Valuation Methodology Handbook (General Model v6)

Welcome to Morningstar's Equity Valuation Model version 6. This document will guide you through the main features of the model and our valuation methodology. If you have any questions, please contact Matthew Coffina, CFA by email at matthew.coffina@morningstar.com or by phone at (312) 696-6864.

Orientation and Navigation

The general model includes four standard tabs. First is the Summary tab, which includes key metrics and pro forma financial statements. Most important information can be found here, such as analyst contact details; our fair value estimate; economic moat, moat trend, and uncertainty ratings; cost of capital assumptions; current valuation multiples; five-year financial statement forecasts; five-year projected average growth and profitability; key ratios; and so on.

The Inputs tab is where analysts feed their assumptions into the model. Information that needs to be reviewed frequently, such as current stock price, foreign exchange rates, scenario fair value estimates, and Stage II-III assumptions are contained in boxes at the top of the tab. Income statement inputs begin on row 25, balance sheet inputs on row 127, and cash flow statement inputs on row 173. Our discounted cash flow valuation comes together in rows 235 through 299, where you can see the distribution of value between Stages I, II, and III, the calculation of Stage I free cash flows, and the estimation of Stage II-III value. Next is the calculation of return on invested capital (ROIC) starting on row 300, important ratios starting on row 344, and historical and projected valuation multiples starting on row 406. Other adjustments to enterprise value, such as for options and pensions, are entered starting on row 431. The 50-year free cash flow progression implied by the analyst's assumptions can be seen starting on row 493. Finally, general information that requires less frequent updates, including cost of capital assumptions, can be found starting on row 513.

The calculations underlying our credit ratings can be found next on the Debt tab. These include the four pillars of our credit rating methodology: business risk, the cash flow cushion, the solvency score, and distance to default.

The final tab is Buildup, where analysts are encouraged to put raw historical data and to break down the financial statements into segments, geographies, or some other decomposition. The assumptions on these tabs should be linked through to the Inputs tab. Clients should feel free to alter assumptions either here or on the Inputs tab to examine the impact of different forecasts on the fair value estimate.

There are a few tools to facilitate navigation through the model. There are hyperlinks to important areas of the model at the top of the Inputs tab and toward the right of the Summary tab. You can also scroll through the various sections of the Inputs tab by selecting any cell in column A and using the Ctrl-↑ or Ctrl-↓ shortcut.

Discounted Cash Flow Valuation--Stage I

We value companies using a three-stage discounted cash flow (DCF) model. The first stage includes our explicit forecasts. Analysts make specific predictions about a company's future financial performance to arrive at annual estimates of free cash flow to the firm (FCFF). Our Stage I forecasts can be seen on the Inputs tab in the section entitled "Discounted Cash Flows" starting on row 254.

Free cash flow to the firm has two components: earnings before interest (EBI) and net new investment (NNI). EBI is calculated as follows:

	Operating Income (excluding charges)
+	Amortization
+	Other Non-Cash Charges[1]
–	Restructuring & Other Cash Charges
+	After-tax Operating Adjustments[2]
–	Cash Taxes[3]
+	Pension Adjustment[4]
=	Earnings Before Interest

Net new investment is added to EBI to arrive at free cash flow to the firm. NNI is calculated as follows:

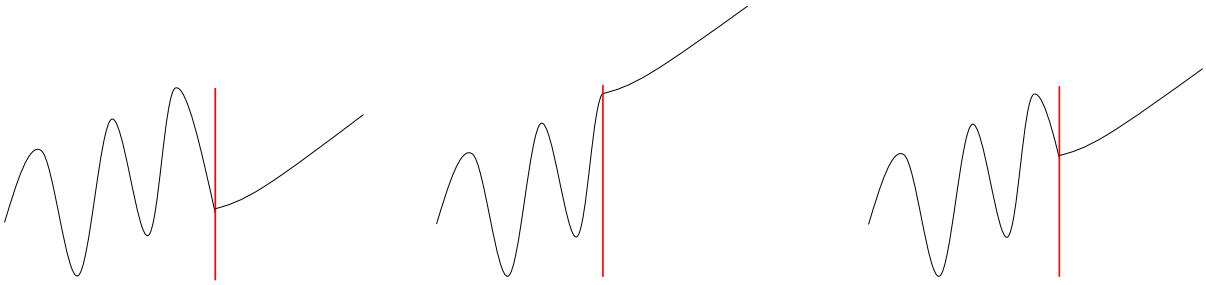
	Depreciation
–	Capital Expenditures
–	Net Investment in Working Capital[5]
–	Net Change in Other Operating Assets / Liabilities
–	Net Acquisitions / Asset Sales
=	Net New Investment

The most important element of Stage I is earnings before interest in the last year of the explicit forecast horizon, since this is used as the jumping-off point for Stages II and III. *It is critical that the last year's EBI be representative of a normalized, sustainable, midcycle level of earnings.* Analysts have the ability to choose either five or 10 years as the length of Stage I. For most companies, five years is appropriate, as estimates become increasingly unreliable as the forecast horizon is extended. However, if a normalized level of EBI cannot be attained within five years, a 10-year Stage I should be used.

[1] Impairment of goodwill and other intangibles, and other noncash charges, included in SG&A or other operating expense accounts.
[2] Minority interest and other after-tax operating gains.
[3] Cash taxes are calculated as taxes from the income statement, plus the net interest tax shield, plus net changes in deferred taxes.
[4] This adjustment is needed to prevent double-counting of non-service components of pension cost (i.e. components of pension cost related to existing assets and liabilities).
[5] Excludes changes in cash.

Figure 1 shows the importance of the EBI forecast in the last year of Stage I. Stage II and III assume a steady growth rate off of this base. If Stage I ends with a company's trough earnings, the fair value estimate will likely be too low. If Stage I ends with a peak level of earnings, the fair value estimate will likely be too high. The appropriate estimate incorporates a midcycle level of both revenue and margins.

Figure 1: Choosing an EBI Forecast in the Last Year of Stage I



Wrong: trough earnings used as the jumping off point for Stages II-III

Wrong: peak earnings used as the jumping off point for Stages II-III

Right: "mid-cycle" earnings used as the jumping off point for Stages II-III

Discounted Cash Flow Valuation--Stage II (Standard Methodology)

Our standard Stage II methodology uses a formula to simplify the summation of discounted cash flows.[6] The formula relies on an assumption that EBI growth, return on new invested capital (RONIC), and return on existing invested capital will be constant during Stage II. Analysts are responsible for choosing the growth rate, RONIC, and the length of Stage II, but do not make specific assumptions about revenue, operating costs, and so on.

Stable EBI growth and RONIC also imply stable FCFF growth. Let $FCFF_1$ represent a company's free cash flow in the upcoming year (recall that $FCFF_1 = EBI_1 + NNI_1$), G represent the growth rate, and WACC represent the discount rate. In this case, the company's fair value (FV) today is given by:

$$FV = \frac{FCFF_1}{WACC - G} = \frac{EBI_1 + NNI_1}{WACC - G}$$

[6] Our Stage II and III formulas were derived independently, but are substantially similar to those found in McKinsey's Valuation (Fifth Edition) by Tim Koller, Marc Goedhart, and David Wessels.

Let us also define the investment rate (IR) as the percentage of EBI that is reinvested in the business and return on new invested capital as the incremental EBI generated from increases in invested capital. That is:

$$IR = -\frac{NNI}{EBI} \qquad \text{and} \qquad RONIC = \frac{EBI_{t+1} - EBI_t}{-NNI_t}$$

Dividing both the numerator and denominator of the RONIC definition by EBI_t yields:

$$RONIC = \frac{(EBI_{t+1} - EBI_t) / EBI_t}{-NNI_t / EBI_t} = \frac{G}{IR}$$

This can be rearranged as IR=G / RONIC. Finally, note that we can factor out EBI from the numerator of the fair value equation above and re-write the equation as follows:

$$FV = \frac{EBI_1(1 + NNI_1/EBI_1)}{WACC - G} = \frac{EBI_1(1 - IR)}{WACC - G} = \frac{EBI_1(1 - G/RONIC)}{WACC - G}$$

We use the right-most version of this formula to value Stage II cash flows. However, because Stage II is assumed to have a finite length, we must subtract the value of cash flows from years beyond the end of Stage II. The final formula becomes:

$$\text{Stage II Value} = \frac{EBI_{T+1}(1 - IR)}{WACC - G} - \frac{EBI_{T+L+1}(1 - IR)}{(WACC - G)(1 + WACC)^L}$$

Where T represents the last year of the Stage I forecast (either five or 10 years from now) and L represents the length of Stage II.

Analysts input their assumptions for Stage II growth and RONIC, and the length of Stage II, in the Stage II-III Methodology box at the top of the Inputs tab. This box also includes the five-year historical average and Stage I projected average values for RONIC and EBI growth to help inform the analyst's choices.

Stage II assumptions are the main way in which our equity valuation models incorporate our analysis of economic moats. In general, companies with wide or narrow economic moats should have RONIC>WACC and a relatively long Stage II. The wider the moat, the longer the company can be expected to outearn its cost of capital. As a rule of thumb, we think of wide-moat companies as being able to earn excess returns on capital for at least 20 years, while narrow-moat companies should be able to earn excess returns on capital for at least 15 years. For no-moat companies, Stage II RONIC normally should be close to or below WACC. If a company's RONIC is below its WACC, it may be appropriate to assume a negative EBI growth rate (that is, the company may rationally choose to disinvest in its business).

Discounted Cash Flow Valuation--Stage III (Standard Methodology)

Stage III includes all of the years after Stage II, into perpetuity. To value these cash flows, we start with the Stage II formula but make a further simplifying assumption that RONIC=WACC in Stage III. That is, we assume that no company is able to invest new capital at rates of return that exceed its cost of capital in Stage III--every moat is eventually eroded.

Using this assumption, we can factor out (1/WACC) from the numerator, and the formula actually becomes very simple:

$$\text{Stage III Value} = \frac{EBI_{T+L+1}(1 - G/WACC)}{WACC - G} = \frac{EBI_{T+L+1}(1/WACC)(WACC - G)}{WACC - G} = \frac{EBI_{T+L+1}}{WACC}$$

Although the growth term has dropped out of the formula, this does not mean that the firm isn't growing in Stage III. Rather, we are only assuming that incremental growth creates no value for shareholders. Looked at another way, if RONIC=WACC, the firm might as well pay out 100% of earnings as dividends. In this case, invested capital and earnings would remain constant (in nominal terms), and the dividend would account for the entire return to shareholders.

The implied progression of free cash flows over the next fifty years can be seen in the "Long-Run FCF Progression" section of the Inputs tab (starting on row 493). Here analysts can adjust the perpetual growth rate, although it will not affect the fair value estimate. Higher growth will result in a steeper progression of free cash flows, but off of a lower base as the implied investment rate increases.

Stage II-III Alternative Methodologies

In addition to the standard Stage II-III methodology, analysts have four alternative approaches available to them. The use of any of the alternative methodologies requires approval of a director or associate director on the analyst's team. The analyst can value the Stage II-III cash flows using a terminal EV/sales, EV/EBI, or EV/EBITDA multiple. The analyst also has the option to add the total value of Stage II-III cash flows directly to the fair value estimate.

The alternative Stage II-III methodologies should only be used in special circumstances. For example, it may be impossible to model a normalized operating margin for a startup or a biotech with no products on the market yet, even by the end of a 10-year explicit forecast. In these cases, a terminal EV/Sales multiple may be appropriate. If a company is in a dying industry or is likely to experience a negative growth rate into perpetuity, standard DCF valuation could result in vast overstatement of the fair value. In these cases, a terminal EV/EBI multiple (roughly equivalent to a P/E multiple) may work better. For companies with a high level of depreciation or depletion expense but relatively low capital expenditures, such as a resource company using up its productive assets, a terminal EV/EBITDA multiple may be the best metric. Finally, if a company is expected to liquidate at the end of the explicit forecast, or if some specific trajectory of cash flows can be projected beyond Stage I, the "Total Value" approach may be most suitable.

Analysts should be careful to justify any choice of a terminal multiple with realistic assumptions for the fundamentals, such as growth, margins, cost of capital, and the return on new invested capital. Comparisons to historical multiples or similar companies may be used as a gut check of the valuation, but should never be the primary justification for a terminal multiple.

Cost of Capital

Because the output of our general model assumptions is free cash flow to the firm--representing cash available to provide a return to both equity and credit investors--we must discount future cash flows using the weighted average cost of capital (WACC), which is a weighted average of the costs of equity, debt, and preferred stock. In most cases, we determine the weights using the book value of debt and preferred stock, and the fair value of equity (using an iterative process). These weights may be adjusted if the company's current capital structure differs from its long-run target capital structure. The cost of debt and preferred stock should be based on observed market rates of return. Because we use a book rather than market value of debt, it may be appropriate to base the cost of debt on a mix of the incremental and historical cost of debt.

The cost of equity (COE) presents the greatest challenge in calculating the WACC because it is unobservable. The most common methodology for estimating the COE is the Capital Asset Pricing Model (CAPM). However, we find that the CAPM raises more questions than it answers, by replacing one unobservable input with three (the risk-free rate, the equity risk premium, and beta). While interest rates

on U.S. Treasury bonds can serve as a reasonable proxy for the risk-free rate, there is significant disagreement about appropriate values for the equity risk premium and beta. For this reason, we have chosen a greatly simplified COE methodology that captures the essence of the CAPM while avoiding precise estimates of inherently unknowable quantities.

The central insight of the Capital Asset Pricing Model is that investors will only be rewarded, on average, for taking on systematic or non-diversifiable risk. We sort the companies in our coverage universe into four buckets based on their level of systematic risk. The buckets correspond to cost of equity values as follows:

Systematic Risk	COE
Below Average	8%
Average	10%
Above Average	12%
Very High	14%

The choice of a systematic risk bucket must be approved by the analyst's director or associate director. When deciding on a systematic risk bucket, the analyst should consider the question: "If aggregate global economic output unexpectedly and permanently increased (decreased) by 5%, what would happen to this company's sustainable operating earnings?"

If the answer is that the company's operating earnings would increase (decrease) by about as much as the average firm in the S&P 500, the company has average systematic risk. Most companies should fall in this bucket. If the answer is that the company's operating earnings would change by significantly less than most other firms, the company has below-average systematic risk. For example, most regulated utilities and soft-drink manufacturers would fall in this bucket. Finally, if the company's operating earnings would be expected to change by significantly more than most other firms, it has above-average or very high systematic risk. These buckets include economically sensitive businesses such as metal fabrication, hotels, oil and gas drilling, and asset management.

Viewed in another way, systematic risk to equity has three components: revenue cyclicality, operating leverage, and financial leverage. Table 1 provides a rough guide for assigning companies to systematic risk buckets based on an assessment of these underlying drivers. Importantly, company-specific, diversifiable (that is, nonsystematic) risks *do not* contribute to the systematic risk rating. For example, companies with a high degree of product or customer concentration, pending legal or regulatory issues, concerns about management execution, and so on would not be allocated to a higher systematic risk bucket. In contrast, the uncertainty rating should incorporate both systematic and company-specific risks. For this reason, the uncertainty rating should be at least as high as the systematic risk rating (where below-average systematic risk corresponds to low uncertainty, and so on). Additionally, company-specific risks should be incorporated in fair value estimates through base-case cash flow forecasts,

which represent the expected value of future cash flows, or by explicitly probability-weighting scenario-based fair value estimates.

Table 1: Assigning Companies to Systematic Risk Buckets

Revenue Cyclicality	Operating Leverage	Financial Leverage	Systematic Risk to Equity	Cost of Equity
Low	Low	Low	BELOW AVERAGE	8%
Low	Low	Medium	BELOW AVERAGE	8%
Low	Low	High	AVERAGE	10%
Low	Medium	Low	BELOW AVERAGE	8%
Low	Medium	Medium	AVERAGE	10%
Low	Medium	High	AVERAGE	10%
Low	High	Low	AVERAGE	10%
Low	High	Medium	AVERAGE	10%
Low	High	High	ABOVE AVERAGE	12%
Medium	Low	Low	BELOW AVERAGE	8%
Medium	Low	Medium	AVERAGE	10%
Medium	Low	High	AVERAGE	10%
Medium	Medium	Low	AVERAGE	10%
Medium	Medium	Medium	AVERAGE	10%
Medium	Medium	High	ABOVE AVERAGE	12%
Medium	High	Low	AVERAGE	10%
Medium	High	Medium	ABOVE AVERAGE	12%
Medium	High	High	VERY HIGH	14%
High	Low	Low	AVERAGE	10%
High	Low	Medium	AVERAGE	10%
High	Low	High	ABOVE AVERAGE	12%
High	Medium	Low	AVERAGE	10%
High	Medium	Medium	ABOVE AVERAGE	12%
High	Medium	High	VERY HIGH	14%
High	High	Low	ABOVE AVERAGE	12%
High	High	Medium	VERY HIGH	14%
High	High	High	VERY HIGH	14%

The 8%,10%,12%, and14%, COE values refer to companies whose primary business is in the U.S. For international companies, we may add a premium to the baseline COE to account for differences in country risk and inflation. The analyst should be sure that the impact of inflation on future cash flow forecasts is consistent with the inflation rate implied by the cost of equity.

The country premium should be based on the location of the company's operations. This may be different from the company's headquarters. For companies with operations in multiple countries with different risk premiums, a blended rate may be appropriate.

The following table provides a guideline for country premiums as of January 2012. We revise this table approximately every six months.[7] Please consult Allan Nichols (allan.nichols@morningstar.com) for up-to-date values or for any countries not shown.

Table 2: International Cost of Equity Premiums

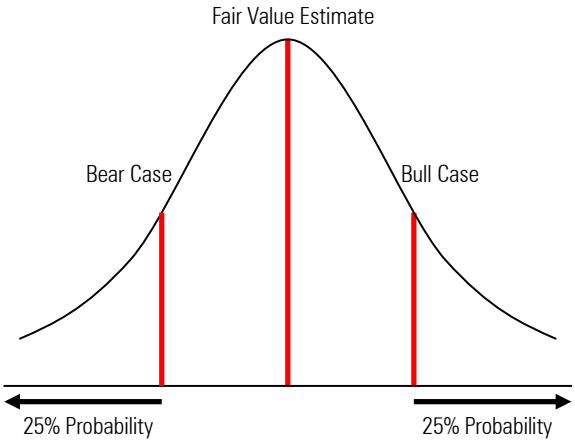
Argentina	9%	Greece	11%	Peru	3%
Australia	1%	Hong Kong	none	Philippines	4%
Austria	none	Iceland	3%	Portugal	4%
Bahamas	2%	India	3%	Russia	3%
Belgium	1%	Indonesia	4%	Singapore	none
Bermuda	1%	Ireland	4%	South Africa	2%
Brazil	3%	Israel	1%	South Korea	1%
Canada	none	Italy	2%	Spain	1%
Chile	1%	Japan	-1%	Sweden	none
China	1%	Lithuania	2%	Switzerland	none
Colombia	3%	Mexico	2%	Taiwan	1%
Denmark	none	Netherlands	none	Thailand	2%
Finland	none	New Zealand	none	Turkey	4%
France	none	Norway	none	United Kingdom	none
Germany	none	Panama	3%		

Scenario Analysis and Uncertainty

Analysts normally must consider at least two scenarios in addition to their base case: a bull case and a bear case. Most often, assumptions should be chosen such that the analyst believes there is a 25% probability that the company will perform better than the bull case, and a 25% probability that the company will perform worse than the bear case. If a company faces a symmetric set of outcomes, we might envision the possible fair values to be represented by a bell curve, as in Figure 2. In this case, the base case (representing the "expected" outcome) and the fair value estimate will be equivalent. The distance between the bull and bear cases is an important indicator of the uncertainty underlying the fair value estimate. Based on the scenarios, the model suggests an uncertainty rating in Inputs cells M21 and M22, using two different methodologies.

[7] Country risk premiums are adapted from research by Aswath Damodaran and are based on differences in nominal sovereign debt rates. See http://pages.stern.nyu.edu/~adamodar/.

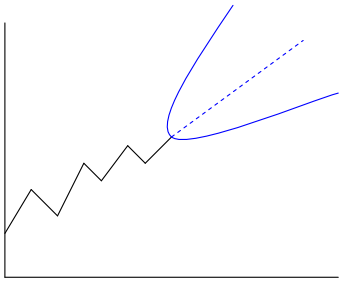
Figure 2: A Symmetric Distribution of Outcomes



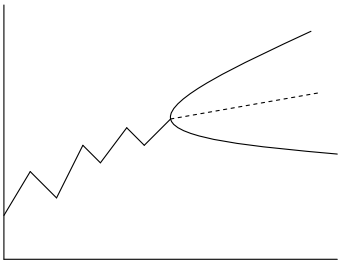
In some cases, companies face a distinctly non-symmetric set of potential outcomes. This might occur, for example, if there is a meaningful bankruptcy risk or if a company has recently launched its first product, which may or may not succeed in the marketplace. In these cases, we recommend that analysts incorporate scenario analysis directly into their fair value estimates by using the scenario-based probability-weighted expected value shown in Inputs cell K20.

Regardless of the method of scenario analysis used, analysts should always remember that a fair value estimate is a point on a continuum of possibilities, rather than a precise value. Events could always unfold more or less favorably than we expect, as illustrated in Figure 3.

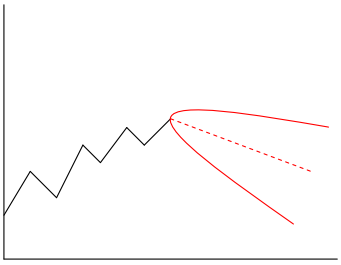
Figure 3: The Cone of Possibilities



5-star call: stock return likely to exceed cost of equity



3-star call: stock return likely to approximate COE



1-star call: stock return likely to underperform COE