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EVALUATING COMMON STOCKS USING VALUE LINE'S PROJECTED CASH FLOWS AND IMPLIED GROWTH RATE

A well-known principle in finance is that the value of a firm must reflect its long-run growth opportunities. In an extensive study, Rappaport [1986] finds that over 60% of the firm's market value is attributable to earnings occurring beyond the immediate five-year horizon. When a firm does not meet analysts' expectations for a given quarter, its long-run potential is often discredited by the investment community. The basic reason for this overreaction is primarily that capital is scarce and, at least for the time being, the opportunity cost is higher somewhere else.

In practice, financial analysts evaluate a firm's growth opportunities by equating its P/E ratio to the growth rate of its earnings.(n1) Thus, the price of the firm's stock follows the volatility of its earnings.

If a firm's earnings are temporarily lower, whether due to seasonality in its business or some other transitory event, but the firm's long-run potential is not impaired, its stock may be called underpriced. This phenomenon is particularly common among semiconductor and other capital equipment companies, which demonstrate fairly frequent boom and bust cycles. In such cases, it is difficult to determine the true growth rate of the firm's earnings, or cash flows, by looking at its historical data.

A preferred way to estimate the firm's long-run growth rate is to deduce it from publicly available data that incorporate expectations concerning the firm's future cash flows. The most widely known source of such data is "Value Line's Investment Survey." Some empirical studies have shown that stock prices react swiftly to Value Line's recommendations.(n2)

The purpose of this article is to demonstrate how investors can use the information from Value Line to assess the long-term, or expected, value of a firm's equity. We follow a simple methodology that is well known in finance and is found in many, basic textbooks. Briefly, we apply the discounted cash flow (DCF) approach to the data supplied by Value Line and compute the price of the firm's common stock, using some reasonable assumptions.

In addition, the study solves for the long-term growth rate implied by the firm's equity cash flows. This rate may be contrasted to various subjective expected rates, or the growth rate for the entire industry, in the form of a sensitivity analysis. If the current price of the stock does not reflect the true long-run rate implied by the firm's cash flows, the stock may be underpriced. Conversely, if the implied rate is greater than the expected growth rate, the stock may be overpriced.

The strategy has several advantages over other security analysis and portfolio selection strategies. It considers forward-looking cash flows, rather than historical information, and

concentrates on the firm's long-term rather than short-term performance.

The methodology is applied to the pricing of MCI's common stock as an example. The results of this simple application are intriguing and promising for investors and analysts, as well as academicians and students of corporate finance.

DISCOUNTED CASH FLOW APPROACH

The discounted cash flow approach (DCF) is the most familiar theoretical method of estimating the firm's value. According to this approach, the value of a firm is the present value of the firm's stream of future expected cash flows discounted at a rate that reflects the riskiness of these cash flows. This approach is widely used by security analysts and financial managers and is consistent with the maximization of shareholder wealth, which is the goal of the management of every corporation. In exploratory research, Copeland, Koller, and Murrin [1996] find a correlation between the market value (actual price per share) and the DCF-based value, using forecasts from the Value, of 0.97.

Although in practice there may be a variety of approaches to valuation of the firm's prospects, the discounted cash flow technique is the most commonly used practical approach to determining a company's value. It is used in capital budgeting decisions to evaluate investment projects or to price entire corporate entities that may be targets for acquisition.

The DCF is expressed as:

(1) [Multiple line equation(s) cannot be represented in ASCII text]

where PV is the present value, n is the number of periods, CF_t are the cash flows that occur in time period t, and r is the relevant discount rate.

If these cash flows were to grow at an annual rate of g%, beginning at year 6, expression (1) becomes:

(2) [Multiple line equation(s) cannot be represented in ASCII text]

The discount factor $1/(1 + r)^5$ is used to discount the collective value of the cash flows at year 6 back to year zero, the present time. The term [(1 + g)/(r - g)] is called the terminal value multiple. It expresses the ratio of the value of the cash flows beyond year 6 to the value of the cash flow of year 5. The price of the firm's stock, P, can then be found by dividing the value of its equity by the number of shares outstanding, N, or P = (PV/N). Of course, if PV represents the present value of the firm's equity and debt, then the value of the firm's debt is first subtracted, and the remaining value is divided by the number of common shares outstanding to obtain the price per

share.

Assuming reliable estimates of the cash flows of the first five years and the discount rate, r, Equation (2) can be applied in conjunction with the firm's value of equity to solve for the implied average growth rate, g, in its distant equity cash flows. This implied growth rate can then be contrasted with various subjective expected rates in the form of a sensitivity analysis. A reasonable choice for the expected growth rate of a firm's equity cash flows would be the one implied by its industry peers, adjusted for opportunities unique to the firm.

In any event, if the implied growth rate is lower than what an investor would have expected, the stock may be underpriced. Conversely, if the implied rate is greater than the expected growth rate, the stock may be overpriced.

CASH FLOWS TO EQUITYHOLDERS

Shareholders' cash flows can be summarized by:

(3) CF_E = EBIT(1- t) - I(1- t) + NCE - Delta WC - CE

where CF_E is cash flow to equity; EBIT is earnings before interest and taxes; T is the corporate tax rate; NCE is non-cash expenses; Delta WC is changes in working capital; and CE is capital expenditures. The cash flows to the debtholders, I_{AT} = I(1- T), imply a tax shield to the common stockholders equal to the firm's marginal tax rate times the interest expense, since I(1- T)= I- IT. This tax shield reduces the firm's cost of debt capital that is used to discount the cash flows to debt in Equation (3). Thus, by discounting the firm's after-tax interest expense by the corresponding after-tax cost of debt, we obtain the value of the firm's debt.

Some authors, including Copeland, Koller, and Murrin [1996], find the present value of the free cash flows to both debt and equity using a weighted average cost of capital and subtract the firm's debt to obtain the market value of its equity. Since the book value of the firm's debt may not be equal to its market value, the preferred approach is to consider only the firm's cash flows to equityholders and discount them by the corresponding cost of equity capital.

Equation (3) can be further simplified as:

(4) CF_E = NI + NCE - Delta WC - CE

where:

(5) NI = EBIT(1- T) - I(1- T)

In order to completely define the variables used in Equation (3), a definition of earnings before interest and taxes is necessary. In general, earnings before interest and taxes is defined as total revenues minus costs and depreciation, or

(6) EBIT = (S + NOI) - (COGS + SGA + R&D) - (Depr)

where S are revenues from the firm's sales; NOI is non-operating income; COGS is cost of goods sold; SGA is selling, general, and administrative expenses; R&D is research and development expenses; and Depr is depreciation. Finally, by substituting Equation (6) into (5) and subsequently into (4) and adjusting for dividend payments to preferred shareholders, denoted by D_p, we obtain Equation (7):

(7) CF_C = (S + NOI - COGS - SGA - R & D - Depr) x (1- T) - I(1-T) + NCE - Delta WC - CE - D_P

where the subscript C denotes cash flows to common equityholders.

VALUE LINE CASH FLOWS

Because of its consistency and broad coverage of stocks, "Value Line Investment Survey" serves as a unique source of information and is widely used by both academicians and practitioners.(n3) This service follows 1,700 companies in over ninety-five industries that represent 94% of the trading volume on all U.S. stock exchanges. It provides subscribers with a detailed one-page overview of each company's past, current, and expected performance for the next four to five years.

In fact, Value Line is the only investment service that provides detailed information for a company's expected short-term performance. Each page offers financial data, trend line growth rates, graphical price history patterns, quarterly sales figures, earnings and dividends, some key financial ratios, and balance sheet information. Value Line also rates companies for timeliness and safety. Furthermore, investors learn, through a summarized text, about the general business and analyst expectations for each company. All data are updated every thirteen weeks on a weekly sequence.

Using the Value Line definition of variables, Equation (7) becomes:

(8) $CF_{C, t}$ =(S_t m_t - $Depr_t$- I)(1- T_t) + $Depr_t$ - Delta WC_t - CE_t - $D_{p, t}$

where m_t is the operating margin as a percent of sales at year t. Equation 8 constitutes the basis for estimating the cash flows to common equity. Note that if a firm decides to either obtain additional debt or repay part or all of its existing debt, Equation (8) must be modified to reflect

this change in leverage.

Exhibit 1 shows the variables in Equation (7) and the corresponding entries from Value Line expressed in (8).

Value Line's projections refer to the range of the three-year period following the year subsequent to the date of the survey. For example, if the survey's date is October 1997, the projections refer to the period 2000-2002, hence covering a five-year window. We assign the projections for the three-year range to the middle year, which is labeled as year 4. The figures for the years 2 and 3 are geometrically interpolated, while the figures for year 5 are extrapolated using the implied growth rate of the previous four years. For an October 1997 survey date, 1998 is the first year, and 2001, the midpoint of the range 2000-2002, represents the fourth year. The data for the fifth year, 2002, are extrapolated on the basis of the growth rate implied between the years 1998 and 2001. Following this practice, we are able to calculate successive cash flows for the ensuing five years.

Following Equation (2), we then assume that the cash flows for years 6 and beyond will grow at an average constant rate g. If we further assume that the firm's cost of equity capital is given by r, we can then solve for either the PV_0, if we know g, or vice versa.

THE COST OF EQUITY CAPITAL

The rate used to discount the firm's cash flows to its equityholders, also termed the cost of capital, is obtained from the capital asset pricing model (CAPM). According to this model, the expected rate of return for a common stock required by investors, $E(R_{C,i})$, equals the sum of two components: namely, the riskless rate of return, R_f, and a risk premium, $Beta_i[E(R_M) - R_f]$. This relationship is expressed by the equation:

(9) $E(R_{c,i}) = R_f + Beta_i\ [E(R_M) - R_f]$

where $Beta_i$ is the beta of company i, which reflects its operating and financial risks. Generally, companies in specific industries with cyclical demand, such as real property and electronics, are associated with higher betas. Companies in the utility industry, like telephone and energy, tend to be less sensitive to market movements, and consequently they exhibit lower betas.

The risk-free rate is approximated by the three-month U.S. Treasury bill rate, and the risk premium represents the reward for bearing risk. The term $E(R_M)$ is the expected return on the market portfolio. In theory, the market portfolio incorporates all risky assets. In practice, however, it is unobservable and it is usually represented by a well-diversified index, such as the Chicago Center for Research in Security Prices (CRSP) value-weighted index. Possible alternatives are the NYSE composite index or the Wilshire 5000 equity index.

A common practice in estimating the market risk premium [$E(R_M) - R_f$], is to assume that it approximates the difference between the historical rate of return on stocks and Treasury bills. According to Stocks, Bonds, Bills, and Inflation, the difference is 8.6% (12.3%-3.7%). Thus, even if both equities and Treasury securities drift away from their historical levels, it is assumed that their difference remains constant through time, or at least reverts to its long-term historical average. Following this approach, a stock with a beta of 1.2 would command a cost of equity capital of approximately 14%.

EXAMPLE: VALUATION OF MCI

Beginning in November 1996, MCI has been considering different consolidation proposals from three competitors in the telecommunications industry: British Telecom, GTE, and WorldCom. The offer by WorldCom prevailed over the other two offers, and the shareholders of both firms have approved the proposed merger at an exchange ratio that amounts to $51.00 per MCI share. (n4) This represents a 60% to 100% premium over the 1996 range of prices for MCI shareholders.

The rationale for such a premium may be justified by the synergistic effect of the MCI/ WorldCom merger. In principle, such a synergistic premium exists for many companies, and shareholders need a simple technique to assess it. It is hoped that our methodology will provide such a means and enable investors to take full advantage of the information supplied by Value Line.(n5)

Application of the analysis to MCI is summarized in the four worksheets in Exhibits 2-5.(n6) Exhibit 2 presents the pertinent inputs for the other exhibits. The projected figures refer to a range of two to four years. Exhibit 3 assumes that these figures correspond to the mid-range year, i.e., 2001. The figures for the years 1999 and 2000 are found by interpolation, assuming a geometric growth between the first and the fourth years, i.e., 1998 and 2001. These growth rates are subsequently used to find the 2002 figures, by extrapolating the data of the year 2001. Following this approach we are able to obtain the estimated cash flows to equityholders for the subsequent five years.

Exhibit 4 shows the estimation of the firm's cost of equity capital, using the capital asset pricing model given by Equation (9). These estimates use two variations of the proxy for the risk-free rate: a historical estimate of 3.7%, as calculated by Ibbotson Associates, and the prevailing rate of interest on three-month T-bills. Exhibit 4 provides a series of estimated costs of capital corresponding to a sequence of betas, ranging from 30% below to 30% above the Value Line beta, in increments of 10.%. The worksheet allows the user to input an estimate for the continuing growth rate of the cash flows to equityholders and the increment for higher and lower growth rates.

Finally, Exhibit 5 presents the sensitivity analysis for various expected continuing growth rates and various costs of equity, corresponding to the series of betas considered in Exhibit 4. Assuming that the middle rates represent the investor's best estimates for continuing growth rate and cost of equity, the center cell of the price matrix represents the most likely price for the firm's stock. Given the market price of the stock, the worksheet in Exhibit 5 also calculates the implied continuing growth rate for the firm's cash flows and the "terminal value multiple." For a price of $60.50, the implied continuing growth rate for MCI's cash flows to equity is 5.4%, and the terminal value multiple is 16.

The $51.00 price offered by WorldCom implies a continuing growth rate of 4%. All in all, given that the MCI/WorldCom merger will result in substantial synergistic savings, the $51.00 offer for each MCI share by WorldCom appears to be fair.

CONCLUSIONS AND RECOMMENDATIONS

We have developed a simple yet practical methodology to evaluate common stocks by applying the DCF approach to the data supplied by Value Line to estimate the implied long-term growth rate of a firm's equity cash flows. Given the value of the firm's equity, its annual cash flows, and its cost of equity capital, one may solve for the implied long-term growth rate of the firm's cash flows. This rate can then be compared to various subjective expected rates using sensitivity analysis. If the implied growth rate is lower than investors' expectations, then the stock may be underpriced. Conversely, if the implied rate is greater than the expected growth rate, the stock may be overpriced.

The strategy has several advantages over current security analysis and portfolio selection strategies. It considers forward-looking cash flows, rather than historical information, and concentrates on a firm's long-term rather than short-term performance. It may thus be useful in assessing the equilibrium level of the overall market, especially when it is used in conjunction with other procedures for pinpointing value, such as the P/E ratio. An exploratory application of our methodology to MCI reveals encouraging results.

ENDNOTES

(n1) See Lynch [1989].

(n2) See, for example, Black [1973], Holloway [1981,1983], Copeland and Mayers [1982], Stickel [1985], Huberman and Kandel [1987,1990], Peterson [1987,1995], and Peterson and Peterson [1995]. Philbrick and Ricks [1991] have shown that in determining earnings surprise, Value Line is a better source for actual earnings per share data.

(n3) Lynch [1989] refers to "Value Line Investment Survey" as "the next best thing to having your own private securities analyst" (p. 165).

(n4) The exchange ratio is equal to the quotient of $51.00 divided by the average of the high and low market prices of WorldCom common stock on each of the twenty consecutive trading days ending with the third trading day immediately preceding the effective time of the MCI/ WorldCom merger.

(n5) According to the prospectus, the consultants and the management of the two companies believe that "the MCI/WorldCom merger will create a fully integrated communications company that will be well positioned to take advantage of growth opportunities in global communications."

(n6) The Excel workbook for this application is available from the first author upon request.

EXHIBIT 1 The Value Line Variables

Legend for Chart:

A - Parameter in Equation(7) Description
B - Represented by
C - Parameter in Value Line Description
D - Represented by

A C	B D
Sales + Non-Operating Income - Sales	S + NOI - S_t
Cost of Goods Sold - --	COGS -
Selling, General, and Admin. Expenses -	SGA -
Research & Development Expenses - Operating Expenses	R&D -
Operating Income	(S + NOI) - (COGS+ SGA+ R & D)
Value Line expresses operating income as a percent of sales, called operating	m_t (as a %

margin	of Sales)
Depreciation	Depr
Depreciation	$Depr_t$
Corporate Tax Rate	T
Income Tax Rate	T_t
Interest	I
Long-Term Interest	I_t
Working Capial	WC
Working Capital	WC_t
Capital Expenditures	CE
Capital Spending per Share x Number of Shares Outstanding	Ce_t
Annual Preferred Dividends	D_p
Preferred Dividend x Number of Shares of Preferred Stock Outstanding	$D_{p,\ t}$

EXHIBIT 2 Value Line MCI Data Input

Recent Stock Price:	$60.50
P/E Ratio:	NMF
Dividend Yield:	0.1%
Beta of the Company:	0.95
First Projected Year:	1998
Projection for Total Annual Return	7%
Projection for Total Annual Return	-5%
Company's LT Interests (millions):	$230.00

Preferred Dividends (millions): $60.00

Legend for Chart:

B-Year 1997
C-Year 1998
D-Projected for Years 2000-2002

A	B	C	D E	F
Capital Spending per Share				$3.50 $2.70
Common Shares Outstanding (millions)				710.00 740.00
Sales (millions)				$20,945 $28,885
Operating Margin(%)				18.0% 26.5%
Depreciation (millions)				$2,300 $2,850
Income Tax Rate(%)				37.0% 38.0%
Long-Term Debt		$3,300		$3,760 $6,200
Working Capital (millions	($2,600)	($2,000)		($500)

EXHIBIT 3 Near-Future MCI Free Cash Flows to Equity (1,000s)

Legend for Chart:

B - 1998
C - 1999
D - 2000

E - 2001
F - 2002

A	B	C E	D F
Sales	$20,945,000	$22,476,894 $25,885,000	$24,120,829 $27,778,200
--Operating Costs	$17,174,900	$17,874,329 $19,025,475	$18,501,985 $19,404,043
Operating Margin	$3,770,100	$4,602,564 $6,859,525	$5,618,844 $8,374,157
--Depreciation	$2,300,000	$2,470,397 $2,850,000	$2,653,419 $3,061,144
EBIT	$1,470,100	$2,132,167 $4,009,525	$2,965,425 $5,313,012
--Long-Term Interest	$230,000	$230,000 $230,000	$230,000 $230,000
Earnings Before Taxes	$1,240,100	$1,902,167 $3,779,525	$2,735,425 $5,083,012
--Income Taxes	$458,837	$722,823 $1,436,219	$1,039,461 $1,931,544
Net Income	$781,263	$1,179,343 $2,343 305	$1,695,963 $3,151,467
+ Depreciation	$2,300,000	$2,470,397 $2,850 000	$2,653,419 $3,061,144
--Change in WC	$600,000	$500,000 $500 000	$500,000 $500,000
Operating Cash Flow	$2,481,263	$3,149,741 $4,693 305	$3,849,382 $5,712,612
--Capital Expenditures	$2,485,000	$2,310,731	$2,148,683

		$1,998 000	$1,857,883
--Preferred Dividends	60,000	60,000	60,000
		$60 000	60,000
--Change in LT Debt	$460,000	$813,333	$813,333
		$813 333	0
CF (Equity)	$396,263	$1,592,343	$2,454,032
		$3,448,638	$3,794,728

EXHIBIT 4 Estimating the MCI Cost of Equity

Beta	0.95
Beta Interval:	10%
Historical Risk-free Rate (H):	3.7%
Current Risk-free Rate (C):	5.0%
Expected Return on the Market:	12.3%
Market Risk Premium:	8.6%

To use historical risk-free rate, input 1; otherwise input 2:

Legend for Chart:

A - Beta:
B - 0.67
C - 0.76
D - 0.86
E - 0.95
F - 1.05
G - 1.14
H - 1.24

A	B	C	D	E
	F	G	H	
Cost of Equity (H):	9.4%	10.2%	11.1%	11.9%
	12.7%	13.5%	14.3%	
Cost of Equity (C):	10.7%	11.5%	12.4%	13.2%
	14.0%	14.8%	15.6%	

Expected continuing growth rate

for cash flows to equity:

5.0%

Interval length for growth rates:

1.0%

EXHIBIT 5 MCI Sensitivity Analysis

Legend for Chart:

B - BETA:
C - 0.67
D - 0.76
E - 0.86
F - 0.95
G - 1.05
H - 1.14
I - 1.24

A	B	C F	D G	E H I
	Cost of Equity:	9.40% 11.90%	10.20% 12.70%	11.10% 13.50% 14.30%
	0.00%	$48.00 $36.61	$43.58 $33.81	$39.83 $31.37 $29.21
	1.00%	$52.70 $39.25	$47.41 $36.05	$42.99 $33.28 $30.85
	2.00%	$58.67 $42.44	$52.17 $38.70	$46.85 $35.51 $32.76
	3.00%	$66.50 $46.33	$58.24 $41.91	$51.67 $38.18 $35.00

Expected	4.00%	$77.22	$66.26	$57.86
		$51.22	$45.84	$41.40
				$37.68
continuing	5.00%	$92.79	$77.35	$66.09
		$57.53	$50.81	$45.39
				$40.93
growth rate	6.00%	$117.47	$93.66	$77.58
		$65.99	$57.26	$50.44
				$44.97
	7.00%	$162.55	$120.07	$94.74
		$77.93	$65.97	$57.03
				$50.10
	8.00%	$271.18	$170.09	$123.14
		$96.04	$78.41	$66.03
				$56.86
	9.00%	N/A	$301.05	$179.20
		$126.76	$97.59	$79.02
				$66.17
	10.00%	N/A	N/A	$341.75
		$190.35	$131.04	$99.42
				$79.78
Implied growth rate:	5.40%			Recent Price:
		$60.50		TVM: 16

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