BENJAMIN GRAHAM MODEL: METHODOLOGY REPORT

Introduction

The Graham Model is an investment approach that is commonly used today by individual investors and portfolio managers. The approach was originally formulated over 60 years ago with the publishing of Graham and Dodd's college textbook "Security Analysis." Benjamin Graham is properly credited as one of the "fathers" of value investing. And reviewing the philosophy of the originators can often prove enlightening. Graham's approach focuses on the concept of an intrinsic value that is justified by a firm's assets, earnings, dividends, and/or financial strength. Focusing on this value, Graham argued, would prevent investors from being misled by the misjudgments often made by the market during periods of deep pessimism or euphoria. Graham outlined his philosophy for the lay investor in his book "The Intelligent Investor," first written in 1947 and updated periodically (by Graham); it is his classic text that is the primary source for this model.

The Investment Philosophy

Graham believed that it was difficult for most investors to "beat the market," that is, to find stocks that would do much better than the overall long-term market average. Stocks that would do better than average over the long term were those with greater growth potential and stronger competitive positions. He stressed that the difficulty was in finding these stocks before such attributes were impounded into the stocks' prices. The problem for investors, he reasoned, was twofold. First, stocks with obvious growth prospects benefiting from some megatrend would frequently not translate into extra gain for investor because the growth would be incorporated into a higher multiple, and second, that investors were frequently incorporate in their growth forecasts. Graham further felt that these risks were compounded by the psychology of the stock market, where the "tides of pessimism and euphoria which sweep the market" could mislead investors into overvaluing or undervaluing a stock.

In short, Graham believed that over the long term most investors could only expect an average return, but that they face an added risk of underperformance due to misjudgment. Instead of seeking a way to produce above-average returns, Graham proposed a method to reduce the risk of misjudgment. He suggested that investors first determine an "intrinsic" value for a stock that is independent of the market. Graham felt that a firm's tangible assets were a particularly important component; other factors included earnings, dividends, financial strength, and stability. Graham felt investors should limit their purchases to stocks selling not far above this value, while stocks selling below their intrinsic value would offer an even better margin of safety to investors. Graham felt investors should view themselves as the owners of a business, with the goal of buying a sound and expanding business at a rational price, regardless of what the stock market might say. And a successful investment, he said, is a result of the dividends produced and the long-range trend of the average market value of the stock.

Investor Suitability

Graham suggested that individual investors fall into two camps: "defensive" investors and "aggressive" or "enterprising" investors. These two groups are distinguished not by the amount of risk they are willing to take, but rather by the amount of "intelligent effort" they are "willing and able to bring to bear on the task." Thus, for instance, he included in the defensive investor category professionals (his example—a doctor) unable to devote much time to the process and young investors (his example—a sharp young executive interested in finance) who are as-yet unfamiliar and inexperienced with investing. Graham felt that the defensive investor should confine his holdings to the shares of important companies with a long record of profitable operations and that are in strong financial condition. By "important," he meant one of substantial size and a leading position in the industry, ranking among the first quarter or first third in size within its industry group. Aggressive investors, Graham felt, could expand their universe substantially, but purchases should be attractively priced as established by intelligent analysis. He also suggested that aggressive investors avoid new issues.

Quantity and Quality Screens for Defensive Investors

The stock selection program employed here is undertaken from the perspective of a value investor. Graham suggested that defensive investors buy issues selling at prices that are reasonably close to their per share tangible asset (book) value (total assets excluding intangible assets such as goodwill and patents, less all liabilities), and no more than one-third above that figure. He cautioned, however, that this criterion alone does not indicate a sound investment. In addition, the company should be in a sufficiently strong financial position, with the prospect that its earnings will at least be maintained over the years, and its stock must be selling at an acceptable P/E multiple.

In "The Intelligent Investor," Graham laid out a specific set of rules for defensive investors:

1. *Adequate size*: Exclude small companies with less than $100 million of annual sales. Graham specified these levels in 1972, over 20 years ago. Obviously, firms have grown. We modify this criteria and require sales of $2 billion. In addition to a sales-based requirement we have added the requirement that a company have a capitalization level of $1 billion. These companies typically have leading market position and are less sensitive to economic shocks.

2. *Strong financial condition*: Current assets (cash, accounts receivable and inventory) should be at least twice current liabilities (short-term debt), and long-term debt should not exceed the net current assets (working capital, or current assets less current liabilities.

3. *Earnings stability*: Positive earnings for at least the last 10 years.

4. *Earnings growth*: Minimum increase of at least one-third in earnings per share in the past 10 years (a 2.9% average annual growth rate over 10 years).

5. *Strong dividend record*: Growing and uninterrupted dividend payments for at least the past 20 years.

6. *Moderate price-to-earnings ratio*: The current price should not be more than 15-times average earnings for the past three years. We modify this and make the determination a function of the current interest rate environment. In particular we require that the current price be no more than k-times earnings for the past 3 years, where k is equal to 1 divided by the AAA corporate bond rate.

7. *Moderate price-to-book-value ratio*: The current price should not be more than 1½ times the last reported book value.

8. *Acceptable Graham number*: Graham noted that a price-earnings ratio below 15 (or "k" based on our modified formulation) could justify a higher price-to-book-value ratio. As a rule of thumb, he proposed that the product of two (otherwise known as the "Graham Number") should not exceed 22.5 (or 1.5 x "k"). For instance, an issue selling at 2.25 times book value could be justified if it were selling at 10 times earnings ($10 \times 2.25 = 22.5$).

Graham felt these firms fulfilled his criteria well for qualifying investments. Graham certainly intended to take a more pragmatic view toward security selection and recommended that most investors stay away from "growth" stocks, which he viewed as more likely to be overvalued and risky, and in today's environment, these criteria will continue to exclude these kinds of firms. However, investors should be aware of this tendency when employing this approach.

For enterprising investors Graham modified the screening criteria slightly. Among his suggested possibilities Graham suggested that investors could consider smaller firms and firms with smaller current ratios. He also relaxed some of the assumptions around dividends and expected only minor payment.

Graham suggested that enterprising investors could accept P/B ratios of less than 120% of net tangible assets. Graham did warn against being fooled by high growth companies with high price-earnings ratios. As such he suggested a requirement that the price be low in relation to past average earnings. Graham further suggested that aggressive investors look for reasonable stability of earnings over the past decade, with no years of negative earnings, and enough financial size and strength that would allow the firm to survive any future setbacks.

Rules-Based Investing

Graham explains that all investors need some understanding of business and economic conditions so as to be able to form some opinion concerning the prospects of a firm or industry. But it is important to note that Graham was generally distrustful of subjective factors and felt that such factors could mislead investors as much as help them. Thus, he preferred basing decisions on quantitative, rather than qualitative, factors. He noted in his book that an investor's "operations for profit should be based not on optimism but on arithmetic."

Pricing a Company's Stock

This valuation model is a method of determining buying and selling points in a company's stock through the determination of a central value as well as an upper and lower valuation range based on historical interest rate and fundamental data.

Graham estimated the central value, or fair value, of a stock by capitalizing the average earnings per share over the previous 10 years by an "equilibrium" multiplier equal to 1 divided by k-times the yield on AAA-rated corporate bonds. Graham then established lower and upper price bounds equal to 80% and 120% of the central value estimate respectively. A summary of the valuation formula is provided below:

$$\text{Central Value} = (\alpha\text{−Year Average EPS}) \times \left[\frac{1}{\text{k} \times \text{AAA− Corporate Bond Yield}}\right]$$

Graham explained that when a stock's market price trended near or exceeded the upper price bound (that is, 120% of its central value), then investors could expect the market to fall or move sideways until it was back within the central value range. At these time, investors should consider shrinking their positions or taking some profits. Similarly, Graham explained that when the market price trended near or fell below the lower price bound (that is, 80% of its central value), then investors could expect the price to rise until it was back within the central value range. At these time, value investors should consider growing their positions.

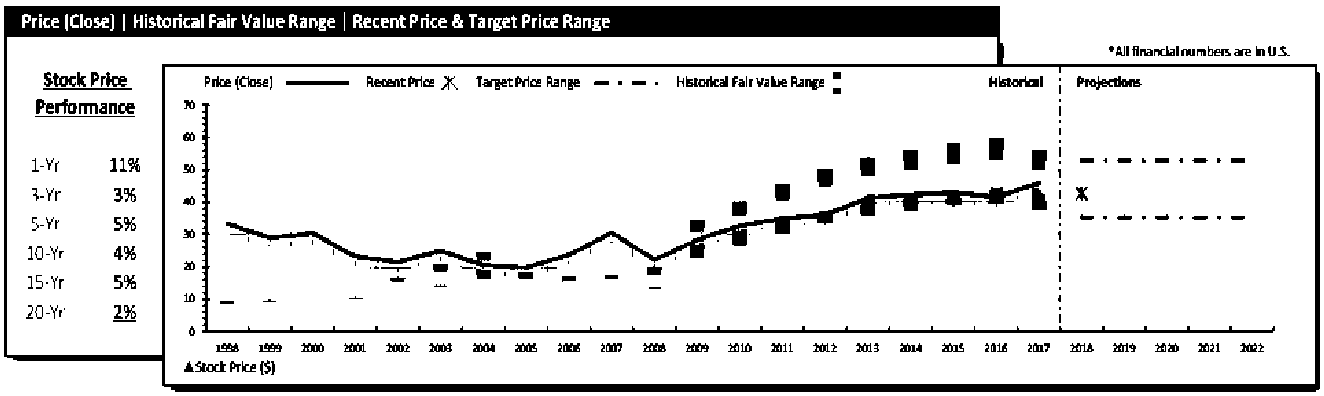
It is important to note that in Graham's original model α=10 and k=2. That is, he capitalized a firm's 10 year average earnings at 1 divided by twice the AAA-rated corporate bond yield. While this approach is intuitively sound, based on our experience it does not always yield the most satisfactory results. To determine the values of "α" of "k" for our model results, we rely on an optimization procedure that varies the parameter value "k" one-by-one for each of the current year, 3-year, 5-year and 10-year moving average EPS series until "k" converges on a "best fitting" series. The best fitting series that minimizes the sum of squared forecasting residuals is then used in combination with next period consensus EPS estimates to determine a central value forecast. Lower and upper price bounds are then set at 80% and 120% of the central value respectively. In addition, for our model results, we do not simply rely on the average AAA rated corporate bond yield in the broad market, we rely on the effective bond yield of the company's own debt issues. For capitalization purposes this yield must be no lower than the 10-year government bond yield.

Application

As an example, presented below is a valuation of Coca-Cola (KO), the largest non-alcoholic beverage company in the world manufacturing such carbonated and noncarbonated brands as Coca-Cola, Diet Coke, Fanta, Sprite, Minute Maid, Powerade, and Dasani. At the present time KO is trading at $43.21. EPS for the last 10 years has averaged $1.60 and the current AAA-rated corporate bond rate is 3.5%. Graham's original valuation model produces a central value estimate of $1.60/(2 x 0.035) = $22.86 and a valuation range of $18.29 - $27.43. This valuation range is significantly lower than what's been observed over the last 10 years. Alternatively, based on our optimization procedure, we capitalize 10-year average EPS (reflecting the consensus 2018 forward estimate of $2.10) at k=1.1, reflecting an effective bond yield of 3% and an equity risk premium over the 10-year government bond rate of 14%, or 42 bps. This implies a stock valuation of \$2.10/(1.1 x 0.03) = \$43.21 and a valuation range of \$35.29 - \$52.93.

The figure below presents KO's historical price series as well as our historical and forecasted fair value range estimates. As can be seen, the model predicted a sideways market through the nineties and early to mid 2000s. The model started to signal near accumulation points starting in 2009 but, for the most part, has suggested remaining in a hold pattern through 2017. The model continues to signal remaining in a hold pattern.

Figure: Coca-Cola Historical Fair Value Range, Price (Close), Recent Price and Target Price Range



Diversification

Graham was a strong believer in defensive investing and protecting a portfolio against errors in judgment. For that reason, he placed a heavy emphasis on diversification. He recommended that individuals purchase a minimum of 10 different issues and a maximum of 30. Stock holdings should be reviewed at least annually, he said, paying attention to dividend returns and the operating results of the company, and ignoring share price fluctuations. However, if the holdings were properly valued originally, he felt there would be little need for changes. Graham felt that as long as the earnings power of the holdings remained satisfactory, the investor should stick with the stock and ignore any market movements, particularly on the downside. On the other hand, investors should take advantage of market fluctuations on the upside, when a stock becomes overvalued (or fairly valued for stocks that were purchased at below their intrinsic value); at these times, investors should sell and replace their holding with one that is more fairly valued or undervalued.

Model Recommendations

Model recommendations are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors in making investment decisions.

BUY: The stock is trading significantly below the lower bound of the company's fair value range: Price < (0.6 x Target Price). Analysis suggests that based on the company's fair value range, the current market price will rise to substantially higher valuation levels.

ACCUMULATE: The stock is trading modestly below the lower bound of the company's fair value range: Price < (0.8 x Target Price) "but" Price > (0.6 x Target Price). Analysis suggests that based on the company's fair value range, the current market price will rise to modestly higher valuation levels.

HOLD: The stock is trading within the lower bound and upper bound of the company's fair value range: (0.8 x Target Price) < Price < (1.2 x Target Price). Analysis suggests that based on the company's fair value range, the current market price will gravitate towards the target price and fluctuate between the upper and lower valuation bounds.

REDUCE: The stock is trading modestly above the upper bound of the company's fair value range: Price > (1.2 x Target Price) "but" Price < (1.4 x Target Price). Analysis suggests that based on the company's fair value range, the current market price will fall to modestly lower valuation levels.

SELL: The stock is trading significantly above the upper bound of the company's fair value range: Price > (1.4 x Target Price). Analysis suggests that based on the company's fair value range, the current market price will fall to substantially lower valuation levels.

INCALCULABLE: A target price, and hence, a fair value range for the company's stock cannot be calculated. This is generally due unreported consensus EPS estimates for the target company or negative forward earnings projections.

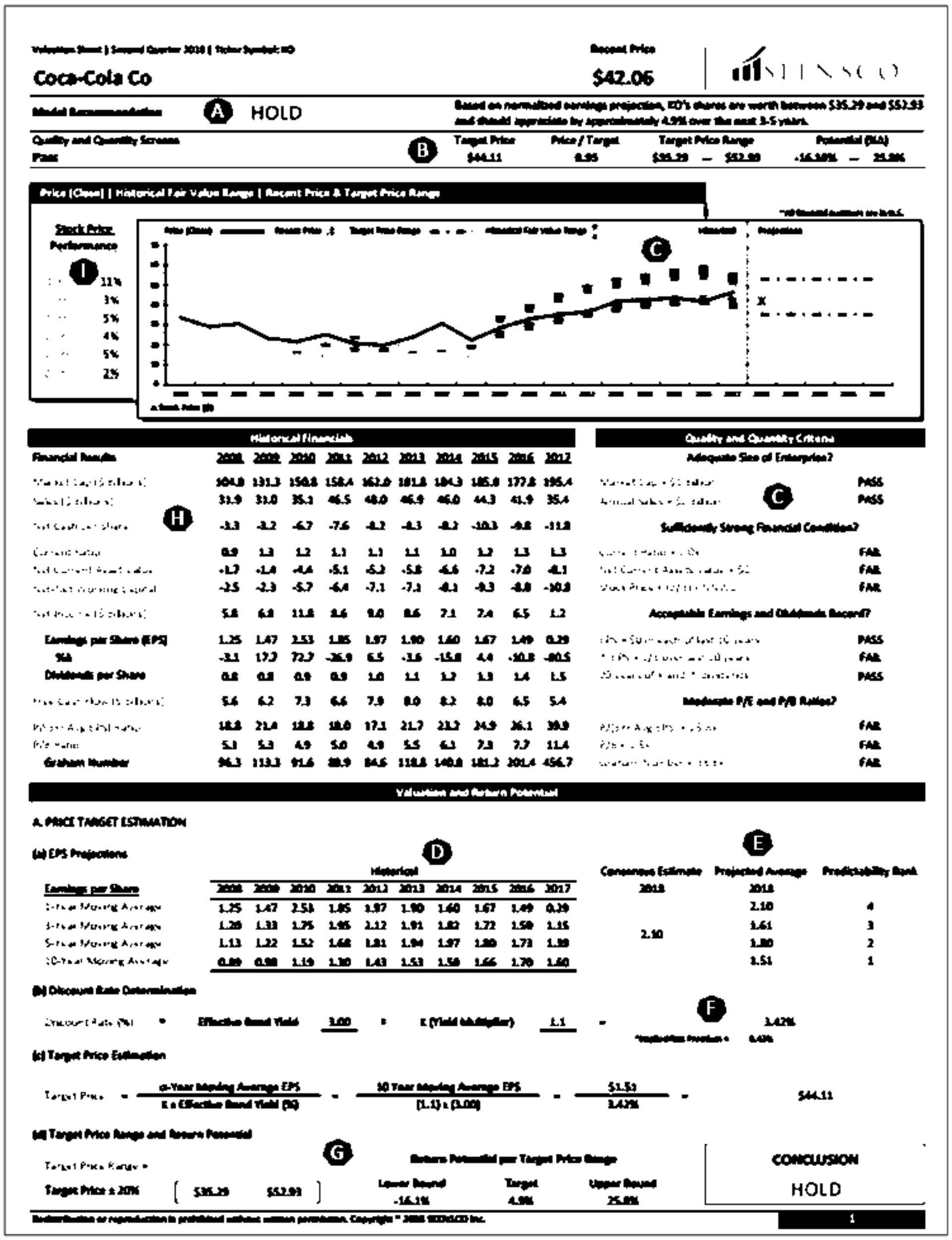
Sample Value Sheet

A **Model Recommendation**
Indicates whether the firm is significantly undervalued, modestly undervalued, fairly valued, modestly overvalued, or significantly overvalued based on the Graham methodology.

B **Target Price**
Shows the company's target price and target price range derived based on the Graham methodology.

C **Historical Fair Value Range, Closing Price Series, Current Price and Target Price Range**
Displays the historical price action and estimated fair value range for the company's stock. Also displays the projected target price range for the next 5 years in relation to the current stock price.

I **Price Action**
Shows the company's historical stock price performance over different periods of time.



C **Quality and Quantity Screens**
Investment screens specific to the Graham Model, including size-based screens, leverage-based screens, and screens based on the level and stability of the company's earnings and dividends.

H **Financial Summary**
A summary of the financial performance of the company over the previous 10 year period.

D **Earnings Properties**
Summary of the firm's earnings performance as well as normalized earnings estimates characterized by the 3 year, 5 year and 10 year moving averages.

G **Valuation and Return Potential**
Shows the calculation underlying the firm's price target, fair value range, and return potential corresponding to each price estimate.

F **Discount Rate Determination**
Shows the calculation underlying the firm's discount rate, equal to the product of the firm's effective bond yield an a multiplier.

E **Key Estimates**
Summary of the market's consensus EPS estimates for the current year-end, projected normalized earnings estimates, and the predictability ranks of each series as a determinant in forecasting the company's stock price.