator of a ratio has a highly leveraged effect compared to an increase in the numerator; deducting interest received from the bottom line flatters the ratio excessively. Where interest income is significant, *and ongoing*, the logical approach would be to add the ongoing interest income to EBIT in the numerator.

Our second reason is more telling: Interest Cover is essentially a measure of risk, and when stocks appear on the risk horizon, the fact that they earned interest income last year is usually academic; the cash has gone, but the debt remains. Therefore, we adopt the more stringent approach, and ignore interest income altogether.

EBITDA in the numerator

Although the equity industry practice is to base the numerator on EBIT, there is considerable merit in replacing that with EDITDA. Such a move would bring us closer to general practice on the credit side, and is also logically appealing – given that interest has to be paid in cash, which EBITDA comes closer to measuring than EBIT.

■ Interpretation

This is principally an indicator of security, becoming relevant in the context of weak free cash flow or high leverage. Alternatively, it is used to estimate how much additional borrowing capacity remains before risk becomes excessive.

■ Watch Out for...

Use of net interest rather than interest paid.

4. Valuation

These measures connect the economic performance of the business to its market value in various ways. The Price/Earnings Ratio is a payback indicator; the Price/Book Ratio reflects the valuation of the company's equity. The Dividend Yield and Free Cash Flow Yield reflect tangible and potential monetary rates of return, respectively.

Enterprise Value/EBITDA is a general structure-neutral cash generation multiple, and Enterprise Value/Sales indicates volume leverage.

Price/Earnings Ratio

Price/Earnings Ratio

Current Share Price

Diluted EPS
(both Reported and Adjusted)

■ Concept

Essentially, this is the payback period in terms of earnings. How many years' earnings per share does it take to recover the share price?

■ Definition

The share price divided by earnings per share, where EPS is positive.

Earnings per share

Conceptually, attributable net earnings per unit of capital.

Basic and diluted EPS

Our definition of *basic* EPS is:

> Net income before abnormal items, less preference dividends, divided by the time-weighted average of dividend-franchised shares in issue.

But because many companies have current obligations that could require them to increase the number of actual shares, such as options, convertibles, etc., the basic EPS often overstate the underlying earnings per unit of capital. A prudent approach demands that valuation should always be done on the basis of *diluted* EPS.

The definition of diluted EPS adds the total of new shares that would have to be issued if those options, convertibles, etc. were to be exercised to the denominator; it now reflects the potential, rather than the actual, shares in issue. In addition, the basic EPS numerator can be adjusted to reflect any potential post-tax impact on earnings that would arise from that exercise. There are many permutations and combinations of possible adjustments, depending on the instruments that create the dilution, and some of these are detailed on page 25.

Please note: the denominator is not necessarily a constant. It is essential to ensure that historical average shares are adjusted whenever there is a stock dividend, bonus issue or split, or a capital increase at a discount to the ex-rights price.

Adjusting EPS for consistency in valuation

This detailed, but apparently straightforward, definition masks a key issue in that there is no unique definition of earnings per share that manages to transcend the boundaries of local accounting standards and investor practice. The situation has improved in recent years, and further convergence is expected, but substantial differences still exist in three areas: goodwill amortization, deferred tax, and pensions.

It is generally accepted that where net income is affected by unusual factors, these should be stripped out of the P/E calculation – because our goal is to value the shares on an ongoing basis. Similarly, in seeking to compare stocks reporting under different conventions, it is essential to eliminate inconsistencies arising from differing accounting practices – for example, by adding back goodwill amortization.

The heart of the problem is defining an unusual factor; there has always been a temptation to stretch the concept in order to flatter EPS, and in the current climate, arguments based on adjusted (or in the US, pro forma) earnings often stand in a poor light.

Getting our story straight

Comparative P/Es are often distorted by semantic differences across different cultures; in particular, we have the problem of aliases where various expressions are used to describe EPS that have been adjusted in similar, but not always identical, ways. How, for example, could we distinguish between clean and underlying EPS? Equally, why – outside the UK – can an investor be expected to be familiar with the esoteric distinction between exceptional and extraordinary?

Setting the rules

In order for our global definitions to be consistent, we must start by defining unambiguous, explicit terminology. There are two discrete reference points: *reported* earnings, presented by the company under local GAAP, and *adjusted* earnings, used to calculate the P/E. We should use these expressions, rather than synonyms or aliases, in all global comparisons. We then need to map the route from reported to adjusted.

A Systematic Protocol to Define Adjusted EPS

The common starting point is local GAAP-reported Net Income attributable to ordinary shareholders (after minority interests and preferred dividends). There are three distinct types of adjustments that are then applied (where appropriate) to lead us to Adjusted Net Income (and so to adjusted EPS):

- Adjustments allowable under local GAAP – already included in reported EPS
- Analysts' adjustments to reverse unusual factors
- Analysts' adjustments to reverse inconsistencies among local GAAPs

(1) Adjustments Allowable Under Local GAAP

Most GAAPs calculate EPS by adding back selected unusual items to Net Income, and so these will already have been included under reported EPS. The adjustment must not be double counted!

Under US GAAP (and generally, elsewhere) these are limited to:

Discontinued Operations

For this purpose, a discontinued operation refers to a separately identifiable segment of a company, a major line of business, or class of customer. It usually takes the form of a clearly identifiable subsidiary or division whose operations and financials can be clearly distinguished from the rest of the company. If a disposal qualifies, the gain or loss on sale and the results of its operation until the sale is complete are reported separately from the company's income from continuing operations. All prior periods presented in a financial statement should show separately the results of operation of the segment to be disposed.

The fact that the results of the portion of the business that is being sold cannot be separately identified argues against treatment as a discontinued operation. For example, the sale of an entire business unit may qualify as a discontinued operation, whereas the sale of one of the three plants and half of the sales offices that make up the unit would not.

Changes in Accounting Principle

This represents the one-time effect of a change from one accounting principle to another. It is generally occasioned by the introduction of new accounting standards and the adjustment made to transition from the old standard to the new standard.

Extraordinary Items

Extraordinary items are those which are *both* unusual and infrequent. The test for whether an item not specifically identified by US GAAP is extraordinary is very demanding. *Infrequent* means that it is not likely to recur in the foreseeable future, given the company's environment.

US GAAP specifies certain items that are always extraordinary and others that are virtually *never* to be considered extraordinary, and this constitutes a very useful model for other GAAPs:

Examples of items required to be considered extraordinary:

- Gains from negative goodwill on an acquisition
  (in the rare case where the value of the assets exceeds the purchase price)
- Most expropriations of property
- Losses resulting from prohibition under a newly enacted law

(2) Analysts' Adjustments to Reverse Unusual Factors

These are items generally deemed to be *not* extraordinary under GAAP, but which exert a distorting influence in assessing the future trend, and so should be properly reversed out of net income in calculating adjusted EPS.

We must stress that unless these items have been stated on an after-tax basis, *nominal tax must be deducted* from the gross amount to reverse the impact on Net Income. The key here is that these are items that impact only the current year's earnings, and do not impact future earnings. Investors and analysts should be cautious here, as companies often try to encourage financial statement users to treat certain recurring expenses as one-time items (e.g., pro forma items).

- Write-downs/write-offs of receivables, inventory, equipment leased out, deferred R&D costs, or other intangibles
- Foreign exchange and translation gains/losses
- Gain/loss on disposal of a *portion* of a business unit (as opposed to the entire unit)
- Other gain/loss from sale of property, plant & equipment used in the business
- Effects of a strike
- Adjustment of accruals on long-term contracts

This list is, of course, by no means exhaustive.

(3) Analysts' Adjustments to Reverse Inconsistencies among GAAPs

Although there has been substantial convergence between national GAAPs and IAS, difference still remain. In particular, major differences exist in three key areas:

- Goodwill amortization
- Unfunded pension liabilities
- Dilution

Reverse goodwill amortization

We regard it as appropriate to add back the cost of goodwill amortization in the calculation of adjusted EPS, on the grounds of comparability. The decision by the FASB to end the requirement for US companies to amortize goodwill marked a sea change in this ongoing controversy, and we expect the process of convergence to support our position.

Because, outside the USA, goodwill amortization is rarely a tax-deductible expense *per se*, it is probably justifiable to add it back in full.

Pension costs: no adjustment

The issue of pension liabilities is more problematic. There are two points: *underfunded* liabilities and *unfunded* liabilities. We think that the quantified costs of restoring underfunded liabilities, where these arise, should *not* be stripped out of the EPS calculation – even if it was the case that other GAAPs would not require them. This is because, unlike with goodwill amortization, there is a very wide range of possible treatments, rather than a straightforward yes/no approach.

On the issue of unfunded (pay-as-you-go) pensions, as in Germany, we feel that, as there is no satisfactory adjustment possible to render comparability with funded schemes, this source of accounting inconsistency is best ignored!

Dilution: different conventions

We must also take account of the different conventions on dilution. In the US, EPS is always diluted to reflect the impact of stock options, as well as equity-linked capital instruments. In Britain and Europe, basic EPS is used unless the impact of dilution is material (over 5%) when the lower of basic or diluted is taken. The divide is driven by the much greater prevalence of options in the US; these are rarely material in other countries, where dilution generally arises through warrants and convertibles.

The rules for calculation of diluted EPS are convoluted in the case of stock options, but straightforward for other instruments. For *convertibles*, the denominator is increased by the number of potential new shares, and the numerator also increased by the estimated post-tax interest saving. For *warrants*, the denominator is first increased by the number of potential shares, then reduced by the number of shares that could be bought back in the market with the exercise proceeds.

Interpretation

The P/E Ratio is the most widely used and most valuable metric in our ***iQ****method*, and is applicable to virtually all stock and sector situations.

It is vital to stress that a low P/E in itself is rarely a sufficient argument to consider a stock undervalued (or vice versa). Given our expectations of earnings, we need evidence to suggest why the rating should change before we can draw a valid inference. This usually takes the form of comparing the stock's P/E against either, or both, of two benchmarks:

- **Peer Group Comparison**

  There is typically a valuation hierarchy within a sector, with stocks trading on higher P/Es perceived as having better prospects or lower risk than their peers. Such hierarchies may have little objective basis, and investment opportunities often arise when the case for change can be made – for example, that a stock's discount (or premium) to the sector is at the limits of its rational range.

- **Cyclical Trends**

  P/Es often show strong cyclical trends, driven by the overlay of macroeconomics and investor sentiment. Current P/E levels are often usefully compared to the limits of their cyclical range, or to levels reached "at this point in the last cycle…."

Connecting the P/E to growth

In absolute terms, however, the P/E is conceptually linked to growth in earnings per share (as defined earlier).

Most investors expect their stocks to have positive EPS growth, at least over the medium term, and it is rational for stocks with higher expected growth rates to command a premium P/E. The problem is in finding a useful connection between the P/E and the expected growth rate.

PEG: a first step

The simplest measure is the *PEG Ratio*, obtained by dividing the P/E by the expected growth rate. Note that to maximize the objectivity, this should use the historical (known) EPS and the expected trendline growth rate. Stocks with a low PEG Ratio are seen as better value, even if their P/E is higher, by virtue of the implied value of future earnings.

Although its simplicity makes it widely used, the PEG Ratio has a serious flaw in that the relationship between growth and value is non-linear. This has the effect of biasing the metric of higher levels of assumed future growth. For example, in simple terms, 20% growth for one year is actually less than 10% for two years.

As well as flattering high growth, this non-linearity also makes the PEG Ratio excessively sensitive to changes in the assumed growth rate.

This bias toward growth is exacerbated by the fact that the PEG substantially ignores the value of current operations relative to future expectations; it is intrinsically risky.

In order to overcome these issues, some analysts modify the basic ratio in two ways:

PEG: modifications

- Dividing the P/E by the logarithm of the growth rate, rather than the actual rate, to restore the linear relationship.
- Adding the current Dividend Yield to the growth rate in the denominator to acknowledge the value of current operations (the PEGY Ratio).

Lateral thinking: the payback period

The *payback period* is probably the most widely used valuation tool in commerce, being easy to calculate, universally applicable, and intuitively rational.

We introduced the concept of the P/E as a simple static payback period, and it is worthwhile to extend this idea to take account of earnings growth. Chart 3 plots EPS against time for a hypothetical stock. Just to simplify the calculations, the price is 100, the historical EPS is 10, and earnings are expected to grow at 10% yearly. The historical P/E can be thought of as the point along the Time (x) axis at which the area under the historical EPS line equals the price: 10 years.

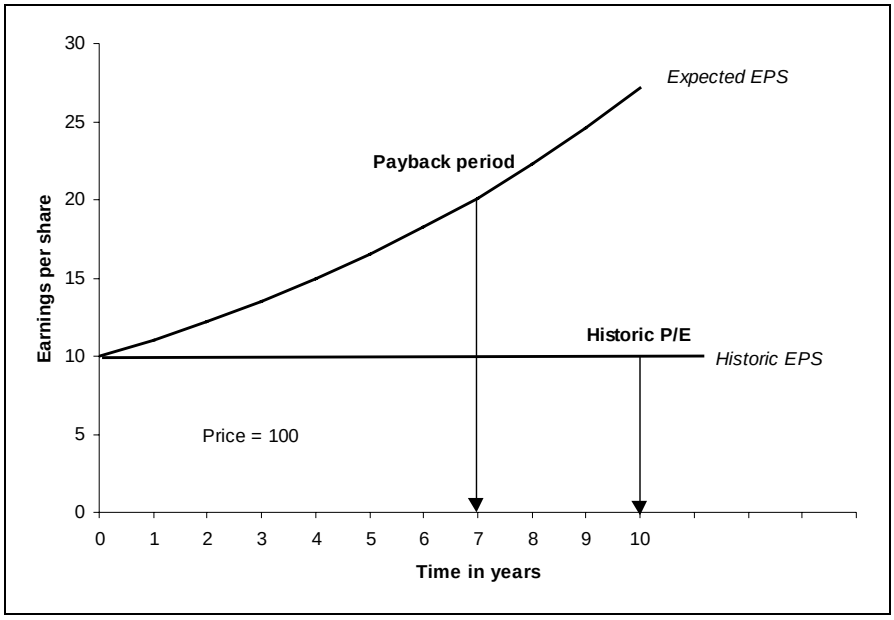
Equivalently, the payback period can be identified as the point on the Time (x) axis at which the area under the expected EPS curve equals the price, in this example about seven years. The area under the curve is effectively the historical P/E adjusted for the logarithm of the growth rate.

This measure avoids the bias and excessive sensitivity of the PEG Ratio. It has the advantage of sharing the look and feel of a P/E; its drawback is the complexity of the calculation!

Chart 3: The Earnings Payback Period

Dynamic Payback

At the payback point, the area under the curve of expected EPS is equal to the share price. The higher the growth, the earlier this is achieved.



Source: Merrill Lynch

■ Watch Out for…

Adjustments for pre-tax adjustments must consider nominal tax

Errors in Adjusting Reported Earnings

It is not unknown for the *gross* amount of pre-tax unusual items to be added back to net income, significantly flattering the adjusted figure. If the abnormal cost had not been incurred, pre-tax profit would have been higher, but that gain would still have been taxable and the rise in net income lower.

Cyclical Lows

Where earnings are volatile, P/Es can often drop to extremely low levels, and *mean reversion* can make these look attractive. The problem is that low P/Es can revert to the mean in either of two ways, higher P or lower E. The latter can (and do) drop faster and farther than we often expect.

Sensitivity to Expectations

High-growth, high-P/E stocks are always at risk from expectations of higher discount rates, let alone loss of earnings momentum. Visibility of growth becomes critical.

Weighted averages can be distorted

Representative Relatives

Ensure that relatives are calculated on an appropriate basis. It is well understood that simple averages can be misleading, but it is perhaps not so widely appreciated that even weighted averages can introduce significant distortion. This typically arises when a small stock has earnings close to zero, and hence a very high P/E. Even though its weight is tiny, its contribution to the average is exaggerated by its extremely *un*representative P/E.

The only truly representative process is *aggregation*. This involves multiplying both the price in the numerator and the EPS in the denominator by the number of shares for each stock, then adding these across the group to obtain the total market capitalization and total earnings, which then give the aggregate P/E.

This approach avoids the distortion caused by both near-zero and negative EPS. It is equivalent to consolidating all the stocks in the peer group as if they had merged, and is applicable to all similar multiples.

Table 9 illustrates this point:

Risk of Flattery
The weighted average P/E for these four stocks is 42.0, but the *aggregate* P/E is 38.8.

Thus, using the weighted average can flatter stocks trading at a discount. (Stock A is trading at more of a discount to the weighted average number.)

Table 9: P/E Averages – How Distortion Can Creep in

Stock	Price	Shares	EPS	P/E	Mkt Cap	Weight (%)	Net Income
A	52.0	96.1	1.40	37.1	4,997	35.6	134.5
B	48.0	100.2	1.23	39.1	4,810	34.3	123.0
C	46.0	86.5	1.20	38.3	3,979	28.3	103.8
D	5.0	51.0	0.02	250.0	255	1.8	1.0
Total					**14,041**	**100.0**	**362.3**

Source: Merrill Lynch Imagination

The weighted average P/E for the four stocks above is 42.0, but the aggregate P/E is 38.8, which is about 8% lower. This has a dangerously flattering effect on stocks trading at a discount. For example, Stock A is trading at a 12% discount to the weighted average P/E, but this drops to only 4% when compared to the aggregate multiple.

Use the median as an alternative

If this process is impractical, perhaps because of the number of stocks involved, we would strongly suggest using the median P/E as the most representative benchmark. In the example above, the median is 38.7, which is reasonably close to the aggregate.

Soup-to-Nuts Example

Table 10 exhibits the key inputs, Table 11-14 outline a step-by-step worked example to evaluate EPS and P/E on both reported and adjusted bases.

Company C has been stuck in time, but the incredible stability of its trading and financial performance makes it ideal to illustrate the various factors that can impact EPS, and how we can fully reflect all of these in our valuation.

Although its operations have been remarkably steady over the years, there have been some changes under the surface.

In 2001, Company C was forced to make a one-off $200 mn reduction in the value of its inventory.

In 2002, it sold off a complete subsidiary (that had failed to generate any profit).

In 2003, it stopped amortizing goodwill.

In 2004, it announced a June capital increase to acquire another business, which (we hope) will increase profits.

Table 10: Summary Financial Data

Company C, Year to December	2000A	2001A	2002A	2003A	2004E
EBIT before goodwill amortization	1,210	1,210	1,210	1,210	1,513
- Goodwill amortization	-200	-200	-200		
= EBIT before exceptional items	1,010	1,010	1,010	1,210	1,513
+/- Exceptional item (pre-tax)		-200			
= EBIT	1,010	810	1,010	1,210	1,513
+/- Financial income (expense)	-120	-120	-120	-120	-120
= Pre-tax profit	890	690	890	1,090	1,393
- Tax expense	-327	-267	-327	-327	-418
=> Tax rate	37%	39%	37%	30%	30%
= Profit after taxation	563	423	563	763	975
+/- Minority interest in profit	22	22	22	22	22
= Ordinary net income	**585**	**445**	**585**	**785**	**997**
+/- Extraordinary items			-130		
= Net income	**585**	**445**	**455**	**785**	**997**
- Preference dividends	-20	-20	-20	-20	-20
= Net income to common	**565**	**425**	**435**	**765**	**977**
Other disclosures					
Marginal tax rate is 30%					
Shares in issue at year-end	1,000	1,000	1,000	1,000	1,500
Potential shares from options	100	100	100	100	100
Potential shares from 5% convertible bond	120	120	120	120	120

Source: Merrill Lynch Imagination

Year-end basic shares need *two* adjustments to reflect the impact of the mid-year discounted capital increase. First, for the time-weighted average, and second, for the effect of the discount. In essence, shares issued for free are assumed to have existed for all time (think of a split), otherwise EPS growth would be understated. The proportion of new shares thus covered depends on the issue terms, and the ex-rights share price.

EOP shares are first averaged on a time-weighted basis (in this case at 50% since the issue was at the end of June).

We then adjust for cumulative historical factors, arising from discounted issues (of which a stock split is the ultimate example).

Diluted shares are obtained by adding on the potential shares that would arise from exercise of options and conversion of the bond.

(Note: these would normally be historically adjusted only for splits.)

Table 11: Shares in Issue

	2000A	2001A	2002A	2003A	2004E
End-of-period shares in issue	1,000	1,000	1,000	1,000	1,500
Time - weighted average shares in issue	**1,000**	**1,000**	**1,000**	**1,000**	**1,250**
/ historical shares adjustment factor (see below)	0.917	0.917	0.917	0.917	1.000
= Basic shares	**1,091**	**1,091**	**1,091**	**1,091**	**1,250**
+ potential shares (options + converts)	220	220	220	220	220
= Diluted shares	**1,311**	**1,311**	**1,311**	**1,311**	**1,470**

Capital Increase Discount Calculation

1 new for 2 old shares issued 30th June 2004 @ 6, cf: ex rights price of 8

2 old @ 8 + 1 new @ 6	22
Divided by 3 implies: theoretical ex-rights price	7.3
Implies: Discount to actual (1-733/800)	8.3%
Implies: Historical shares adjustment factor (733/800)	0.917

Source: Merrill Lynch Imagination

Reported (GAAP) EPS are based on ordinary net income to common shares, and the calculation is straightforward. In this (illustrative) example, everything stays the same except for:

- 2001: $200 mn charge to EBIT arising from nonrecurring, but ordinary event (inventory write-down). The net impact of $130 mn passes straight through to EPS.
- 2002: $130 mn post tax (equivalent to same $200 mn pre tax) charge to net income. As this arose from an event recognized as extraordinary under GAAP (loss on disposal of a discrete business unit), the effect is reversed at the ordinary net income level.
- 2003: Groundhog ceases amortizing goodwill. Effect fully recognized in reported EPS.
- 2004: mid-year capital increase lifts shares in issue; historical years also impacted.

The starting point for reported, or GAAP, earnings is net income from ordinary, continuing operations. Preference dividends are then subtracted to give "ordinary net income to common shares" – the numerator.

For diluted shares, the numerator is increased to reflect the economic benefit of the new shares – in this case, the interest saving on the convertible bond.

The denominator is basic or diluted shares, respectively.

Table 12: Reported EPS

	2000A	2001A	2002A	2003A	2004E
Net income	585	445	455	785	997
-/+ Extraordinary items (reversal)	0	0	130	0	0
= Ordinary net income	**585**	**445**	**585**	**785**	**997**
- Preference dividends	-20	-20	-20	-20	-20
= Ordinary net income to common	**565**	**425**	**565**	**765**	**977**
/ Basic shares	1,091	1,091	1,091	1,091	1,250
= Basic earnings per share	**0.52**	**0.39**	**0.52**	**0.70**	**0.78**
Ordinary net income to common (above)	**565**	**425**	**565**	**765**	**977**
+ Interest saving on converts	20	20	20	20	20
- Nominal tax on interest	-7	-8	-7	-6	-6
= Ordinary net income to diluted	**578**	**437**	**578**	**779**	**991**
/ Diluted shares	1,311	1,311	1,311	1,311	1,470
= Diluted earnings per share	**0.44**	**0.33**	**0.44**	**0.59**	**0.67**

Source: Merrill Lynch Imagination

The use of *adjusted* EPS must be limited to the elimination of distortions arising either from:

- Non-recurring, or exceptional elements that do not qualify as extraordinary under GAAP, but should be reflected in valuation. Even though they represent a fair deduction from (or, occasionally, an increase in) ordinary earnings, their unusual nature distorts the trend, and they are reversed (on a net basis) to give a clearer picture; or
- Inconsistent local GAAPs. For example, whether goodwill is amortized.

Table 14 shows how the distorting effects of these events are reversed out to give a consistent picture of the company's prospects. Note that the impact of taxation must be fully reflected. In particular, it is critical to ensure that the pre-tax exceptionals are subjected to nominal tax before adjusting.

One further practical caveat: make sure that the effects of extraordinary events are only counted once. With this in mind, it is probably safer to start from net income than ordinary net income, especially if there are both exceptional and extraordinary elements involved.

Note that the impacts of all three events: extraordinary, exceptional, and goodwill are ironed out in the calculation of adjusted EPS, which are unchanged over the relevant period.

Analysts' adjustments involve reversal of distorting effects in order to identify the trend in EPS, rather than their strict value.

Table 13: Adjusted EPS

	2000A	2001A	2002A	2003A	2004E
Net income	585	445	455	785	997
- Preference dividends	-20	-20	-20	-20	-20
= Ordinary net income	**565**	**425**	**435**	**765**	**977**
-/+ Extraordinary items (reversal)	0	0	130	0	0
Ordinary net income to common	**565**	**425**	**565**	**765**	**977**
+ Adjustments to reverse unusual factors					
Exceptional items (reversal)	0	200	0	0	0
- Tax impact	0	-60	0	0	0
+ Adjustments to reverse inconsistencies					
Goodwill amortization (reversal)	200	200	200	0	0
= Adjusted net income to common	**765**	**765**	**765**	**765**	**977**
/ Basic shares	1,091	1,091	1,091	1,091	1,250
= Basic earnings per share	**0.70**	**0.70**	**0.70**	**0.70**	**0.78**
Adjusted net income to common (above)	**765**	**765**	**765**	**765**	**977**
+ Interest saving on converts	20	20	20	20	20
- Nominal tax on interest	-7	-8	-7	-6	-6
= Ordinary net income to diluted	**778**	**777**	**778**	**779**	**991**
/ Diluted shares	1,311	1,311	1,311	1,311	1,470
= Diluted Earnings per share	**0.59**	**0.59**	**0.59**	**0.59**	**0.67**

Source: Merrill Lynch Imagination

It is worth calculating all four definitions of EPS to see if material differences arise. For valuation purposes, the most useful measure is adjusted diluted, but where adjustments are significant, the reported P/E should be referenced as well.

And finally, the P/E is obtained by dividing the current share price by EPS. Having calculated all four permutations of reported and adjusted, basic and diluted EPS, we decide that the most useful measure is the adjusted diluted, and so base our valuation on the highlighted measure.

Table 14: P/E Ratio at the Current Price of $9.00

	2000A	2001A	2002A	2003A	2004E
Reported basic	17.4	23.1	17.4	12.8	11.5
Reported diluted	20.4	27.0	20.4	15.1	13.4
Adjusted basic	12.8	12.8	12.8	12.8	11.5
Adjusted diluted	**15.2**	**15.2**	**15.2**	**15.1**	**13.4**

Source: Merrill Lynch Imagination

Price/Book Value

Concept

The valuation multiple the market applies to the company's equity.

Definition

Price/Book Ratio

Current Share Price

———————

Common Shareholders' Equity/
Current Number of Shares

The current share price divided by Book Value per Share (common shareholders' equity per share.)

Common shareholders' equity is issued and fully paid capital, plus other paid-in capital/share premium account/reserves plus retained earnings. This represents the base of equity attributable to ordinary/common shares; minority interests in equity are not included, neither is preferred stock.

Note that the number of shares in this ratio is the current actual number; it is not diluted, or averaged.

Interpretation

With the ROE, a check on the P/E Ratio

Essentially, a high Price/Book Ratio implies high, expected rates of return on equity and vice versa.

The Price/Book Ratio is essentially a complement to the Price/Earnings Ratio. It is equal to the product of the P/E and the Return on Equity, and as such acts as a confirming indicator, given the P/E and expected ROE.

Watch Out for…

Inconsistencies among the P/E, Price/Book, and ROE.

Remember that book value is a historical cost number that can differ significantly from market value, and may not be comparable across firms. This is especially important in analyzing firms that have assets whose market values can be fairly readily estimated (such as real estate companies) but according to GAAP are recorded at historical cost.

Dividend Yield

Concept

The tangible rate of return to shareholders from company cash. While the Free Cash Flow Yield (see page 33) represents the *potential* cash return to shareholders, the *Dividend Yield* represents *actual* cash payments.

Definition

Dividend Yield

Annualized Cash Dividend per Share

———————

Share Price

The annualized declared cash ordinary dividend, expressed as a percentage of the share price.

There are two points of detail here:

- **How are dividends "annualized?"**

According to regional convention:

Regional variations outlined

In Continental Europe, dividends are generally paid once a year in arrears; the dividend is declared and paid in the year following that in which it was earned. We annualize in terms of the year in which the dividend was earned, rather than paid.

In the US, UK, and occasionally Europe, interim dividends are often paid on account, with the final dividend paid in arrears. In the UK, the practice is to combine the (single) interim and final for the year in which they were earned.

In the US, where dividends are usually declared and paid quarterly, the basis of annualization is rather different. Investors generally calculate the yield based on the "current indicated annual rate," which is the *latest* declared quarterly dividend, multiplied by four. Depending on where we are in the calendar, this is not always the same as the cumulative dividend for the fiscal year. Although this implies the risk of inconsistency when benchmarking against European practice, the practical impact is rarely significant.

- **What is a declared dividend?**

Avoid net and gross

That declared by the company, before any tax considerations.

Dividends have long been described as *net* or *gross* according to their tax status. In strictly local terms, these expressions are explicit, but even in a regional context (let alone global), they can become highly ambiguous. The reason is that there are two separate tax issues involved:

- Credits sometimes added to declared dividends in respect of the fact that they have been paid out of the issuer's post-tax profits, and/or
- Withholding tax debited in respect of the imputed fiscal liabilities of the recipient.

The expression *net* usually refers to the declared dividend, before tax credits, but can also mean the declared dividend after deduction of withholding tax, with equivalent ambiguity attached to *gross*: after-tax credit or before-tax deduction?

Ideally, the dividend used in valuation should be the amount effectively received by the shareholder, but this is impractical because of the number of permutations and combinations between the fiscal status of the issuer and holder. We think the most rational approach is to base the yield on the dividend explicitly declared by the issuer, ignoring any associated tax impact, which will depend entirely on the fiscal status of the particular holder.

Where the declared dividend attracts a tax credit, this will *sometimes* lead to an understatement of the effective yield; for example, French recipients of French dividends are entitled to a significant tax credit. But this cannot be generalized: in this example, holders outside France cannot usually realize this benefit in full. Equally, it is also possible that the dividend will be declared before mandatory withholding tax (common in Scandinavia), in which case the declared yield will overstate the effective rate of return.

Interpretation

Components of total return

Investors expect a total return, which is the combination of Dividend Yield and Capital Appreciation. The relative attraction of these components will be primarily determined by the holder's attitude to risk; tangible immediate income versus potential future gains, overlaid with fiscal issues, which, independent of the probabilities involved, affect the value of the expected income and appreciation.

It is sometimes argued – generally in bull markets – that dividends are unnecessary, in that income requirements can also be met by realizing capital gains. Undeniably true, provided these are not ephemeral; capital gains can be reversed, but a dividend can always be spent. Similarly, it is fallacious to ignore the value of potential growth. Where a company's expected returns justify it, shareholders will benefit more from reinvestment than distribution.

Theoretical arguments aside, the Dividend Yield is a critical determinant of value when comparing stocks in mature industries. It can also point to possible recovery situations; when high-yielders maintain their dividends, the implied risk premium can unwind rapidly.

Dividend discount models

The Gordon Model

The dividend can also be used to derive an absolute valuation for stocks by dividing the current dividend by the difference between the company's WACC and its expected growth. This simple model works fairly well at low growth rates (obviously, they must be below the WACC), but does suffer from two drawbacks. The Gordon approach is excessively sensitive to changes in the assumed growth rate, a typical issue when the determining factor is in the denominator. In addition, it tends to undervalue future growth, working best for high-yielding stocks. For these reasons, its applicability is limited to value stories.

It is possible to extend the Gordon approach to more general stock situations using two-, or even three-stage models. Although these exercises can be stimulating, they suffer from the problem that the numbers of assumptions, and thus the degrees of freedom, rise rapidly, increasing the uncertainty of the conclusion.

Internal Rate of Return

IRR: a useful benchmark

It can be shown that the expected total return from holding a dividend-paying security is equal to the yield plus the expected growth. This simple measure makes an excellent benchmark for comparing stocks in many mature sectors, and can easily be calculated from our standard measures.

Watch Out for…

One-time special payments do occur

Specials

Simply screening a range of stocks for dividend yield can fail to spot when a dividend represents a one-time payment. Such "specials" can often be paid after a major disposal, or after an exceptionally good year (at the peak of a cycle, for example). Sometimes boards just feel generous; many German companies pay an "anniversary" dividend to commemorate corporate milestones.

Security

The conventional measure of dividend security is EPS/DPS. This cover ratio completely ignores the fact that the dividend has to be paid in cash; we feel that the best indicator of cover is the ratio of free cash flow to the cost of dividend.

False Security

Be cautious of dividend yields that are inflated by significant reductions in share price. It may well be a signal that the market believes that the most recently paid dividend is unsustainable and ripe for a cut or outright elimination. Remember that the shareholder buying the stock today is entitled to the next dividend, not the last one already paid.

Free Cash Flow Yield

Free Cash Flow Yield

$$\frac{\text{Free Cash Flow}}{\text{Share Price} \times \text{Current Shares}}$$

Concept

The potential rate of cash return that could be obtained; an upper bound to the dividend yield.

Definition

Free cash flow divided by market capitalization.

Interpretation

We have traditionally used cash flow-based metrics in the form of a multiple, but this approach has significant limitations:

The generic expression *price/cash flow* is completely ambiguous, and requires qualification; what exactly is cash flow in this context, and what should it be?

The generally accepted definition is net income, plus total depreciation and amortization, plus deferred taxation. The value of this multiple lies in its simplicity, being easy to calculate and consistently applicable across a wide range of sectors.

Distinguish between cash generation and availability

However, its simplicity is its key limitation, in that it is essentially incomplete: it gives a useful signal on a business's ability to *generate* cash, but says nothing at all about the claims on that cash flow that must be met before shareholders can benefit. It is equivalent to an individual's confusing his salary with his effective spending power. To carry the analogy further, while credit may well be granted on the former basis, it must be repaid from the latter.

On the other hand, price/free cash flow is a more rigorous valuation measure, despite being difficult to forecast, because free cash flow, being struck after all non-discretionary expenses, indicates the value that could either be taken out of the business by shareholders, used to fund expansion, or used to reduce debt. We focus on free cash flow because it is the most relevant cash-flow metric in the context of valuation.

Alternatively, if the multiple is inverted and expressed as a percentage, it represents the yield in terms of the cash that could be withdrawn from the business. We feel that this is the optimum approach because it represents a valuation floor in that where the Free Cash Flow Yield is above an investor's cost of capital, the total economic return will be positive, regardless of the share price.

Finding a floor…

In other words, this indicates the point of equilibrium when it is worth taking the enterprise private.

…and a ceiling

The free *cash flow* yield also represents a ceiling to the dividend yield; where there is substantial room between these, there could be a story.

Watch Out for...

The option value of positive *Free Cash Flow* may be illusionary if debt reduction is an overriding priority.

The intrinsic difficulty in forecasting *Free Cash Flow* (please see page 15).

Enterprise Value/EBITDA

Concept

A "structure-neutral" metric

This is a structure-neutral metric; it offers a broad indication of the cash-generation potential of an enterprise *as if it were debt free*.

EBITDA is the cash generation available to meet first interest payments, then taxation.

Enterprise Value is the market value of the company's capital employed at this time and in its current structure. In addition to equity and net debt components, pension liabilities, deferred taxes, capitalized lease, and other post-retirement benefits are explicitly included in other non-current liabilities. However, this item is not limited to these factors, as new and inventive forms of funding are always emerging and need to be captured.

Definition

Enterprise Value/EBITDA

Enterprise Value = Market Capitalization
+ Net debt + Minority Equity
+ Other Non-Current Liabilities

EBITDA = EBIT + Depreciation & Amortization

Enterprise Value divided by EBITDA, where EBITDA is positive.

EBITDA is EBIT plus depreciation and amortization.

Where nonconsolidated earnings (associates, joint ventures, etc.) are significant, the nominal depreciation and amortization of these contributions should be estimated, and included with consolidated depreciation and amortization.

Enterprise Value is the sum of: market capitalization, net debt, minority interest in equity, and other non-current liabilities.

Market capitalization covers all classes of shares. Net debt should be the analyst's estimate of the level *at this point in time*, rather than the historical actual or next forecast level. Moreover, the debt should be at market value where this is determinable, especially where the difference is material, as with some convertibles.

We feel that the minority interest in equity should be taken at book value, rather than scaled up by the Price/Book Ratio, because that measure takes full account of the fact that the minorities exist. The most important elements of other non-current liabilities are usually unfunded pension or post-retirement benefits, deferred taxes, and capitalized leases, but others could include environmental decommissioning provisions and all long-term claims on the business.

Consolidation Issues

Nonconsolidated entities: Adjust EBITDA, not EV

A limitation of this measure is that the contribution of nonconsolidated entities' depreciation and amortization is not explicitly available, and often ignored, understating EBITDA. To compensate for this, we sometimes see EV reduced by the value of these non-contributing entities. We do not feel that this is appropriate, because, although this approach appears more rigorous, *that valuation is only based on part of the enterprise.* If, for example, the associates were dilutive (which is quite likely) this would not be picked up. Thus, there is a real danger of swinging from understatement to *over*statement.

We think that estimating the missing D&A contribution of nonconsolidated items, and including this in EBITDA, provides a better assessment of this metric that fully covers the enterprise.

When use of cash is critical

Interpretation

The classic application of this metric is in mature sectors in which cash flow is highly visible – Building Materials, for example. The key determinant of quality is not so much how cash flow is created, but how it is deployed. Good companies know when to take on debt to acquire strategic targets, and how much to pay. EV/EBITDA, being structure neutral, is a useful starting point to evaluate acquisition targets.

Another argument runs that for any given present level of Equity Value, positive cash flow will reduce debt over time, implying that the equity value should increase to compensate. This argument is fine, provided the cash flow actually materializes.

Watch Out for...

Net debt at book value, when market value is significantly higher (convertibles).

Capital liabilities (such as unfunded pension exposure) omitted if they are not recognized on the balance sheet.

Enterprise Value/Sales

Enterprise Value/Sales

$$\frac{\text{Enterprise Value = Market Capitalization + Net Debt + Minority Equity + Other Non-Current Liabilities}}{\text{Net Sales}}$$

Concept

This is a measure of volume leverage: how much is the enterprise worth in relation to its turnover?

Definition

Enterprise Value divided by Sales.

Interpretation

This measure is fairly narrow and should never be relied on in isolation, but it is useful in two particular situations –

Benchmark for deals…

In the context of acquisitions:

The purchaser generally starts from the view that he or she will be able to run the business better than the vendor (raise margins). So current earnings multiples are less important than sales, because revenue better represents the level of opportunity.

…and an indicator of volume sensitivity

When valuation is highly dependent on macro factors:

Where valuations are driven by external factors, such as the price of oil or the level of consumer expenditure, it is useful to determine the exposure of the business to that macro factor. Sales is the best general indicator of volume sensitivity.

Watch Out for...

Understatement of enterprise value (as before).

5. The Good DCF Guide

The valuation metrics covered above are generally used in a *relative* sense; the most common form of *absolute* valuation is Discounted Cash Flow, based around the Capital Asset Pricing Model (CAPM). Many of the concepts involved have been referred to already; this section seeks to tie those threads together and outline our best-practice approach.

The basic concept is disarmingly simple: the absolute value of any capital asset is the present value of the expected cash flows, discounted at the cost of that capital. In practice, however, several key issues underlie that statement.

What Is the Asset – Enterprise or Equity?

There are two possible approaches. We can either:

- value the equity *directly*, by discounting the free cash flow (which is fully attributable to equity, because interest has already been deducted); or
- value the enterprise as a *whole,* by discounting free cash flow before interest (adjusting for the tax shield), and then deducting current debt to value the equity.

Direct equity valuation looks simpler…

The first approach looks to be the simpler option, as it enables us to ignore the cost of debt (which is difficult to calculate rigorously) because this is fully reflected in the post-interest cash flow. It also feels closer to real-world situations where DCF is widely used to value specific projects.

…but ignores the value of leverage

Although the equity can be viewed as a stream of projects, it differs crucially in that it has a distinct capital structure independent of its constituent projects. Essentially, we cannot ignore the significant impact of leverage on equity valuation. This is positive, provided that the return on capital employed is greater than the cost of debt. This being generally the case, normal practice should be to discount the enterprise rather than the equity.

A similar issue arises with minority equity. Should we treat the minorities the same way as debt, deducting the current balance sheet figure from the Enterprise Value to leave the attributable equity valuation? Or should we factor in the minority by deducting the P&L charge from the cash flow? Neither approach is completely rigorous; for the former we strictly need to deduct the market value of the minority, rather than the book. In the latter, we tacitly assume that cash flow equals profit. Fortunately, the impact of minorities is rarely significant, and the inconsistency can usually – but not always – be ignored.

We suggest that the best approach is to deduct the minority profit from the cash flows, rather than the minority equity from the EV. The reason is that, whereas debt remains essentially a fixed element of the structure, the minority moves in line with the cash flow. To ignore the future growth in the minority interest is to overstate the attributable equity value.

What Are Expected Cash Flows?

A definition for DCF

We suggest the following definition, which is a compromise between pragmatism and rigor.

EBIT	
Minus:	nominal tax
Plus:	depreciation and amortization
Plus:	net change in provisions
Minus:	net change in working capital
Minus:	capital expenditure
Minus:	minority interest in profit

Reverse the tax shield on interest

The tax charge is applied to EBIT, rather than pre-tax profit, to reflect the tax shield of the interest charge. Strictly speaking, it should be applied to EBIT before deduction of any goodwill amortization (which is *generally* not tax deductible) and this should be done where goodwill is material. The nominal tax rate should be based on the analyst's assessment of the long-term trend rather than any anomalous immediate rates. Dealing with the change in provisions as a whole enables us to fully reflect the timing differences between the accrual and cash accounts – including deferred tax.

Working capital (inventory plus receivables less payables) is extremely difficult to forecast – to the extent that some prefer to omit this item altogether. However, because working capital usually rises over time, this would effectively overstate value. We would suggest that recent trends in working capital be extrapolated in line with expected sales growth.

As discussed on Page 15 under *Free Cash Flow*, capital expenditure should be total, not maintenance.

Financial assets and equity accounting

DCF is most effective for modeling *operating*, as opposed to *holding* companies; but in practice, many enterprises have more complex structures, and these must be factored in where appropriate. In particular, we must take account of the value of any financial assets that have not contributed to the free cash flow as calculated, and where significant, adjust for elements of EBIT that are not fully received in cash.

Dealing with financial assets is straightforward; the value (at market if known, if not at book) of purely financial assets should be added to the implied EV in calculating the equity value. Note this does not apply to an operating asset that is currently not contributing!

Dealing with equity-accounted entities (associate companies and joint ventures) is more complex, for two reasons. Although their operating contributions are usually included in EBIT, this is not always the case (they can be included at the net income level, for instance), and it may be necessary to estimate the implied EBIT contribution. In addition, the EBIT contribution may be at significant variance with the effective cash generation. This can cut two ways: on one hand, the share of the associate's depreciation is not included, but equally, the parent's actual influence over the associate's cash flow may well be limited to the dividend received, and it may be important to adjust accordingly.

Over What Period Should We Discount?

A distinguished professor was acting as a consultant to a chemical company, assessing its DCF-based project appraisals. "Why," she asked the technical director, "are all your DCFs based over different periods?"

"Well," the director replied, "sometimes we have to go farther out to get a positive number."

The problem: balancing the residual

Our task is rather different. DCF models of projects can usually be calculated over their entire expected lives, but – conceptually at least – equities have no finite lifespan. This means dealing with a series of explicit periodic forecasts together with a residual, representing the ongoing value. But how many periods should we forecast? Most models are built on the basis of a detailed assessment of the current and upcoming situation, then overlaid with our view of key trends.

Inevitably, the further ahead we extrapolate, the greater the uncertainty; but equally, if the forecasting horizon is too short, our process is little more than valuing the residual. How can we strike a balance?

The law of diminishing returns dictates that over time, returns on capital inevitably revert to the cost of capital. Successful enterprises will make higher returns, but their "comparative advantage period" (CAP) is finite, and characterized by Porter's Five Forces model that defines industry structure and profitability.

The Porter Principles and the comparative advantage period

- Strength of current competition
- Threats from new entrants
- Threats from substitutes
- Bargaining power of suppliers
- Bargaining power of customers

Although these cannot be objectively determined, it is useful to use an intuitive assessment as the basis for our DCF: say five years for a technology business, 10-15 for most mature businesses, and perhaps 20 for a utility.

Tapered extrapolation

Our models will rarely cover more than five explicit forecast years, but it is not difficult to extrapolate the trend in free cash flow (just the bottom line, rather than its input assumptions) to reflect the CAP. As a refinement, we would suggest tapering the trend in growth at the end of the explicit modeling period down to 4% (expected nominal GDP growth) over our assumed CAP.

For example, if FCF had been growing at 14% p.a. over the five years of our detailed forecast, and the CAP was 10 years (five to extrapolate) in our DCF, we would assume FCF growth of 12% in year six, 10% in year seven, etc. – bringing growth down to nominal GDP by the end of the CAP.

Watch Out for…

In discounting annual cash flows at their year-ends, we must avoid the discontinuity that can arise as our valuation date approaches the year-end month. The best way to deal with this in Excel is to record the explicit year-end of each period-end, and discount on the basis of partial years:

PV (Cash flow$_n$) = Cash flow$_n$/(1 + WACC) ^ ((year end$_n$ – valuation date)/365)

How Should We Deal with the Residual Cash Flows?

Coming to terms with infinity

Growth in Perpetuity

The residual is commonly calculated by assuming that after the last explicit period, cash flow grows at an assumed constant rate, then evaluating the sum of the resulting geometric series as: cash flow/(discount rate – growth rate). The present value of this is then added to that of the explicit annual cash flows to estimate the enterprise value.

Although this is mathematically correct (provided that the growth rate is below the discount rate) as a modeling technique, it is rarely satisfactory, and often yields an implied value far higher than the market price. The problem is that in any model where the input variable (the growth rate in this situation) is in the denominator, the output value can be extremely sensitive to changes in the input.

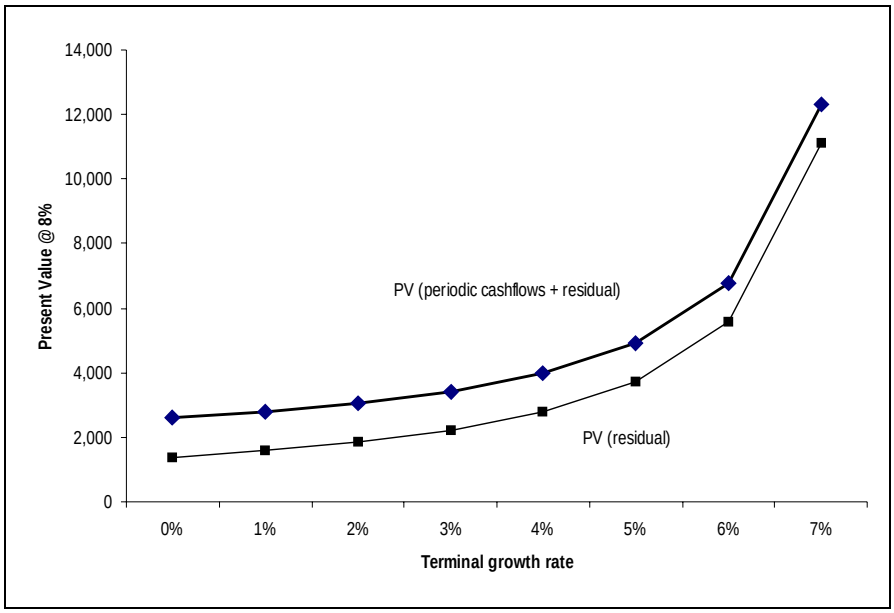
Moreover, for small numbers, the sum of the geometric series converges very slowly, so the residual can often dominate the valuation. Again, although this may be mathematically correct, it is intuitively problematic; should an investor buy an asset on the basis of a valuation primarily dependent on cash flows that are receivable several decades ahead?

For example, a hypothetical initial cash flow of 100 is forecast to grow by 10% each year for the 10 years of our explicit model. Discounting this at a cost of capital of 8% yields a present value (PV) of 1,208. The analyst then assumes a conservative 5% terminal growth rate (only half of the trend rate) and adds the PV of this residual to that of the annual cash flows to reach a value of 4,916. That may or may not represent fair value, but the key point is that the residual accounts for 75% of the total valuation. Looking at it another way, if we had not used the geometric sum formula, but had continued to forecast year by year, it would take 93 years to reach that figure!

Moreover, that estimate is extremely sensitive to the figure we take for terminal growth, as Chart 4 illustrates. If, alternatively, we had taken a figure of 6% instead of 5%, the estimated value rises to 6,770, an increase of 38%. If we had gone the other way, and used 4%, the PV would have dropped to 3,989, a fall of 19%.

If *growth in perpetuity* models are used, the terminal rate should always be below the expected growth in nominal GDP – say 4%.

Chart 4: Growth in Perpetuity Model, Sensitivity to Terminal Growth Rate



Source: Merrill Lynch

Sensitivity to Growth Rate:
If we had taken a figure of 6% instead of 5%, the estimated value would have risen to 6,770, an increase of 38%.

If we had gone the other way, and used 4%, the PV would have dropped to 3,989, a fall of 19%.

Residual Yield

An alternative – and simpler – approach to handling the residual is to assume that the equity is sold at market value (based on a standard benchmark) at the end of its comparative advantage period.

As well as avoiding the necessity to make an assumption about perpetual growth, this methodology sits comfortably with investment theory. The essential reason for buying an equity is growth, and when that growth has run its course, the equity will then essentially trade as a (undated) fixed income security, and should be valued on its hypothetical yield.

We would suggest taking the current market average free cash flow yield, or a suitable proxy: twice the average dividend yield, perhaps. The residual is then evaluated by grossing up the final cash flow by the yield, and discounting to obtain the PV.

A more conservative approach

This approach generally gives a much lower value for the residual (because we are dividing the final cash flow by a larger number). In the example above, if we use a free cash flow yield of 6%, the DCF values the residual at 1,854, which represents 61% of the total, as shown in Table 15.

Table 15: Residual Methodologies Compared

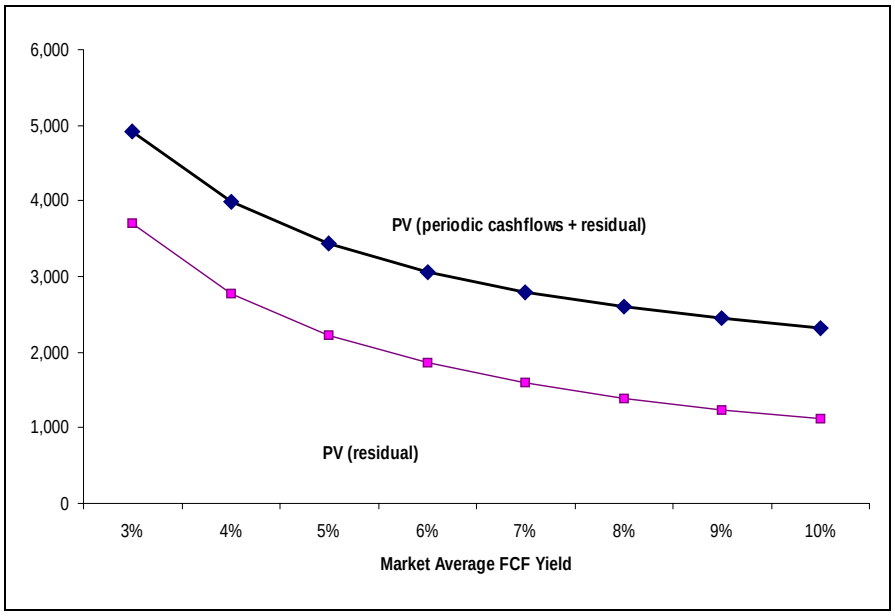
Present Value (WACC = 8%)	Growth in Perpetuity (5%)	Residual Yield (6%)
Forecast cash flows	1,208	1,208
Residual	3,708	1,854
Total	**4,916**	**3,062**
Residual/Total	75%	61%

Source: Merrill Lynch

Reduced input sensitivity

Although we still have to make an assumption about the yield, this approach is far less sensitive than the growth-in-perpetuity model. If we had taken a 4% yield instead of 5%, the valuation would have risen by 16%, less than half the impact of the equivalent input sensitivity under growth-in-perpetuity.

Chart 5: Residual Yield Model – Sensitivity to Yield



Source: Merrill Lynch

What Is the Cost of Capital?

We discussed the issues involved in calculating the Cost of Capital in detail in section 2, page 10. Some additional issues, however, need to be addressed in applying this concept to our DCF. These arise, in the main, because of the extended time horizon involved; it will usually be appropriate to use long-term estimates for many of the inputs, rather than the immediate values.

How Should Leverage Be Treated?

Use long-term estimates where current levels could change

Actual debt levels will almost certainly vary – possibly considerably – over the DCF term, and this can impact the WACC significantly. This arises both through changing weights of equity and debt, and also the effect on the stock Beta.

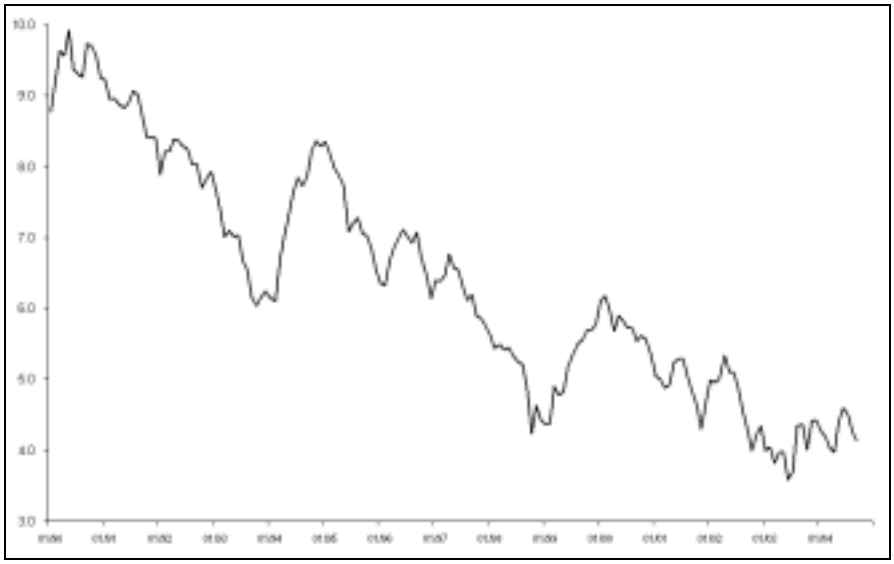
Where debt levels have been, or are expected to be volatile, it is worthwhile basing the weights in the WACC on a representative or long-term target level of gearing, rather than the current actual. Note, however, that it is still the actual level to be deducted from the estimated EV when the discounting is complete!

Risk-Free Rates

The yield on Government bonds (aggregated across the G7 countries) has been falling steadily since 1990: the current levels (4.1% in September 2004) may well prove to be too low longer term.

When the latest figure differs from the trend
On average, G7 government bond yields have been steadily declining for years. In our very long-term DCF assumptions, are we justified in assuming this trend could never reverse?

Chart 6: G7 Aggregate Government Bond Yield (%)



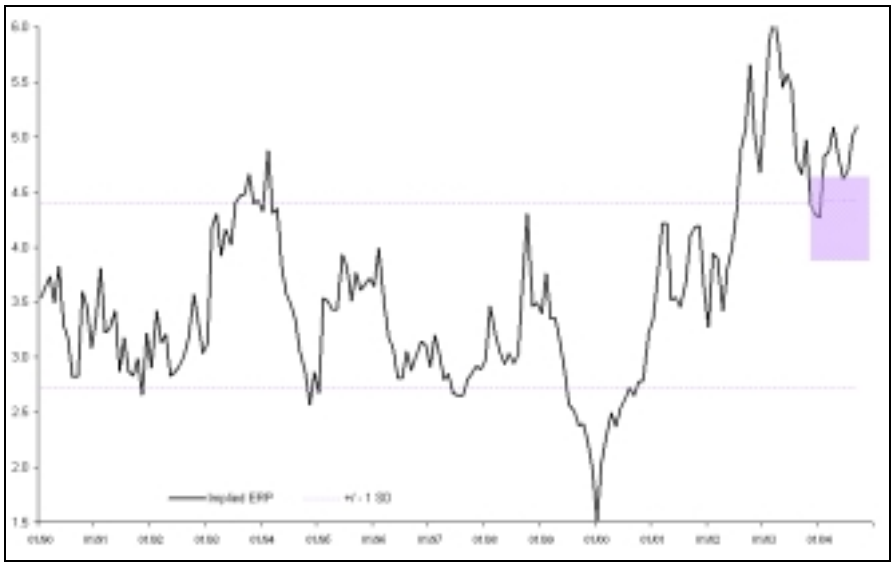
Source: Merrill Lynch

The Equity/Risk Premium

The Implied ERP can be calculated as the difference between the Implied Return on Equities (obtained from an aggregated dividend discount model) and the risk-free return. Chart 7 shows that, although the ERP has spiked occasionally, it has essentially remained within a single standard deviation of its average of about 3.5% since 1990. The current level (5.1%) appears likely to be high for long-term forecasting.

Please note: updated information on this data is available from the Global Valuation and Analytics Team upon request.

Chart 7: Implied Equity Risk Premium (%)



Source: Merrill Lynch

What Beta to Use?

It is well worth reiterating the basic principles: the Beta is the systematic risk (volatility) of an asset within a portfolio. In this context, it is the relative variability of a particular stock to the market as a whole. The equity risk premium reflects the risk of holding equities as a class; multiplying the ERP by the Beta indicates the risk of holding that specific stock. The Beta is the link between macro and micro in equity valuation.

The problem lies in the uncertainty involved in measuring the Beta. This is usually measured as the slope of the regression line between changes in the stock and market values. This is only an estimate, however, and is subject to a considerable margin of error. Are we really justified in projecting this into the distant future?

Aggregate Betas can be better

There is a strong argument, especially for less liquid stocks, new issues, and situations where the capital structure has changed, to use the aggregate Beta for the relevant industry/sector as the basis of a proxy for the stock's own specific risk.

Table 16 lists aggregate Betas for various industries. The *unlevered Beta* is the observed *Beta* of the stock adjusted for the impact of its leverage. Please note that the unlevered is always less than or equal to the levered: removing the debt reduces the risk.

Table 16: Aggregate Betas for Various Industries

Sector	5Y Avg Levered	Current Levered	Current Unlevered
Oil & Gas	0.63	0.67	0.57
Construction & Building Materials	0.60	0.60	0.46
Forestry & Paper	0.87	0.79	0.56
Steel & Other Metals	0.72	0.74	0.58
Aerospace & Defense	0.68	0.92	0.78
Diversified Industrials	0.89	0.64	0.46
Electronic & Electrical Equipment	1.09	1.17	0.85
Engineering & Machinery	0.81	0.86	0.65
Automobiles	0.91	0.95	0.68
Household Goods & Textiles	0.77	0.76	0.71
Beverages	0.41	0.39	0.32
Food Producers & Processors	0.34	0.39	0.32
Health	0.63	0.61	0.53
Personal Care & Household Products	0.49	0.39	0.31
Pharmaceuticals	0.73	0.77	0.72
Retailers, General	0.92	0.78	0.74
Leisure, Entertainment & Hotels	0.82	0.70	0.60
Support Services	0.84	0.98	0.88
Transport	0.59	0.63	0.48
Food & Drug Retailers	0.57	0.76	0.58
Telecom Services	1.23	1.20	0.81
Electricity	0.24	0.67	0.47
Banks	0.92	1.01	0.58
Insurance	0.98	1.28	1.10
Life Assurance	1.01	1.32	1.12
Investment Companies	0.63	0.42	1.09
Real Estate	0.53	0.42	0.28
Specialty & Other Finance	1.15	1.18	0.99
Information Technology Hardware	1.75	1.55	1.45
Software & Computer Services	1.48	1.29	1.29

Source: Merrill Lynch estimates, September 2004. NB: Calculations based on 104 weekly geometric observations against the MSCI World Index in US Dollars.

Levered and unlevered Betas

Strictly speaking, we cannot, however, simply substitute the industry Beta into our calculation. The reason is that the measured, actual Beta is significantly influenced by the weights of debt and equity, and if our particular stock's structure varies from the industry as a whole (which is quite likely), an adjustment is necessary.

In order to use an industry/sector Beta, we must start with the *unleveraged* industry Beta, and apply the following formula:

$$\beta_{LeveragedStock} = \beta_{UnleveragedSector} * \left(1 + (1-t) * \frac{D}{E}\right)$$

Where:

t = Tax rate
D = Debt value
E = Equity value

Summary

The weighted average cost of capital is:

WACC = Cost of debt * D/(D + E) + Cost of equity * E/(D + E)
Cost of debt = Effective interest rate * (1 – t)
Cost of equity = Risk-free rate + Equity risk premium * Beta

Appendix: The *iQdatabase* Global Template

The tables in the appendix provide an outline of the standard industrial accounting layout used by Merrill Lynch analysts to populate our ***iQ****database*.

Several industries also have industry-specific measures, both financial and operational. We employ specialized layouts to meet the needs of the finance sector: banks, insurance, financial services, and real estate investment trusts.

Explicit links between reported and adjusted figures

The key objective is to enable the analyst to include both *reported* (local GAAP) and *adjusted* (standardized) data in an explicit and consistent manner. We show only the general measures used in the commercial/industrial sectors, our analysts can, and do, add their own industry-specific measures in addition to these. Note that the number of adjusted metrics is kept to a minimum; in the Income Statement, we consider adjustments to EBIT and Net Income; in the Balance Sheet, we provide adjusted fields for both Equity and Debt.

We also incorporate the *costs are negative* convention, so that profits are calculated additively, and adjustments (reversals) subtracted. Although a little counterintuitive, this approach does avoid possible ambiguities.

Table 17: Income Statement

Measure	Definition
Sales revenue	Trading revenue from consolidated operations, net of returns and discounts
Other revenue	Non-trading revenue
Total revenue	Sales + other revenue
Cost of goods sold	Cost of goods sold
Gross profit	**Total revenue + COGS**
Depreciation	Total depreciation (excluding Amortization)
Amortization	Amortization of all intangible assets (inc. goodwill & other intangibles)
Total depreciation & amortization	Total depreciation + total amortization
o/w: depreciation PPE	Depreciation of PPE
o/w: depreciation Other NCA	Depreciation of PPE
o/w: amortization of intangibles ex. Goodwill	Amortization intangibles other than goodwill
o/w: amortization Goodwill	Amortization minus the above
Share of associates Dep & Amort (est)	Explicit or estimated (adjustment to EBITDA)
EBIT (reported)	**EBIT as reported under local GAAP**
Included contribution from associates etc	The part of EBIT (reported) from non-consol entities (if any)
EBIT excluding associates' contribution	EBIT – inc contrib assocs ("consolidated EBIT")
Interest expense	Total interest expense (not "net" unless only that is given, if so, set IntInc=0)
Interest income	Total interest income (not "net" unless only that is given, if so, set IntExp=0)
Other financial income/expense	Financial items not covered by the above
Financial income/expense	**Sum of the above three**
Profit/loss before tax	**EBIT (reported) + financial inc/exp total**
Tax expense/benefit (total)	Total tax (expense/benefit) for the year
o/w: deferred	The part of Tax which is deferred
o/w: on exceptionals	The part of Tax which relates to exceptionals
Post-tax contribution from associates etc.	Where not included in EBIT
Post-tax goodwill amortization	Where not included in EBIT
Profit/loss after tax	**PBT + total tax + post-tax assocs + post-tax goodwill**
Minority interest in profit/loss	Minority profits negative, loss profit. Give the net figure.
Net income before exceptionals	PAT + Minority interest in profit/loss
Effect of discontinued operations	As per US GAAP
Effect of accounting changes	As per US GAAP
Effect of extraordinary items	As per US GAAP
Other exceptional	Equivalents under other GAAP
Exceptional items post-tax (total)	Sum of the above four
Net income (reported)	**Net Income before exceptionals + exceptionals**
Adjustments to EBIT	
EBIT (reported)	EBIT as reported under local GAAP (as per P&L above)
Add: associates EBIT inferred from post tax	Post-tax assocs * (1 - standard tax rate) or actual if no standard
Add: amortization inferred from post-tax	where goodwill is amortized at the post tax -level
Financial income treated as operational	Financial income relating to operations
Financial expense treated as operational	Financial expenses relating to operations
Add: total financials treated as operational	Sum of the above two
Restructuring costs	Reversal: adjustment for exceptional restructuring charges
Asset write-downs	ditto: asset write-downs
Gain/loss on sale of assets	ditto: gain/loss on asset sales
Other pre-tax exceptionals	Other adjustments to EBIT
Less: total pre-tax exceptionals	Total pre-tax exceptionals
EBIT adjusted	EBIT reported + post-tax assocs, amort + op fins - pre-tax excepts
Adjustments to net income	
Net income (reported)	Net Income reported under local GAAP (as per P&L above)
Exceptionals pre-tax (est post-tax equiv)	Reversal: est. post-tax equiv of pre-tax exceptionals (@std tax)
Exceptionals post-tax	Reversal: pre-tax exceptionals
Goodwill amortization	Reversal: goodwill amortization
Other profit adjustments	Any other reversals of reported net income under local GAAP
Less: Total adjustments to net income	Total post-tax exceptionals
Net income (adjusted)	Net Income reported - total post-tax exceptionals

Source: Merrill Lynch

Table 18: Cash Flow Statement

Measure	Definition
Net income	Net income (per P&L)
Total depreciation & amortization (contra)	Add back total depreciation & amortization
Deferred taxation charge (contra)	Add back deferred tax
Cash earnings	**Sum of the above three**
Minority interest (contra)	Add back minority interest
Difference between assocs' divs & sh of profits	Because assocs cash contribution is only the dividend
Change in provisions etc.	Includes equivalent other non-current liabilities
Change in working capital	To capture cash effects
Other operating cash items	Balances op cash flow to cash earnings + the above 4
Cash flow from operations	**As reported under local GAAP. Cash earnings plus the above 5**
Capital expenditure	Total capex, not "maintenance" (considered indeterminable)
Proceeds from sale of non-current assets	As published
Acquisitions/disposals of investments	As published
Other investing cash items	As published
Cash flow from investing	**Sum of the above four**
Shares issue/repurchase	As published
Cost of dividends paid	As published
Change in debt	As published
Other sources/uses of cash	Balances the above three to the total below
Cash flow from financing	**Balances chg cash (total cash flow) to cash flow op + cash flow inv**
Total cash flow (change in cash & equivs)	As published. Equates to sum of op, inv & fin cash flows
Free cash flow	Operating cash flow plus total capex (which is defined negative!)
Change in net debt	Change in debt + change in cash

Source: Merrill Lynch

Table 19: Supplementary Measures

Measure	Definition
Restricted stock	Restricted stock compensation
Stock options	Stock options compensation
Total equity-based compensation	Sum of restricted stock and stock options
Expense options at fair value?	Indicates (yes/no) whether options are expensed
Proportional revenue	Consolidated revenue plus pro-rata associates, etc.
Revenue from discont. ops	As per US GAAP
Profit before tax - adjusted	Profit before tax adjusted for exceptionals: EBIT adjusted + financial income/(exp)
Tax on non-recurring items	Tax on exceptionals
Proportional EBITDA	Consolidated EBITDA plus pro-rata assocs, etc.
Headcount	Year-end full-time equivalent employees
Personnel costs	Total wages, salaries, social security, pension & post-retirement benefits charged to EBIT
Capitalized interest	As published
Standard tax rate %	Analyst's assessment of the "normalized" or sustainable tax rate
Cash tax rate %	Same as tax rate, but excluding deferred tax
Tax rate on ordinary activities %	Tax rate excluding exceptionals. NM if negative
Cash taxes paid	Cash taxes actually paid

Source: Merrill Lynch

Table 20: Balance Sheet

Measure	Definition
Property, plant & equipment	Property, plant & equipment ("Tangible FA")
Goodwill	Exclude other intangibles
Other Intangible assets	Patents, trademarks, etc.
Investments	Financial fixed assets
Other non-current assets	Balances total below to the above four.
Non-current assets	**Book value after accumulated dep/amort**
Inventory	At book value (after B&D debts)
Trade receivables	Accounts receivable (debtors) arising from sales
Other receivables & prepayments	Other accounts receivable
Receivables (total)	Sum of the above two
Cash & equivalents	"Equivalents"= items promptly convertible into cash at certain value
Other current assets (balances)	Balances total CA to inventory, cash & receivables
Current assets	**As published**
Total assets	**CA plus NCA**
Trade payables	Accounts payable (creditors) arising from purchases for sales
Other payables & accruals	Other accounts payable
Payables (total)	Sum of the above two
Short-term debt	All maturities under 12m, includes current portion of LT debt
Other current liabilities	Balances total CL to payables & ST debt
Current liabilities	**As published**
Long-term debt	Interest-bearing liabilities maturing over 12m
Provision for deferred tax	The balance of deferred tax payable, net of credits
Provision for pensions/PRB	Accruals for pension and PRB liabilities as published
Other provisions	All other accruals
Provisions	Sum of the above three
Other non-current liabilities	Balances total NCL to LT debt and provisions
Non-current liabilities	**Enter total as published**
Total liabilities	**Current liabs + non-current liabs**
Contributed capital	As published
Reserves	As published NB: this field can be negative!
Cumulative retained earnings	As published NB: this field can be negative!
Ordinary shareholder equity	**Sum of the above three**
Preferred stock	As published
Minority equity	As published NB: this field can be negative!
Total equity	**Total of ordinary, pref & minority equity**
Adjustments to debt	
Total debt	As reported under local GAAP (as per BS above)
Off balance sheet borrowings	Leases, securitized working capital, etc.
Other obligations	Other obligations equivalent to debt for valuation purposes
Less: Total adjustments to reported debt	Total post-tax exceptionals
Total debt (adjusted)	Total debt + adjustments
Adjustments to equity	
Ordinary shareholder equity	As reported under local GAAP (as per BS above)
Unrealised capital gains	After tax
Other	Untaxed reserves, provisions with equity character, etc.
Less: Total adjustments to reported equity	Total post-tax exceptionals
Ordinary shareholder equity (adjusted)	Ordinary equity + adjustments

Source: Merrill Lynch

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