Valuing Coca-Cola Using The Free Cash Flow To Equity Valuation Model

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ABSTRACT

In this paper, we provide a detailed example of applying the free cash flow to equity valuation model proposed in Damodaran (2006). Damodaran (2006) argues that the value of a stock is the discounted present value of the future free cash flow to equity discounted at the cost of equity. We combine the free cash flow to equity model with the super-normal growth model to determine the current value of Coca-Cola. At the time of this paper, we determined a value of Coca-Cola at $161 billion using the free cash flow to equity model, and the actual market value of Coca-Cola was $150 billion.

Keywords: Coca-Cola; Free Cash Flow to Equity; Equity Valuation; Super-normal Growth Model

CORPORATE FINANCIAL MANAGEMENT AND STOCK VALUATION

Corporate financial management encompasses the efficient acquisition and allocation of funds. The objective of corporate financial management is to maximize the value of the firm. Solomon (1963, page 22, Chapter II) argues that wealth maximization should be the goal of corporate financial management because this criterion maximizes the wealth of the owners of corporations and maximizes the wealth of a society by maximizing economic output. The value of the firm is measured by the market capitalization of the firm. The market capitalization for the firm is calculated by multiplying the total number of shares outstanding times the market price per share. The value of the firm is determined by the risk and return characteristics of the firm. Firms that wish to achieve a higher rate of return must assume a higher level of risk. Firms that wish to have a lower level of risk must accept a lower rate of return. A firm that has a goal of minimizing risk would likely be in an industry like money market management and invest all of the firm's available funds in Treasury bills, while a firm that has a goal of maximizing return would choose an industry like oil well drilling. The former option has minimal risk while the later one has a high expected return.

The risk and return characteristics of the firm are determined by the decisions made by corporate financial managers. Higher returns require higher levels of risk and lower risk provides lower rates of return. Decisions made by corporate, financial managers fall into three categories: 1) investment decisions, 2) financing decisions, and 3) dividend decisions. Investment decisions determine the type of assets purchased and the relationship between current assets and fixed assets. A firm in the money management business would buy Treasury bills and an oil well drilling company would buy oil well drilling equipment. The higher the ratio of current assets to fixed assets in the firm the less risk of illiquidity and, consequently, the less risk of default or insolvency. The higher current asset ratio will lead to a lower return on assets and return on equity. Financing decisions relate to the extent to which the firm uses fixed cost sources of funding – long-term, bonds. More financial leverage leads to higher return on equity but more volatility of return on equity. The dividend decision is a hybrid one as the dividend decision involves the allocation of funds but is not an asset decision, while at the same time affecting financial leverage because the dividend payment affects the level of retained earnings, thus the need for more or less external funding.

After a set of decisions have been made, a firm is created that can be represented by their financial statements. The balance sheet is a cross-sectional representation of the firm at a point in time and the income statement is a representation of what has happened to the firm during the most recent accounting period. The risk and return characteristics of the firm are affected by the amount of fixed cost assets and fixed cost financing used by the firm. The degree of operating leverage, the degree of financial leverage, and the degree of combined leverage measure the impact of fixed cost assets and fixed cost financing on projected cash flows for the firm. Decision makers can use the probability distribution of expected future cash flows to determine the total market capitalization, *value*, of the firm. Firms with higher expected cash flows will have higher value if the cost of funds is held constant and firms with lower required rates of return will have higher value, holding cash flows constant. The goal of corporate financial management is to make decisions that optimize the probability distribution of expected future cash flows to maximize the value of the firm. The value of the firm increases with higher cash flows and with lower required rate or return, other things being equal.

Decision makers estimate the probability distribution of future cash flows based on accounting information provided by the financial managers. To be useful, accounting information must influence decisions. Beaver, Kennelly and Voss (1968) argue that accounting information is useful if the information has predictive ability. Managerial accounting information is all information that is available to corporate insiders and includes material non-public information. Individuals who have access to material non-public information, such as commercial loan officers, investment bankers, attorneys, and auditors, are constructive insiders, that is, because of access to inside information, these individuals are *de facto* insiders. The sub-set of information that is provided to external decision makers constitutes financial accounting information. External decision makers include customers, suppliers, bond holders, and stock holders. Each group must determine whether to provide credit, buy bonds, or buy stock.

VALUING A SHARE OF STOCK USING THE FREE CASH FLOW MODEL

Brigham and Ehrhardt (2008, pages 287-288) and Ross, Westerfield, and Jordan (2008, pages 235-238) derive the value of the firm using dividends. We substitute free cash flow to equity for dividends (Damodaran, 2006). The value of a share of stock is determined by the future Free Cash Flow to Equity (FCFE) available to the company to pay to shareholders.

$$P_0 = FCFE_1 + FCFE_2 + FCFE_3 + - - - \qquad [1]$$

However, since the Free Cash Flow to Equity is in the future, each Free Cash Flow to Equity must be discounted to the present time by the cost of equity, k. That is, the value of a share of stock is equal to the discounted present value of the future of stream of Free Cash Flow to Equity discounted at the cost of equity which is the opportunity cost of funds to the shareholders.

$$P_0 = \frac{FCFE_1}{(1+k)^1} + \frac{FCFE_2}{(1+k)^2} + \frac{FCFE_3}{(1+k)^3} + \qquad [2]$$

The discounted present value of the future stream of Free Cash Flow to Equity discounted at the cost of equity can be represented as the sum of each Free Cash Flow to Equity, $FCFE_t$, discounted by one plus the cost of equity, $(1+k)^t$.

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

If we assume that the future Free Cash Flow to Equity will grow at a constant rate, g, each future Free Cash Flow to Equity is equal to the Free Cash Flow to Equity at time zero times one plus the growth rate raised to the power of t. $FCFE_t = FCFE_0 (1+g)^t$. We can substitute this value of $FCFE_t$ into formula [D3].

$$P_0 = \sum_{t=1}^{\infty}\left(\frac{FCFE_0(1+g)^t}{(1+k)^t}\right) \quad [4]$$

If g and k are constant and k is strictly greater than g, Equation [4] can be simplified to Equation [5]. That is, the value of an investment is equal to the anticipated Free Cash Flow to Equity at time t=1 discounted at the cost of equity minus the growth rate.

$$P_0 = \frac{FCFE_t}{(k-g)} \quad [5]$$

The value of a share of stock in the firm is equal to the anticipated future FCFE divided by the required rate of return for equity minus the expected future growth rate of FCFE for the firm. This model assumes that FCFE will be greater than zero and that k is strictly greater than g. If FCFE is zero, the implied value of the firm would be zero, which does not occur. High growth firms often have no dividend payout but have positive value. Investors are anticipating high dividends in the future, after the high growth period. If k=g, the denominator for Equation [5] would be zero which is undefined in mathematics. If g is greater than k, the model implies a value that is negative and the lowest value for a share of stock is zero.

THE SUPER-NORMAL GROWTH MODEL

The valuation formula derived in the previous section assumes that g and k are constant and k is strictly greater than g. If the conditions described by these assumptions are not met, the value of the investment must be determined by computing the value of each Free Cash Flow to Equity until the conditions assumed in the stock valuation model are met. The super-normal growth period is the time period during which the growth rate will be above average. After the super-normal growth period, the growth in earnings of the firm reverts to the long-term growth rate, which is assumed to be the long-term growth rate for the economy as a whole. For example, see Brigham and Ehrhardt (2008, pages 293-296) or and Ross, Westerfield, and Jordan (2008, pages 241-242).

The present value of the shares in the firm is equal to the discounted present value of the Free Cash Flow to Equity ($FCFE_t$) for the super-normal growth period plus the present value of the future Free Cash Flow to Equity for the normal growth period. Industry practice for company valuations is to compute five years of super-normal growth and then assume a constant long-term growth rate.

$$P_0 = PV(FCFE_1) + PV(FCFE_3) + PV(FCFE_3) + PV(FCFE_4) + PV(FCFE_5) + PV(P_5) \quad [6]$$

The Free Cash Flow to Equity values for years 1 to 5 are computed using the super normal growth rate, g^*, and the Free Cash Flow to Equity for year six is computed using the long-term normal growth rate, g. $FCFE_1$ is equal to the value of $FCFE_0$ times the growth factor, $FCFE_0(1+g^*)^1$. $FCFE_2$ is equal to the value of $FCFE_0$ times the growth factor, $FCFE_0(1+g^*)$. The remainder of the Free Cash Flow to Equity values, until $FCFE_{5,}$ are computed using the super-normal growth rate. $FCFE_6$ is equal to the value of $FCFE_5$ times the normal growth rate, $FCFE_5(1+g)^1$.

$$FCFE_1 = FCFE_0(1+g^*)^1 \quad [7]$$

$$FCFE_2 = FCFE_1(1+g^*)^1 \quad [8]$$

$$FCFE_3 = FCFE_2(1+g^*)^1 \quad [9]$$

$$FCFE_4 = FCFE_3(1+g^*)^1 \quad [10]$$

$$FCFE_5 = FCFE_4(1+g^*)^1 \quad [11]$$

$FCFE_6 = FCFE_5(1+g)^1$ [12]

After time =5, it is assumed that the firm will return to a normal long term growth rate that is constant at which point the financial analyst can use the simplified model. The terminal value of the investment at time = 5 is the discounted present value of all of the future Free Cash Flow to Equity beginning with Free Cash Flow to Equity six. The terminal value, P_5, is equal to the discounted present value of all of the future FCFE. Beginning with $FCFE_6$, the future cash flows are assumed to grow at a constant rate equal to g.

$P_5 = FCFE_6/(r-g)$ [13]

After the future Free Cash Flow to Equity values are computed for years one to five and the terminal value at time five is computed, each cash flow is discounted to the present time, t=0. The future cash flows are discounted at the cost of equity, k, and discounted for the number of years in the future that the cash flow will be received.

$PV(FCFE_1) = FCFE_1/(1+r)^1$ [14]

$PV(FCFE_2) = FCFE_2/(1+r)^2$ [15]

$PV(FCFE_3) = FCFE_3/(1+r)^3$ [16]

$PV(FCFE_4) = FCFE_4/(1+r)^4$ [17]

$PV(FCFE_5) = FCFE_5/(1+r)^5$ [18]

$PV(P_5) = P_5/(1+r)^3$ [19]

The present value of the investment is equal to the sum of the six present values of the future Free Cash Flow to Equity and the future terminal value.

$P_0 = PV(FCFE_1) + PV(FCFE_3) + PV(FCFE_3) + PV(FCFE_4) + PV(FCFE_5) + PV(P_5)$ [20]

FREE CASH FLOW TO EQUITY

In this paper, we combine the concept of the super-normal growth rate model of stock valuation with the Free Cash Flow to Equity model from Damodaran (2006, pp. 491-493). The FCFE model defines FCFE as net income minus net capital expenditures minus the change is working capital plus net changes in the long-term debt position. Net income is taken from the income statement. Net capital expenditure equals capital expenditures minus depreciation, both taken from the statement of cash flows. The change in working capital is the difference of accounts receivable plus the difference in inventory from one year to the next less the difference in accounts payable from one year to the next.

$FCFE = NI – (CE-D) – (\Delta WC) + (NDI-DR)$ [21]

FCFE	=	Free Cash Flow to Equity
(CE-D)	=	Net Capital Expenditures
(ΔWC)	=	Changes in non-cash working capital accounts: accounts receivable, inventory, payables
(NDI-DR)	=	New debt issues are a cash inflow while the repayment of outstanding debt is a cash outflow. The difference is the net effect of debt financing on cash flow.
NI	=	Net Income
CE	=	Capital Expenditure
D	=	Depreciation
ΔWC	=	Change in Working Capital
NDI	=	New Debt Issued
DR	=	Debt Retired

COMPUTING FREE CASH FLOW TO EQUITY FOR COCA-COLA FOR 2001 TO 2010

Table 1 shows the computation of FCFE for Coca-Cola for the period 2001 to 2010 using data taken from Coca-Cola Form 10-Ks from 2001 to 2011. Net income is taken from the income statement and depreciation is taken from the Statement of Cash Flows. Capital expenditure is the difference between purchases of Property, Plant, and Equipment and depreciation. The change is working capital for each year is calculated by taking the difference in each of the working capital accounts for each year between 2000 and 2010. The working capital accounts are accounts receivable, inventory, and accounts payable and the change in working capital is defined at the net change in accounts receivable plus inventory minus accounts payable. When net income, depreciation, capital expenditure and the change in working capital are combined, we have FCFE before changes in debt. Net cash flow from debt equals new debt financing minus old debt retirement, which is added to FCFE before debt to compute FCFE after debt.

Table 1: FCFE for Coca-Cola

Year	NI	Depr	Cap Exp	ΔWC	FCFE(BD)	NCFFD	FCFE(AD)
2001	3,969	803	-678	-340	3,754	-1,039	2,715
2002	3,050	806	-782	-441	2,633	-1,340	1,293
2003	4,347	850	-725	414	4,886	-1,435	3,451
2004	4,847	893	-414	24	5,350	168	5,518
2005	4,872	932	-811	49	5,042	-4,107	935
2006	5,080	938	-1,295	39	4,762	-3,672	1,090
2007	5,981	1,163	-1,409	551	6,286	4,122	10,408
2008	5,807	1,228	-1,839	-450	4,746	-464	4,282
2009	6,824	1,236	-1,889	-383	5,788	1,509	7,297
2010	11,809	1,443	-2,081	1,234	12,405	553	12,958
						Average	**$4,995**

The Free Cash Flow to Equity for 2010 is $12,958 million. However, because Free Cash Flow to Equity for Coca-Cola for the period 2001 to 2010 is volatile, we use the average value of FCFE for the period from 2001 to 2010 of $4,995 million to estimate the future values of Free Cash Flow to Equity for the five year super-normal growth period assumed in the Table 2. Gardner, McGowan, and Moeller (2011) demonstrate how to calculate sustainable growth for Coca-Cola. Gardner, McGowan, and Moeller (2010) show how to calculate the beta and required rate of return for Coca-Cola and Harper, Jordan, McGowan, Revello (2010) show how to calculate beta for Dow Chemical Company.

Column 1 Year
Column 2 Projected Free Cash Flow to Equity for Years 2011 to 2015, assuming a growth rate of 14.10%.
Column 3 Present value of FCFE for years 2011 to 2015 discounted at the required rate of return for equity for Coca-Cola of 9.54%.

Table 2

Year	FCFE	PV(FCFE)
Average	4,995	
2011	5,699	5,203
2012	6,502	5,419
2013	7,419	5,645
2014	8,465	5,880
2015	9,658	6,125

The projected Free Cash Flow to Equity for year 2015 is $9,658 million. The terminal value of Coca-Cola for year 2015 is $209,945 million which is equal to $10,114 million divided by the required rate of return, 9.54% minus the anticipated growth rate of 4.72%. The present value of P_5, is $133,145 million.

$FCFE_6$	=	$FCFE_5(1+g)^1$
	=	$\$9,658\ (1+.0472)^1$
	=	$10,114
P_5	=	$FCFE_6/(k-g)$
	=	$10,114/(0.0954-0.0472)
	=	$10,114/(0.0482)
	=	$209,945
$PV(P_5)$	=	$P_5/(1+k)^5$
	=	$\$209,945/(1+.0954)^5$
	=	$133,145

Year	**FCFE**	**P_5**	**PV(FCFE)**
2015	$10,114	$209,945	$133,145

Thus, the current value of Coca-Cola is the sum of the five anticipated Free Cash Flow to Equity values plus the present value of the value of the firm at time t=5. The discounted present value of the Free Cash Flow to Equity for the super-normal growth period for the five years from 2011 to 2015 is $28,273 million and the present value of the terminal value is $133.145. The total value of Coca-Cola is $161,417 million. The actual market value for Coca-Cola on December 28, 2010 is $150,185 million.

PV(FCFE)	**PV(Terminal Value)**	**Total Value**
$28,273	$133,145	$161,417

When we value a stock that has a period of super-normal growth, that value of the equity is the discounted present value of the expected free cash flow to equity during the super-normal growth period plus the terminal value of the stock at the end of the super-normal growth period. In the case of the KO valuation, the authors assumed that the super-normal growth period will last five years. This is standard in the valuation industry. Projections beyond five years are very uncertain. The value of the stock at the end of the super-normal growth period is the discounted present value of all of the future free cash flow to equity and is computed from the $P_0 = FCFE_1/(k-g)$. The difference is that the present value of a share of stock at time=t is equal to the anticipated free cash flow to equity at time=(t+1). Beginning with time=(t+1), the investment returns to the long-term growth rate with both k and g becoming constant and k being strictly greater than b. Since we are using a super-normal growth period of five years, the terminal value of the stock is $P_5 = FCFE_6/(k-g)$. The value of P_5 is five years into the future and must be discounted to the present using the cost of equity.

SUMMARY AND CONCLUSIONS

In this paper, we have combined the concepts of equity valuation, super-normal growth, required rate of return on equity, and sustainable growth to determine the market value of Coca-Cola Corporation (KO). The value of the equity of a firm is defined as the present value of all future cash flows from the firm to the shareholders. The value of the firm is FCFE divided by the sum of the required rate of return for equity minus the growth rate of the firm's earnings. Free Cash Flow to Equity is defined as net income minus net capital expenditures minus the change in net working capital plus the net change in long-term debt financing. The required rate of return for equity is computed using the CAPM using a five-year monthly rate of return beta relative to the S&P500 index. Sustainable growth for the super-normal growth period is computed with the extended DuPont model. The long-term growth rate is assumed to be the same as the growth rate of the economy. The table in Appendix A summarizes the results of this analysis.

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APPENDIX A

Calculating the Present Value of Free Cash Flow to Equity for Coca-Cola

$FCFE_0$	$3,914	
RROR	9.96%	
g	5.50%	
g*	13.43%	
Years	5	
Year	$FCFE_t$	$PV(FCFE_t)$
0	$3,914	
1	4,440	4,037
2	5,036	4,165
3	5,712	4,296
4	6,479	4,432
5	7,349	4,572
6	7,754	
PV_5	169,291	
$PV(P_5)$		104,735
PV_0		$126,165

$FCFE_0$ Free cash flow to equity at time zero.
FCFE is used as the initial cash flow, $FCFE_0$.

$FCFE_t$ The Free Cash Flow to Equity at each year in the future.
$FCFE_1$ to $FCFE_5$ grow at the super-normal growth rate.
We use a super-normal growth rate of 13.43% which is the average growth rate for Coca-Cola over the company's life.

$FCFE_6$ The Free Cash Flow to Equity in the sixth year grows over the Free Cash Flow to Equity in year five by the long-term real growth rate of GDP, 3.6%. Assume that in the long-term, all large firms grow at the GDP growth rate.

RROR The required rate of return is derived from the CAPM and is 10.08%.

