The Pedagogical Importance of the Implied Growth Rate and Terminal Value Multiple

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ABSTRACT

This paper seeks to reconcile the Dividend Growth valuation model and the Discounted Cash Flow methodology and their use as benchmark valuation criteria. In most finance textbooks these two approaches are presented as alternative valuation techniques which can be used to value stocks. Textbook authors, in general, use hypothetical examples to explain these models and do not explore their application using actual data. Our goal is to shed some light into how the implied growth rate and the Terminal Value Multiple from the Discounted Cash Flow model can be used as an alternative valuation benchmark and offer some suggestions concerning its presentation by academicians and its application by practitioners.

THE DIVIDEND GROWTH MODEL

According to the Gordon (1962) dividend growth model we can express the price of a dividend paying stock as the present value of all future dividend payments. Expression (1) demonstrates this relationship:

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r_e)^t} \qquad (1)$$

where P_0 is the price of the company's stock at time period 0, D_t is the dividend paid at time t, and r_e is the cost of common equity capital. ∞ denotes that there is an infinite stream of dividends that need to be estimated and discounted.

Following Gordon and Shapiro (1989), let us assume that future dividends are a function of time and grow at a constant rate. In that case, the firm's stream of dividends can be expressed as:

$$D_t = D_0(1+g_D)^t \qquad (2)$$

where D_t is the dividend paid at time period t, D_0 is the amount of the current dividend, and g_D is the constant and perpetual growth rate in dividends. By substituting expression (2) into expression (1), an infinite geometric series is obtained, as follows:

$$P_0 = \sum_{t=1}^{\infty} D_0 \left[\frac{1+g_D}{1+r_e}\right]^t \qquad (3)$$

The infinite summation in expression (3) can be replaced by a closed form solution if the dividend growth rate is less than the cost of equity. The resulting formula is denoted as expression (4):

$$P_0 = D_0 \frac{(1+g_D)}{(re-g_D)} \tag{4}$$

If we divide both sides of expression (4) by the firm's earnings per share, *E*, we get the *P/E* ratio:

$$P_0 / E = (D_0 / E)\frac{(1+g_D)}{(re-g_D)} \tag{5}$$

Expression (5) states that the firm's *P/E* ratio is equal to the firm's payout ratio times $(1+g_D)/(r_e-g_D)$, a term which we will define more appropriately when we present the Discounted Cash Flow approach.

Rearranging terms in expression (4) and solving for the return on equity (or cost of equity capital), r_e, we obtain:

$$r_e = \frac{D_0(1+g_D)}{P_0} + g_D$$

or,

$$r_e = \frac{D_1}{P_0} + g_D \tag{6}$$

Expression (6) states that the firm's return on equity is equal to the sum of the dividend yield and the growth rate in dividends. Regardless of how simplistic this model is, it is obvious from expression (6) that there is a direct relationship between a firm's rate of return (and risk) and growth rate.

Meaningful application of this model requires accurate estimates of the growth rate. Many authors suggested using the product of the retention or plowback ratio and return on retained earnings (e.g. Ross, Westerfield and Jaffe, 2008, p141):

$$g_D = (\text{plowback ratio})(\text{return on retained earnings}) \tag{7}$$

We must keep in mind that this is the growth rate of a firm's cash dividends. As we will see below, the Discounted Cash Flow approach implies a growth rate in cash flows, which may not necessarily be equal to the growth in dividends.

THE DISCOUNTED CASH FLOW (*DCF*) 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 shareholders wealth, which constitutes the goal of the management of every corporation. In an exploratory research, Copeland, Koller and Murrin (1996) found that the correlation between the market value (actual price per share) and the *DCF*-based value, using forecasts from *Value Line,* was 0.97. Although in practice there may be different approaches to the valuation of the firm's prospects, it is acknowledged that the discounted cash flow technique is the most commonly used practical approach in determining the company's value. It is used in capital budgeting decisions to evaluate investment projects or to price entire corporate entities which may be targets for acquisition. The concept of *DCF* is delineated by the following expression.

$$PV_0 = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} \qquad (8)$$

where PV_0 is the present value, CF_t are the cash flows that occur in time period t, n is the number of periods, and r is the corresponding discount rate. If these cash flows were to grow at an annual rate of g percent, beginning at year six, expression (8) becomes:

$$PV_0 = \sum_{t=1}^{5} \frac{CF_t}{(1+r)^t} + \frac{CF_5\left[\frac{1+g}{r-g}\right]}{(1+r)^5} \qquad (9)$$

PV_0 = Present Value of cash flows for the first 5 years + Present Value of cash flows after year 5

The discount factor $1/(1+r)^5$ is used to discount the collective value of the cash flows at year six back to year zero, the present time. We refer to the term [(1+g)/(r-g)] as terminal value multiple (TVM). It expresses the ratio of the value of the cash flows beyond year six to the value of the cash flow of year five. 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.

Although the choice of five years is somewhat arbitrary, it represents a reasonable projection period since most analysts rarely project data and cash flows beyond five years. However, for firms with fairly high growth rate in their early (growth) years than in their subsequent (mature) years, it is necessary to project cash flows beyond five years, as many as possibly ten years.[1] A prime example of such firms may be some new technology-based firms (e.g. Google Inc., Research in Motion, Ltd., First Solar, Inc.).

Assuming expression (9) represents the present value of the firm's equity cash flows, the Implied Growth Rate (IGR) is the rate, g, which solves expression (9'):

[1] For an example, see Damodaran's website: http://pages.stern.nyu.edu/~adamodar/

$$PV_0 = \sum_{t=1}^{5} \frac{CF_t}{(1+r_e)^t} + \frac{CF_5\left[\frac{1+g}{r_e - g}\right]}{(1+r_e)^5} \qquad (9')$$

where,
P_0 = price of the stock
CF = cash flows to stockholders
r_e= expected rate of return on equity
g = growth rate in the firm's cash flows

Assuming reliable estimates of the cash flows of the first five years and the discount rate, r_e, expression (9) 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 (IGR) can then be contrasted with the implied growth of the firm's industry peers, adjusted for opportunities unique to the firm. In any event, other things equal, 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, other things equal, the stock may be considered as overpriced.

The fact that the key term (1+g)/(r-g) appears in both models (see expressions (5) and (9')) it may be used as a valuation benchmark, just like the P/E ratio. In expression (5) the P/E ratio is equal to the multiple (1+g)/(r-g) scaled by the firm's payout ratio. However, investors are unable to reconcile the use of the P/E ratio as a benchmark valuation criterion in its plain form. In order to make it more meaningful they often divide it by the expected growth rate, represented by the consensus estimate of analysts that follow the firm, to obtain the familiar PEG ratio. The fact that both the P/E and the PEG ratio reflect the volatility of the firm's earnings, it is an evidence that investors use them as valuation benchmarks.

It should be noted that the growth rate in the DCF approach is the growth in the firm's cash flows, while the growth rate in the Dividend Growth model is the growth in the firm's dividends. Although these rates are presumed to be comparable, most textbooks treat them as identical without any discussion concerning their equivalency.

The contribution of this paper is to shift emphasis away from the proverbial P/E ratio to its more meaningful component (1+g)(r-g), called TVM. There are several advantages in using the TVM rather the P/E ratio as a benchmark valuation criterion. First, it incorporates both risk elements (through r_e) and growth opportunities (through g). Second, it avoids the ambiguity as to which earnings should be used, trailing or forward earnings. Finally, the TVM is less volatile than the P/E ratio, since it considers the long-term prospects of the firm reflected in the rate of return, r, and growth rate, g, rather than the volatile earnings and the resulting stock prices. As an example, on April 15, 2007 the trailing P/E ratio on the Dow Jones Industrial Average (DJIA) stocks was 17.26 and on August 29, 2008 this ratio dropped to 14.77 and the projected P/E ratio was 12.73.[2] In contrast, applying expression (9') using actual data from *Value Line* the TVM for

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[2] (see:http://www.djindexes.com/mdsidx/index.cfm?event=showavgstats, or WSJ Market Data Group: http://online.wsj.com/mdc/public/page/2_3021-peyield.html?mod=topnav_2_3000).

the DJIA non-finance related stocks was 16.74. This is derived by using the average IGR of 6% for the last three years and a rate of return of 12.3%, which is the historical rate of return on stocks calculated by Ibbotson Associates (*Morningstar, 2007 Yearbook, p.31*).

The TVM may be used as a benchmark valuation criterion, just like the P/E ratio. Other things equal, stocks with a higher growth potential are associated with a higher TVM, while stocks with a lower growth opportunities have a lower TVM.

ESTIMATION OF THE CASH FLOWS TO EQUITY AND THE IMPLIED GROWTH RATE

The shareholders' cash flows can be summarized by the following expression.

$$CF_E = EBIT(1-T) - I(1-T) + Depr - \Delta NWC - CE + \Delta B \qquad (10)$$

where CF_E is cash flow to equity, *EBIT* is earnings before interest and taxes, *T* is the corporate tax rate (based on current taxes; not including deferred taxes), *NCE* is non cash expenses such as depreciation and amortization of good will, ΔWC is change in net working capital, *CE* capital expenditures and ΔB is the change in the firm's long-term debt (proceeds from new debt – repayment of existing debt). 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 which is used to discount the cash flows to debt in expression (10). 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, Coller 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.
Expression (10) can be further simplified as:

$$CF_E = NI + Depr - \Delta NWC - CE + \Delta B \qquad (11)$$

If the tax rate, T, reflects current and deferred taxes, then expression (11) becomes:

$$CF_E = NI + Deferred\ Taxes + Depr - \Delta NWC - CE + \Delta B \qquad (12)$$

where: $NI = EBIT(1-T) - I(1-T)$ and *T* represents the aggregate tax rate based on current and deferred taxes in expression (12).

THE COST OF EQUITY CAPITAL

The rate used to discount the firm's cash flows to its equity holders, also termed as 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, $E(R_{,i})$, equals the sum of two components; namely, the riskless rate of return, R_f, and a risk premium, β_i $[E(R_M)-R_f]$. This relationship is known as *Security Market Line* (SML) and is given by the following expression.

$$E(R_{,i}) = R_f + \beta_i\,[E(R_M)-R_f] \tag{11}$$

Cost of Equity = Risk-free Rate + Risk Premium

where, β_i is the beta of company *i* and it reflects its operating and financial risks. Generally, companies with high growth such as the technology sector, are associated with higher betas. However, 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, while 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 *Morningstar's 2007 Yearbook*, this figure was 8.6 percent (12.3 percent - 3.7 percent), using the arithmetic mean of large company stocks from 1926 to 2005. 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 it reverts to its long-term historical average.

DISCUSSION

For years, financial educators taught stock valuation techniques based on the Gordon Dividend Growth model and more recently the Capital Asset Pricing Model (CAPM). Historical dividend yields and growth rates made these two models fairly compatible in terms of estimating the expected rate of return by investors and consequently the cost of capital used by corporations to make capital budgeting decisions. For example, during the period of 1925-2006 the dividend yield was 4.2% and the capital appreciation was 6% annually. The combined (geometric) rate of 10.4% was consistent with the compound annual growth rate of US large company stocks during that period (*Morningstar, 2007 Yearbook, p.61*). Applying these data to expression (5), we may infer that the implied growth rate in dividends over the period of 1925-2006 was about 6%.[3]

In recent years, the dividend yield has fallen significantly below its historical levels and as of September 4, 2008 the average dividend yield on the S&P 500 stocks was around 2.4%. This presents a challenge for educators and practitioners, especially considering the dismal growth potential for stocks alleged by recent market commentaries. Following expression (6), a 2.4% dividend yield combined with a growth rate of 6%, which was the historical average, yields a required rate of return on stocks of 8.4%. Of course, a lower growth rate will result in a lower required rate of return. These results present a divergence from the traditional application of the

[3]The growth rate for any 30-year period since 1900 has not exceeded 6.4%.

dividend growth model. In the past, when the dividend yield fell below 2.7%, stocks run into problems. For example, when the yield fell to 2.65% in January 1973, the stock market entered into a severe bear market (which, eventually, caused the yield to rise). Also, about two months before the 1987 crash the dividend yield was 2.64%.

Buffett seems to be concerned about the market's expectation regarding future rates of return. When Buffett has reservations about the market's assumption, it is not a trivial matter. In his recent letter (February 2008) to Berkshire's shareholders, states that 363 companies in the S&P that have pension plans assumed an investment rate of return of 8% in 2006. According to Buffett, the average holdings of bonds and cash for all pension funds is about 28% and the remaining 72% of assets is mostly in equities, held either directly or through vehicles such as hedge funds or private-equity investments. Assuming a generous rate of return of 5% on bonds and cash, equities need to earn on average 9.2% in order to achieve a combined rate of return of 8% on all assets. Buffet then, puzzles over the following question: *How realistic is this expectation?*

This paper investigates the issues of the expected risk premium on stocks and the implied long-term growth rate and provides a plausible answer to the above befuddlement. We solve for the implied growth rate in the Dow Jones Industrial Average Index (DJIA) stocks following the standard cash flow valuation methodology, as described in Christofi et. al. (1999). In brief, we solve for the constant perpetual implied growth rate g, in the expression (9').

Our results show that non-finance related stocks in the DJIA had an implied annual perpetual growth rate of approximately 6% (assuming a rate of 12.3% for the expected return on the market portfolio and 3.7% for the risk free rate - *Morningstar, 2007 Yearbook, p.31*). This result was consistent for the last three years (see Tables 1-3).

This implied growth rate has serious implications for future market performance. Given the current level of dividend yield of about 2.4%, a growth rate of 6% offers a combined rate of return of about 8.4%, according to the classic Gordon Dividend Valuation Model. Since this is a geometric growth type of return, it implies an arithmetic average rate of return of about 10.4% (if returns are log-normally distributed the arithmetic average exceeds the geometric average by half of the variance, which is about 2%). This rate is about 2% lower than the rate earned by large stocks during the period 1926-2006. Part of this lower expected return, of course, is due to a lower risk-free rate since current rates of interest are much lower than their historical levels. If interest rates remain low for the foreseeable future, we would expect firms to reduce their cost of capital, by using more favorable financing for their operations and capital expenditures. Assuming analysts are correct in their cash flow projections, a lower cost of capital will favor earnings and push stock prices higher. However, if analysts' projections prove to be too optimistic stock prices may not change, since a downward pressure on cash flows and consequently earnings will offset any savings from a lower cost of capital. As in earlier instances, the caveat is inflation and its effect on interest rates. Looking at Figure (1), it appears that low dividend yields and higher interest rates are irreconcilable and stocks end up paying the toll. Given the escalating oil prices and commodity prices, the odds are stacked against stocks if interest rates were to rise suddenly.

CONCLUSION, APPLICATION AND IMPLICATIONS

Our conclusion can be best summed up in two applications of the methodology of our paper. The first one concerns inferences concerning the expected risk premium on stocks. For example, let us assume a risk premium on stocks of 5% (8% for the expected return on the market portfolio minus 3% for the risk-free rate). Using these figures in expression (9') and projections from *Value Line*, we obtained an implied a growth in cash flows of several DJIA stocks in the range of 1%-2%. In view of the fact that such long-term growth rate does not seem unrealistic, we find it hard to reconcile a lower expected return on stocks, despite the gloomy outlook reflected in the current stock market behavior. Thus, instructors may include a project assignment in their courses similar to this application to challenge their students view concerning the stock market risk premium.

A second application is to use the TVM as benchmark valuation criterion, similar to the P/E ratio. An application of this concept is shown in the Appendix. Students may disagree with *Value Line's* projections and make adjustments, as shown in the Appendix. Furthermore, they may use the TVM benchmark to form an opinion whether a stock is underpriced, overpriced, or fairly priced.

The motivation for our paper was purely pedagogical and it is our hope that it will aid academic colleagues in Finance, as they struggle to present this difficult material to their students.

REFERENCES

Chrsitofi, A, P. Christofi, M. Lori and D. Moliver. "Evaluating Common Stocks Using Value Line's Projected Cash Flows and Implied Growth Rate." *Journal of Investing*, 8, 1 (1999), 38-45.

Copeland, T. E., T. Koller, and J. Murrin. "Valuation: Measuring and Managing the Value of Companies." New York: Wiley, 1996.

Fama, Eugene F. and French, Kenneth R. "The Equity Premium," *The Journal of Finance,* 57 (2002), 637-659.

Gordon, M.J., 1962, The Investment, Financing and Valuation of the Corporation, Homewood, Illinois: Richard D. Irwin, Inc.

Ross, S. A., R. W. Westerfield and J. F. Jaffe (2008), *Corporate Finance*, 8th edition, Homewood, IL: McGraw-Hill/Irwin.

Stocks, Bonds, Bills, and Inflation, 2007 Yearbook. Chicago: Ibbotson Associates.

Stocks, Bonds, Bills, and Inflation, 2007 Yearbook: Market Results for 1926-2006, Chicago: Morningstar, Inc.

Figure 1

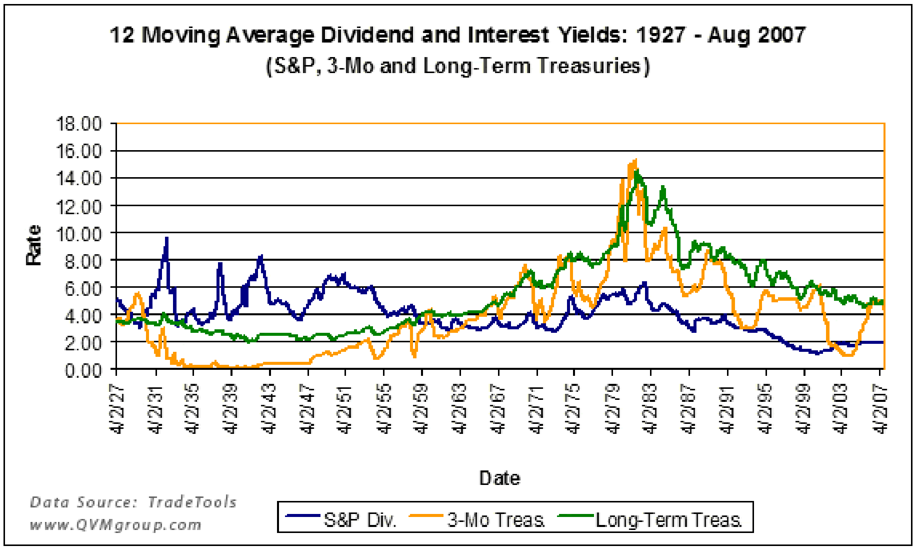
12 Moving Average Dividend and Interest Yields: 1927 - Aug 2007
(S&P, 3-Mo and Long-Term Treasuries)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Rate
4/2/27
4/2/31
4/2/35
4/2/39
4/2/43
4/2/47
4/2/51
4/2/55
4/2/59
4/2/63
4/2/67
4/2/71
4/2/75
4/2/79
4/2/83
4/2/87
4/2/91
4/2/95
4/2/99
4/2/03
4/2/07
Date
Data Source: TradeTools
www.QVMgroup.com
S&P Div.
3-Mo Treas.
Long-Term Treas.

Table 1
Calculation of Implied Growth Rate (IGR) and Terminal Value Multiple (TVM) for selected non-finance firms of the DJIA using the Discounted Cash Flow model
2007

Company Name	Ticker Symbol	IGR	TVM	Price Used	52 Week Beta	Exp. EPS
3M Co.	MMM					
ALCOA Inc.	AA	7.00%	22	$36.77	1.35	$2.92
Boeing Co.	BA	5.90%	20	$88.70	0.88	$6.99
Caterpillar Inc	CAT	6.60%	14	$77.59	1.20	$6.66
Chevron Corp.	CVX	4.80%	16	$88.22	0.90	$9.79
Coca-Cola	KO	6.00%	26	$60.29	0.75	$3.32
E.I. DuPont de Nemours & Co.	DD					
Exxon Mobil	XOM	5.70%	19	$87.87	0.9	$8.00
General Electric Co.	GE	5.30%	16	$33.53	0.95	$2.48
Hewlett-Packard	HPQ	8.40%	21	$46.10	1.15	$3.92
Home Depot Inc.	HD	7.30%	21	$28.76	1.00	$1.99
Intel Corp.	INTC	8.00%	17	$19.54	1.25	$2.00
International Business Machines C	IBM	6.00%	15	$116.49	0.95	$9.29
Johnson&Johnson	JNJ	2.30%	17	$63.66	0.55	$4.67
McDonald's Corporation	MCD	6.20%	27	$56.00	0.75	$3.54
Merck	MRK	4.7%	19	$37.10	0.75	$3.68
Microsoft Corp.	MSFT	8%	28	$29.16	0.95	$2.11
Pfizer	PFE	5.20%	18	$23.47	0.85	$2.55
Procter & Gamble Co.	PG	5.70%	29	$73.94	0.65	$3.91
United Technologies Corporation	UTX	4.90%	14	$71.36	1.00	$5.44
Wal-Mart Stores Inc.	WMT	6.00%	21	$54.08	0.85	$3.50
Walt Disney Company	DIS	5.40%	14	$32.24	1.10	$2.40
AVERAGE:		**5.97%**	**20**	**$56.24**	**0.94**	**$4.46**

Assume beta=1.00

$r=E(R_i)=R_f+b_i[E(R_m)-R_f]$ = **0.123**

0.037+1.00*(0.123-0.037)

TVM = (1+g)/(r-g) **16.74**

Table 2
Calculation of Implied Growth Rate (IGR) and Terminal Value Multiple (TVM) for selected non-finance firms of the DJIA using the Discounted Cash Flow model
2006

Company Name	Ticker Symbol	IGR	TVM	3/17/2006 Price	52 Week Beta	Exp. EPS
3M Co.	MMM	4.70%	15	$74.79	0.73	$4.50
ALCOA Inc.	AA	14.90%	32	$30.11	1.72	$1.85
Atlria Group, Inc.	MO	-0.30%	9	$73.55	0.84	$5.50
American Express Co,	AXP			$54.65	1.09	$2.56
American International Group Inc.	AIG			$68.82	1.02	$3.30
AT&T Inc.	T			$27.00	0.80	$1.72
Boeing Co.	BA	6.50%	23	$77.85	0.87	$3.20
Caterpillar Inc	CAT	6.30%	14	$74.39	1.93	$4.70
Citigroup Inc.	C			$47.41	0.70	$3.96
Coca-Cola	KO	6.50%	22	$42.16	0.90	$2.30
E.I. DuPont de Nemours & Co.	DD	8.90%	20	$42.46	1.24	$2.80
Exxon Mobil	XOM	10.10%	16	$60.66	1.52	$5.15
General Electric Co.	GE	4.00%	19	$34.47	0.68	$1.72
General Motors	GM			$21.13	1.70	$1.70
Hewlett-Packard	HPQ	6.90%	16	$34.16	1.14	$1.70
Home Depot Inc.	HD	9.70%	17	$42.90	1.41	$2.72
Honeywell International Inc.	HON	12.70%	33	$42.76	1.44	$2.35
Intel Corp.	INTC	13.60%	23	$19.54	1.71	$1.60
International Business Machines C	IBM	9.30%	20	$83.30	1.27	$5.32
Johnson&Johnson	JNJ	-0.20%	14	$60.34	0.40	$3.80
JP Morgan Chase & Co.	JPM			$41.40	0.91	$2.95
McDonald's Corporation	MCD	3.90%	19	$35.03	0.67	$2.04
Merck	MRK	6.4%	22	$35.35	0.88	$2.51
Microsoft Corp.	MSFT	5.7%	23	$27.50	0.76	$1.16
Pfizer	PFE	2.00%	11	$26.39	0.89	$2.05
Procter & Gamble Co.	PG	2.60%	17	$59.39	0.59	$2.60
United Technologies Corporation	UTX	0.40%	10	$58.80	0.83	$3.55
Verizon Communications Inc.	VZ	4.70%	12	$34.41	1.10	$2.60
Wal-Mart Stores Inc.	WMT	5.20%	21	$46.69	0.75	$2.63
Walt Disney Company	DIS	9.60%	18	$28.67	0.81	$1.55
AVERAGE:		**6.42%**	**18.58**	**$46.87**	**1.04**	**2.87**

Assume beta=1.00

$r=E(R_i)=R_f+\beta_i[E(R_m)-R_f]$ = 0.037+1.00*(0.123-0.037) **0.123**

TVM=(1+g)/(r-g) **18.10**

Table 3
Calculation of Implied Growth Rate (IGR) and Terminal Value Multiple (TVM) for selected non-finance firms of the DJIA using the Discounted Cash Flow model
2005

NAME	Ticker	IGR	TVM	Price-11/15/05	Beta	P/E
3M Co.	MMM	4.00%	14	$78.06	0.90	16.90
Alcoa Inc.	AA	6.60%	11	$26.26	1.45	14.30
Altria Group Inc.	MO	-2.50%	7	$74.39	0.80	12.80
American Express Co.	AXP			$50.93	1.50	19.30
American International Group Inc.	AIG			$66.68	1.15	12.30
Boeing Co.	BA	8.30%	22	$67.00	1.10	19.90
Caterpillar Inc.	CAT	3.30%	6	$55.90	1.20	13.00
Citigroup Inc.	C			$47.66	1.40	11.60
Coca-Cola Co.	KO	4.30%	21	$42.46	0.65	20.50
E.I. DuPont de Nemours & Co.	DD	6.00%	17	$42.35	1.00	14.90
Exxon Mobil Corp.	XOM	4.00%	15	$58.25	0.85	12.40
General Electric Co.	GE	9.40%	22	$35.75	1.25	17.30
General Motors Corp.	GM	7.40%	14	$24.05	1.30	17.00
Hewlett-Packard Co.	HPQ	9.70%	17	$29.40	1.45	16.40
Home Depot Inc.	HD	7.80%	16	$42.44	1.25	13.90
Honeywell International Inc.	HON	12.80%	44	$36.38	1.35	16.04
Intel Corp.	INTC	8.60%	16	$25.30	1.35	16.30
International Business Machines Corp.	IBM	9.10%	27	$87.77	1.10	15.50
Johnson & Johnson	JNJ	2.90%	16	$62.83	0.65	17.70
JPMorgan Chase & Co.	JPM			$37.73	1.50	11.90
McDonald's Corp.	MCD	7.10%	20	$33.31	1.00	16.30
Merck & Co. Inc.	MRK	5.10%	19	$30.02	0.80	10.70
Microsoft Corp.	MSFT	10.10%	28	$27.50	1.20	21.40
Pfizer Inc.	PFE	1.40%	11	$21.89	0.80	12.40
Procter & Gamble Co.	PG	1.40%	14	$56.00	0.55	21.00
SBC Communications Inc.	SBC			$23.89	1.05	15.20
United Technologies Corp.	UTX	5.70%	13	$53.41	1.15	16.80
Verizon Communications Inc.	VZ	4.10%	13	$30.82	1.00	12.70
Wal-Mart Stores Inc.	WMT	4.20%	15	$48.78	0.85	18.70
Walt Disney Co.	DIS	9.30%	18	$26.06	1.35	17.70
AVERAGE:		**6.00%**	**17.44**	**$44.78**	**1.10**	**15.76**

Assume beta=1.00	
r=E(Ri)=Rf+□i[E(Rm)-Rf] =	0.123
0.037+1.00(0.123-0.037)*	
TVM=(1+g)/(r-g)	16.83

Appendix

How to use the Terminal Value Multiple (TVM) when pricing stocks

Assuming stock's beta is estimated accurately.

Given the fact that Terminal Value Multiple (TVM) reflects risk-return and growth, TVM=(1+g)/(r-g), it should be the same for all firms.

Given our research results, the market TVM is around 17 and for Financial companies is around 10.

Scenario 1: A firm's TVM is too low (lower than 17).

Rectification (Make sure your beta is accurate):

- Value Line (VL) projected sales are too high; adjust projected sales lower.
- Value Line projected sales are correct, but operating margin is too high; adjust operating margin lower.
- Value Line (VL) projected Capital spending is too low; increase Capital spending.
- Stock is under-priced; increase stock price (If the firm maintains its operating margin and/or sales level, it will experience an increase in its stock price)

Projected Sales	Price	Operating Margin (%)	Beta	IGR (%)	TVM	Action
$60,000	$36.84	14%	1.6	7.1%	**10**	
$60,000	$36.84	**11%**	1.6	11%	17	Decrease operating margin
$48,000	$36.84	14%	1.6	11%	17	Decrease sales
$60,000	$36.84	14%	1.6	7.1%	17	Increase Capital spending
$60,000	**$52.00**	14%	1.6	7.1%	17	stock is under-priced; increase price

Scenario 2: A firm's TVM is too high (higher than 17).

Rectification (Make sure your beta is accurate):

- Value Line (VL) projected sales are too low; adjust projected sales higher.
- Value Line projected sales are correct, but operating margin is too low; adjust operating margin higher.
- Value Line (VL) projected Capital spending is too high; decrease Capital spending.
- Stock is overpriced; decrease stock price (If the firm does not take action to increase its operating margin and/or sales, it will see its price declining)

Projected Sales	Price	Operating Margin (%)	Beta	IGR (%)	TVM	Action
$48,000	$36.84	11%	1.6	13.5%	**29**	
$48,000	$36.84	**14%**	1.6	11%	17	Increase operating margin
$60,000	$36.84	11%	1.6	11%	17	Increase sales
$48,000	$36.84	11%	1.6	11%	17	Decrease Capital spending
$48,000	**$25.00**	11%	1.6	13.5%	17	stock is overpriced; reduce price