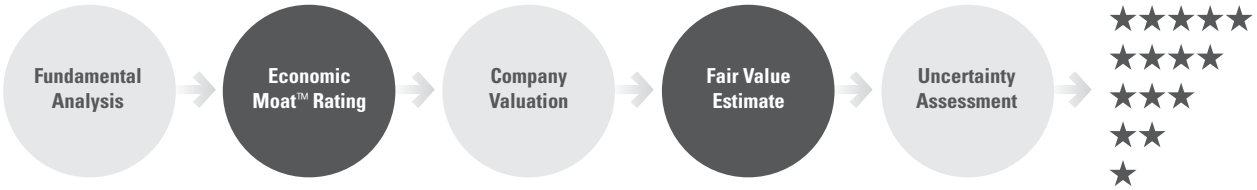
Equity Research Methodology

January 5, 2012

We believe that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk-adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth. Four key components drive the Morningstar rating: ❶ our assessment of the firm's economic moat, ❷ our estimate of the stock's fair value, ❸ our uncertainty around that fair value estimate and ❹ the current market price. This process ultimately culminates in our single-point star rating. Underlying this rating is a fundamentally focused methodology and a robust, standardized set of procedures and core valuation tools used by Morningstar's equity analysts. In this document, we provide a detailed overview of how the Morningstar Rating for stocks is derived, and also outline the analytical work that feeds into our coverage of stocks.

Morningstar Research Methodology for Valuing Companies



Analyst conducts company and industry research:

- Financial statement analysis
- Channel checks
- Trade-show visits
- Industry and company reports and journals
- Conference calls
- Management and site visits

Strength of competitive advantage is rated: None, Narrow, or Wide

Advantages that confer an economic moat:

High Switching Costs (Microsoft)

Cost advantage (Wal-Mart)

Intangible assets (Johnson & Johnson)

Network Effect (Visa)

Efficient Scale (Lockheed Martin)

Analyst considers past financial results and focuses on competitive position and future prospects to forecast future cash flows.

Assumptions are entered into Morningstar's proprietary discounted cash-flow model.

Analyst uses a discounted cash-flow model to develop a Fair Value Estimate, which serves as the foundation for the Morningstar Rating for stocks.

The analyst then evaluates the range of potential intrinsic values for the company and assigns an Uncertainty Rating: Low, Medium, High, Very High, or Extreme.

The Uncertainty Rating determines the margin of safety required before we would recommend the stock. The higher the uncertainty, the wider the margin of safety.

The current stock price relative to Morningstar's Fair Value Estimate, adjusted for uncertainty, determines the Morningstar Rating for stocks.

The Morningstar Rating for stocks is updated each evening after the market closes.

Morningstar's Economic Moat™ Rating

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates.

"Economic moat" is a term Warren Buffett uses to describe the sustainability of a company's future economic profits. We define economic profits as returns on invested capital, or ROICs, over and above our estimate of a firm's cost of capital, or WACC (Weighted Average Cost of Capital). Competitive forces in a free-market economy tend to chip away at firms that earn economic profits, because eventually competitors attracted to those profits will employ strategies to capture those excess returns. We see the primary differentiating factor among firms as how long they can hold competitors at bay. Only firms with economic moats—something inherent in their business model that rivals cannot easily replicate—can stave off competitive forces for a prolonged period.

We assign one of three Economic Moat™ Ratings: none, narrow, or wide. There are two major requirements for firms to earn either a narrow or wide rating: ❶ The prospect of earning above-average returns on capital; and ❷ Some competitive edge that prevents these returns from quickly eroding. To assess the sustainability of excess profits, analysts perform ongoing assessments of what we call the moat trend. A firm's moat trend is positive in cases where we think its competetive advantage is growing stronger, stable where we don't anticipate changes to our moat rating over the next several years, or negative when we see signs of deterioration. The assumptions that we make about a firm's economic moat play a vital role in determining the length of "economic outperformance" that we assume in the terminal sections of our valuation model—a topic we will further explore in the next section.

Because of the global nature of the equities market and business competition, and its importance to our valuation process and its use in many of the products and services that Morningstar provides, analysts must vet proposed changes to the Economic Moat Ratings™ with senior managers in Morningstar's equity research department.

Determining Fair Value

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' independent primary research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our standardized, proprietary DCF modeling templates. We use scenario analysis and a variety of other analytical tools to augment this process. The vast majority of our covered firms are forecasted using a standard operating company model. But, we have also developed specialized models for valuing banks, insurance firms, real estate investment trusts (REITs), and biotechs.

Combining our analyst's inputs with the moat rating, the models fade a firm's ROICs and earnings growth rate from the end of an analyst's explicit forecast horizon until the perpetuity period.

The returns of firms with a wide Economic Moat™ Rating are assumed to fade to the perpetuity period over a longer period of time than the returns of Narrow Moat firms, and both will fade slower than No-Moat firms.

As a result of this methodology, our model is divided into three distinct stages. Here is how the system works in practice for operating companies:

First Stage

In the first stage, which can last from 5 to 10 years, analysts make numerous detailed assumptions about items such as revenue, profit margins, tax rates, changes in working-capital accounts, and capital spending. These assumptions result in detailed forecasts of the company's income statement, balance sheet and cash flow statement. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Second Stage

The length of the second stage depends on the strength of the company's Economic Moat. We define the second stage of our model as the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. We forecast this period to last anywhere from 0 years (for companies with no Economic Moat) to 25 years (for Wide-Moat companies). During this period, cash flows are forecasted using four assumptions: a starting growth rate for EBI, a normalized investment rate, ROIC in the first year after Stage I, and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Third Stage: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, the return on new investment is set equal to the firm's real WACC, which is our discount rate minus inflation, net of assumed asset decay. At this point, we believe the firm will no longer be able to invest in new projects to earn a profit greater than its cost of capital. Thus, the company could be generating significant free cash flow—the more free cash flow, the higher the value—but any net new investment would destroy value for shareholders.

The cash flows from all three stages are then discounted to the present value using the WACC. By summing the discounted free cash flows from each period, we arrive at an enterprise value for the firm. Then, by subtracting debt and adjusting for any off-balance-sheet assets or liabilities, we arrive at a fair value of the common stock. The calculations differ for financial firms, but the logic and reasoning behind our valuation remains the same for these firms as it does for operating companies.

Discount Rates

In deciding on the rate at which to discount future cash flows, we ignore stock-price volatility, which drives the WACC estimates in many other methodologies. Instead we rely on a system that measures the estimated volatility of the firm's underlying cash flows and takes into account fundamental factors such as the diversity of revenue sources and the firm's fixed cost structure. Additionally, a company's capital structure affects the return demanded by equity holders. To calculate a WACC we estimate the cost of debt for the firm. Because debt rates are usually directly observable, we typically use the higher of a) current yields on the firm's outstanding bonds, or b) our estimate of the company's marginal cost to borrow.

Once we have these two inputs, we weight them in terms of the implied value of the firm's equity to its debt and then sum the proportional cost of equity with the proportional tax-effected cost of debt to arrive at our WACC.

Because a significant percentage of our coverage includes firms domiciled outside the United States—and those that call the U.S. home but have considerable non-U.S. operations—when we cannot reasonably forecast cash flow impacts that derive from a company's location, we may incorporate a country risk premium into our discount rate where appropriate. Some components that we consider are differences in local real risk-free rate, expected inflation, financial disclosure, expropriation risk, and other specific operating-market differences that could cause equivalent businesses to be more or less risky in one national economy versus another. In assigning country risk premia, we have developed a set of country-specific standardized scores that are reviewed at least twice annually. Then, analyst-specific adjustments are incorporated. Ultimately, analysts must vet their proposed company-specific country score with a committee led by our International Market Strategists.

Hidden Assets/Liabilities: Options, Pensions, Etc.

One last point in arriving at our fair value estimate is that we make adjustments to our discounted cash flows to add back any hidden assets and subtract out hidden liabilities. Hidden assets might include real estate that's undervalued on the firm's books. Hidden liabilities mainly include stock options outstanding and under-funded pension obligations.

The Uncertainty Rating

Morningstar's Uncertainty Rating captures the range of potential intrinsic values for a company and uses it to assign the margin of safety required before investing. The Uncertainty Rating represents the analysts' ability to bound the value of the shares in a company around the Fair Value Estimate, based on the characteristics of the business underlying the stock. The range of outcomes is core to our investment philosophy of buying stocks with a margin of safety to our estimate of the company's long term intrinsic value: the greater the uncertainty, the greater the margin of safety

required before we're willing to assign a 5-Star rating to the stock. In addition, the uncertainty rating provides guidance in portfolio construction based on risk tolerance.

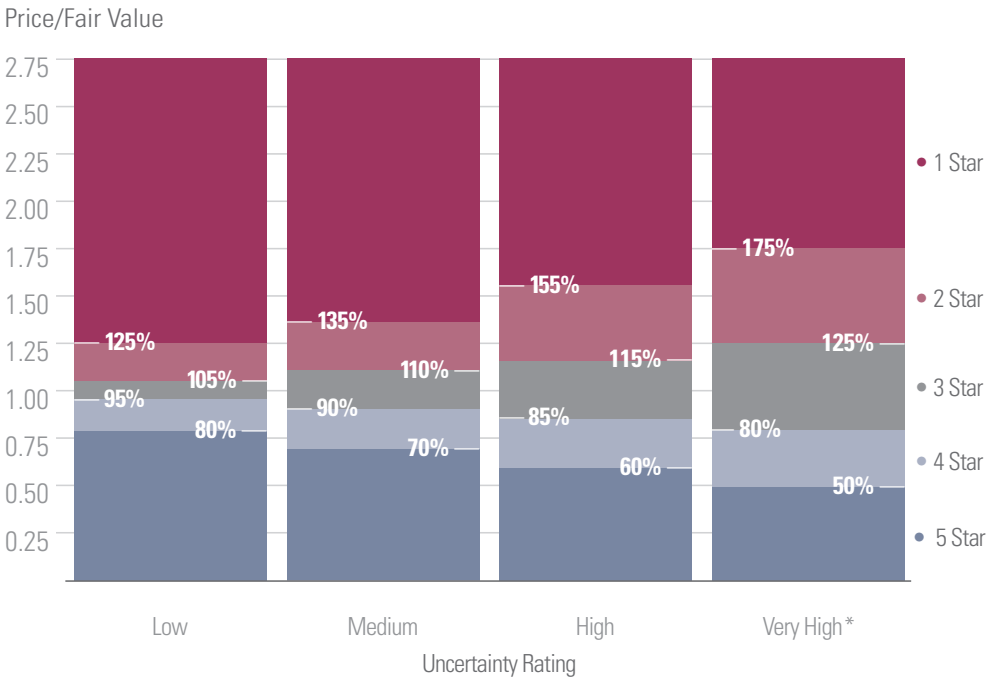
The value of any given stock theoretically falls somewhere between $0 and infinity, depending on the amount of cash that we expect the company to generate from here to the end of time, as well as a discount rate that compensates for the long-run average of the risk-free time value of money and the incremental risk involved in an equity investment. From a practical standpoint, a reasonable range of fair values is usually fairly narrow. As a simple example, analysts might reasonably surmise that free cash-flow growth for a particular firm will fall somewhere between 5% and 10% and that an acceptable WACC lies between 8% and 10%. Based on these ranges, it is reasonable to estimate a $50 fair value estimate with a 50% chance that the firm's value falls somewhere between $40 and $60 per share.

To formalize the process for quantifying the uncertainty in placing a value on a company, our framework decomposes the uncertainty around company value to four simplified conceptual elements: range of sales, operating leverage, financial leverage, and contingent events. Some industries require special adjustments to this formula, but the basic framework remains focused on bounding the range of the long run cash generating value of the firm, and then adjusting for leverage. So, uncertainty is defined by:

*Uncertainty = Range of sales * operating leverage * financial leverage + contingent event discount.*

The predominance of a company's value is determined by its long run operating earnings power, so operating earnings power forms the basis of our bounding of the uncertainty. We further structure our assignment of uncertainty by decomposing operating earnings power into the range around the long run sales estimate, and the impact of those changes in sales on the operating earnings of the company, also known as operating leverage. We estimate the range around the company value by multiplying the range of sales by the operating leverage. Because financial leverage, which we define as the ratio of our estimates of the enterprise value of the company to the fair market value of its equity, amplifies any impact of the change in the value of the entire company on the market value of the equity, we multiply by financial leverage as well. Finally, we recognize material contingent events that add to the uncertainty of the valuation of the shares. A contingent event is an imaginable, realistic event that would materially change the value of the company, such as a large legal claim, natural disaster, or technological disruption. We include such contingent events by estimating the loss of firm value from our fair value estimate, and we add this to our estimate of margin of safety. Each of these values is forward looking, based on analyst judgment, and is a cardinal measure anchored in a fundamental financial framework. Because the economic moat of the business has a significant impact on the ability to bound the range of sales of the business, as well as the operating profit level of those sales, this framework also incorporates our analysis of the competitive strength of the business.

Morningstar Margin of Safety and Star Rating Bands as of August 18, 2011



* Occasionally a stock's uncertainty will be too high for us to estimate, in which case we label it Extreme.

The result of the analysis of the uncertainty of the value of the firm is an estimate of the uncertainty of our fair value estimate for the equity. Our margin of safety—the discount to fair value demanded before we'd recommend the stock—widens as our uncertainty of the value of the equity increases. The more uncertain we are about the value of the equity, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares.

Our uncertainty ratings are low, medium, high, and very high. With each uncertainty rating is a corresponding set of price to fair value ratios that we use to assign star ratings, as shown in the graph.

The actual price to fair value cut-offs are determined using a combination of a) empirical data from the historical performance of our uncertainty rating, and b) option pricing theory based on the implied volatility of stocks with commonly agreed upon uncertainty characteristics. Our empirical data show that appropriate one star and five star prices fall approximately at the midpoint between a log-normal relationship and a symmetrical relationship. A log normal relationship would mean that a stock would post the same return between the five star price and the fair value as it would between the fair value and the one star price, while a symmetrical relationship would mean that the same percentage

discount to a stock price for a 5-star rating would be assigned as a premium to the stock price for a 1-star rating. We formally assign our one-star prices as the midpoint between the symmetrical and the log-normal relationship. We then round these price to fair value relationships to the nearest five percentage points for simplicity.

Extreme Uncertainty

In very rare cases, the potential outcomes for a firm's intrinsic value become so disparate and volatile that a proper margin of safety cannot be properly estimated. For these speculative situations, we assign companies an uncertainty rating of extreme. Using our best estimates, we publish fair values on these firms, but because of the extreme uncertainty surrounding these companies, we fix the stock rating at three stars regardless of stock price movements. Significant financial distress is the most common reason for assigning an extreme uncertainty rating to a firm, although not the only one.

Generating the Star Rating

Once we determine the fair value of a stock, we compare it to the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market is open.

Every day our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted. It is also worth noting that there is no predefined distributions of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued than when very few companies garner our highest rating. MI

Market Valuation

Median price/fair value of all covered stocks compared with prevailing market prices