FTS Real Time System Project: The Two-Stage Dividend Model

Question: How do you assess the intrinsic value of a stock using the 2-stage dividend growth model?

Introduction

Stock analysts frequently produce price targets for stocks and recommend that you either buy or sell that stock. The recommendations and price targets are based upon an assessment of the intrinsic value of a stock compared to the current market price. A popular approach to assessing intrinsic value is to start with the basic dividend model and the notion that the intrinsic value of a stock is the present value of all future dividends discounted back at the stock's cost of equity capital. Applying this method requires identifying the growth behavior of current earnings which in turn support assumptions about projected future dividends. As a result, analyst recommendations based upon this approach rest upon their forecasts of a stock's earnings growth. In this project you will apply the two stage abnormal dividend growth model to focus on answering the following questions:

What growth forecasts explain the current stock price and are these forecasts consistent with current consensus analyst forecasts?

Based upon your analysis would you recommend the stock as a "Strong Sell, Sell, Hold, Buy or Strong Buy" (and why)?

Finally, what is your target price for 1-year's time?

In a two stage dividend growth model two growth forecasts must be made:

Stage 1 growth or "abnormal growth."

Stage 2 growth or "normal growth." Normal growth is applied in perpetuity once stage 2 is reached in time. Stage 2 growth depends upon forecasts of the long run average growth for the economy as a whole.

Background Motivation for the Two Stage Growth Model: Long term average nominal growth rates for the US economy have been around 4.5%-4.8%. This places an upper bound on assumed normal (i.e., long term) growth rates for stocks. This is because if an analyst assumes this is higher it would imply that the stock eventually grows larger than the economy as a whole --- a contradiction!

However, many stocks have analyst growth forecasts that significantly exceed 4.5%-4.8% which raises the question:

How can we reconcile growth forecasts that are greater than the economy wide growth?

The answer is that a company can have some finite period of abnormal growth that can easily exceed economy wide growth constraints. Eventually, however, this abnormal growth rate must revert being bound by economy wide growth. This type of growth behavior is referred to as a "two stage growth model." In stage 1 growth behavior is unconstrained (referred to as abnormal growth) and in stage 2 it is constrained by economy wide growth (referred to as Normal growth).

Applications of the two stage growth model usually assume the stage 1 abnormal growth period is between 5-10-years. Clearly, the actual number of years depends upon the underlying economics that influence a firm's future earnings. In this exercise we will work with 5-years as the length of time for Stage 1 which matches the maximum time period of abnormal growth forecast by the analysts (i.e., 1-year, 2-year and 5-year growth forecasts). Our goal is to examine what the implied growth rate forecasts is *given the two stage dividend growth model and the current stock price.*

Two Stage Growth Model: Normal Growth

First, what evidence supports the normal growth rate for the US economy to be around 4.5%-4.8%?

Consider the following Government report. Long Term Growth in the US: In a 2005 Report to Congress on Long Term Growth for the US economy. The following quote was given:

http://www.ftsmodules.com/public/modules/ftsRT/projects/longtermgrowth.pdf

"We also observe over the last 100-year span that the rates of economic growth across the then emerging industrial nations were fairly tightly clustered around this 2.0% pace. At the high end was Japan with an annual rate of growth averaging about 2.7%, while at the low end was Great Britain with an annual growth rate averaging 1.4%. The United States, which grew at a 1.8% average annual rate, was slightly below average."

They also went on to observe:

"For the United States, the long-term growth of real GDP per capita over the last 125 years has revealed remarkable steadiness, advancing decade after decade with only modest and temporary variation from the observed 1.8% annual rate of increase."

However, 1.8% is the long term average for real rates of growth so next we consider the nominal rate of growth. Inflation has been a fact of life for the U.S. economy. Inflation numbers suggest that inflation compounded from 1913 to 2008 resulted in a cumulative rate of 2071.23%[1] This, implies an annual constant compounded rate of approximately 3.24%.

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[1] Source www.InflationData.com

Combining the above we can make a reasonable estimate for one plus the long term nominal growth in the US, to be around 1.018*1.03 = 1.04854. As a result, to be conservative we will use as an upper bound for economy wide growth for US stocks (i.e., the stage 2 growth rate) is between 4.5-4.8%.

Getting this number correct is most important to a 2-stage dividend growth model of intrinsic value. This is because in stage 2 the simplifying assumption is that growth is constant in perpetuity. Further, this simplifying assumption will usually drive the majority of most stock's intrinsic value estimate when using this model. So as indicated earlier, nominal growth cannot exceed the overall rate for the economy as a whole in stage 2 and for some stocks a reasonable estimate may be lower.

What is a Reasonable Estimate for the Current Normal Growth Rate for the US Economy

Here we will assume that the 1.8% real rate applies and we will adjust the nominal rate for current projections of long term inflation rates. We based these projections upon the implied inflation rate from the current US Treasury Yield Curve. Current information for these long term implied inflation rates are provided by FTS at:

http://www.bondtutor.com/InflationExp/inflationexp.htm

The current screen reveals the following:
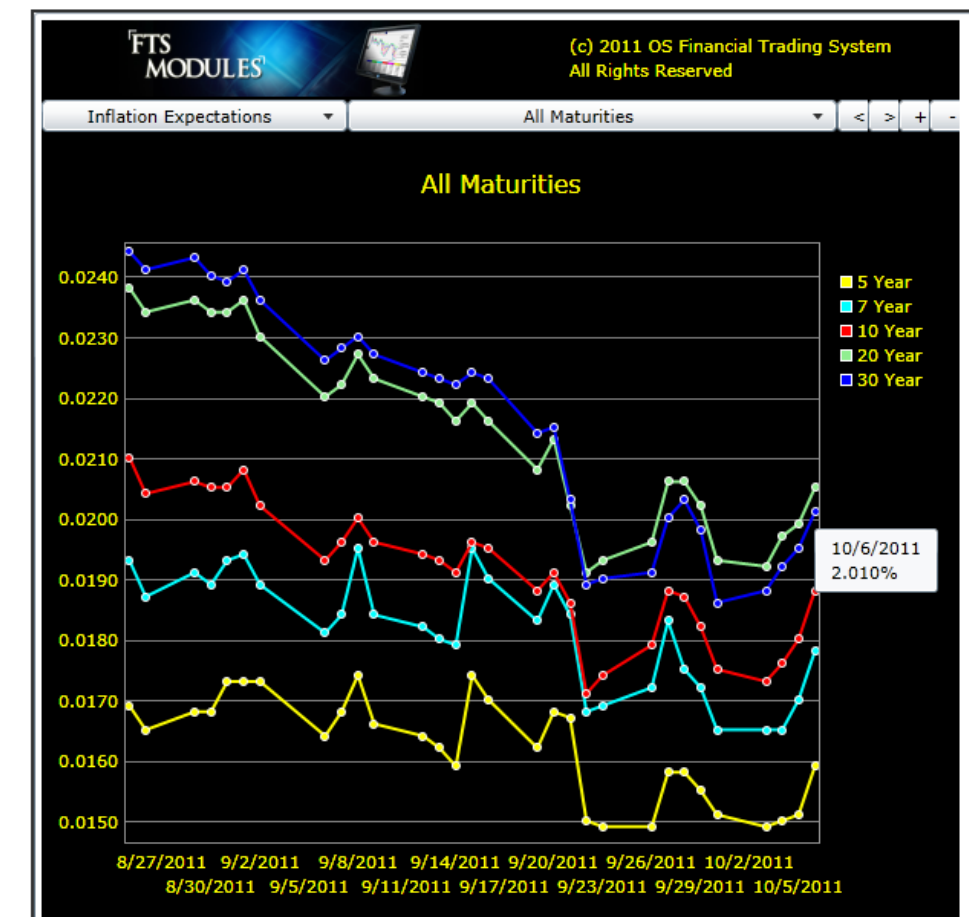
To read the numbers from this site bring up the graph and place the cursor over the dots. On 10/6/2011 the implied inflation rate from the 30-year bond was 2.010%. This implies that a reasonable estimate for normal growth as of this date is:

Current Upper Bound for Normal Growth = 1.018*1.0201 = 1.0384% or 3.84%.

Sample Answer to the Project Questions for Coca-Cola:

To provide a sample answer to the question we will use a traditional dividend paying stock. This stock is Coca-Cola which started in 1885 as a pharmacist's patent medicine. It grew to become the biggest selling soft drink in the world and its symbol became arguably most successful and widely recognized in the world.

Additional Information: The ticker symbol for Coca-Cola is KO. Go to the web (e.g., Yahoo finance or MSN investor or equivalent site and identify for the companies you are working with the following inputs:

i.	Suppose the current Dividend Rate per share for Coca-Cola is $1.76 per share (Column Div below).
ii.	Current forecast for the "Next 5-years Earnings' growth rate" equals 10.39% (column Growth 1 below).
iii.	Suppose the historical average is naively applied for the normal rate is 4.5% (column Growth 2 below).
iv.	Assume that the cost of equity capital is estimated from CAPM for KO is 0.0695 or 6.95%. KO's stock beta is around 0.60. The cost of equity capital is in the two columns (Disc 1 (k_e)), Disc 2 (k_e) for the two stages).

What is the implied abnormal growth rate from the 2-stage dividend model?

Assume the number of years in stage 1 equals 5 (see below under column Years 1) to match the same horizon as the analyst forecasts. In the screen below we use the RTFTS support titled: **"Stocks: Implied Intrinsics: 2 Stage."**

From this the implied growth numbers that are implied from the 2-stage dividend model given the current stock price for KO are now provided:

At the time of this write-up KO was trading around $66.43. The implied intrinsics below provide the implied growth rates for KO given the inputs into the 2-stage dividend model.

Name	Implied G1	Implied G2	Implied D1	Implied D2	Implied Div	Div	Growth 1	Growth 2	Years 1	Disc 1 (ke1)
3M COMPANY	0.1052	0.0402	0.1070	0.0872	1.8875	2.1000	0.1305	0.0450	5.0000	0.0823
ALCOA	0.8257	0.1401	-0.1537	0.0583	0.6890	0.1200	0.2430	0.0450	5.0000	0.2430
AMERICAN EXPRESS	0.5415	0.1223	-0.1636	0.0623	2.9526	0.7200	0.1301	0.0450	5.0000	0.1409
AT&T	-0.1435	-0.0141	0.3381	0.1331	0.5863	1.6900	0.0721	0.0450	5.0000	0.0690
BANK OF AMERICA	0.9749	0.1586	-0.3649	0.0497	0.6233	0.0400	0.0777	0.0450	5.0000	0.1639
BOEING	0.2237	0.0675	0.0025	0.0785	2.5998	1.6800	0.1136	0.0450	5.0000	0.1016
CATERPILLAR	0.4192	0.1085	-0.0924	0.0707	4.8073	1.7400	0.1341	0.0450	5.0000	0.1358
CHEVRON	0.0428	0.0415	0.0979	0.0788	2.5721	2.8400	0.0649	0.0450	5.0000	0.0751
CISCO SYSTEMS	N/A	N/A	N/A	N/A	N/A	0.0000	0.1133	0.0450	5.0000	0.0981
COCA-COLA	0.0185	0.0320	0.1592	0.0830	1.1974	1.7600	0.1039	0.0450	5.0000	0.0695
E.I DU PONT DE NEMOURS	0.1886	0.0700	0.0309	0.0898	2.3463	1.6400	0.0981	0.0450	5.0000	0.1159

That is, assuming that the model's two stage growth rates are: 10.39% for the first 5-years and then 4.5% thereafter and given the spot stock price is $66.43 then holding stage 2 growth fixed at 4.5% the implied stage 1 growth rate is 1.85% for KO. That is, the implied stage 1 growth rate given price is much lower than the estimated input for Stage 1 growth. This suggests that KO is currently being undervalued in the market. Or put alternatively to support a stock price of $66.43 only requires very conservative stage 1 growth forecast for KO.

However, the above assumes that the normal growth is 4.5% which is higher than what we inferred given the current US Treasury yield curve analysis provided earlier. As a result, we must first update the default parameters before drawing any conclusions about KO.

Updating the Parameters with the Dividend for Coca-Cola (KO)

You do this by selecting from the main menu in the trader "Parameters" (see below):
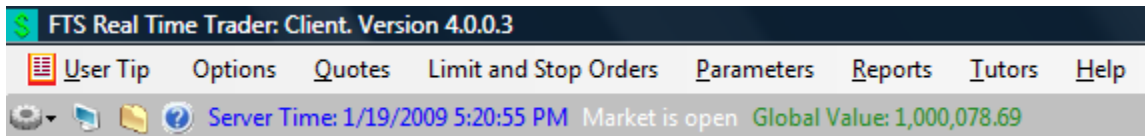
By selecting Parameters then from the pop up click on "List All" and select from the Security drop down "Coca-Cola". Next below Security the drop down beside the label "Field" lets you select which field you want to change in the Analytical support.
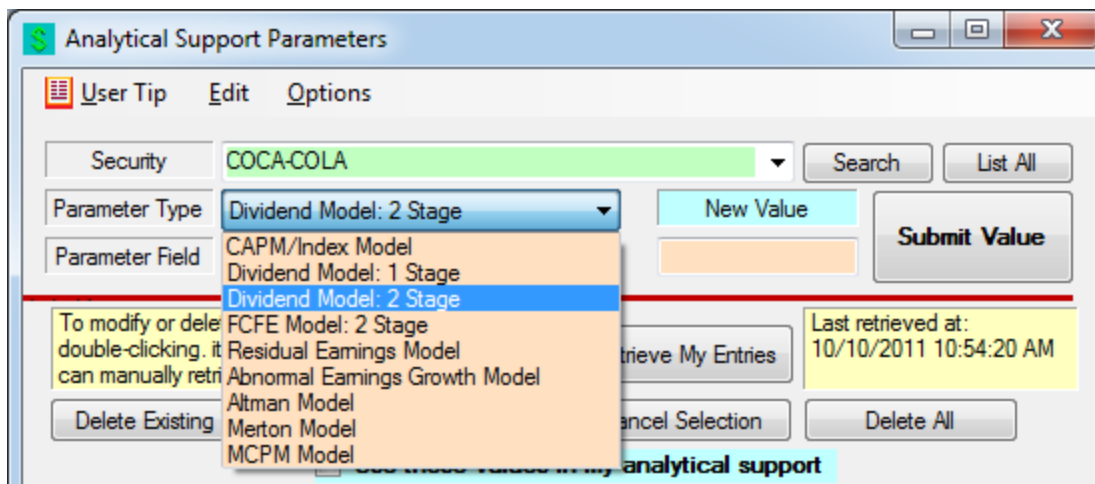
Suppose you wanted to change to the Accounting/Actual Dividend for Coca-Cola, you can do this directly from the Parameter support screen.
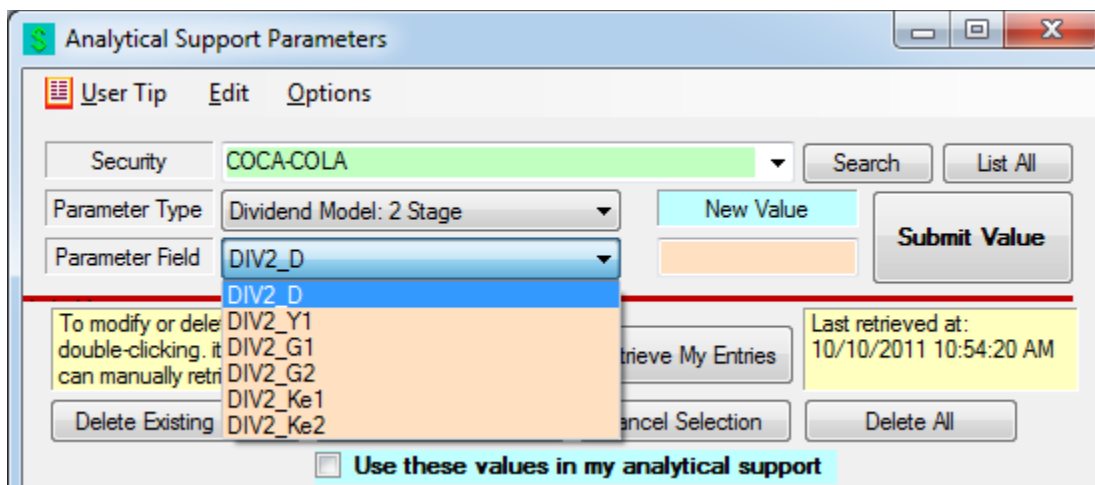
Sensitivity Analysis Using Current Market Growth Forecasts for KO and Normal Growth

The market's consensus forecast for KO has recently been revised down by analysts to 8% and suppose that normal growth for KO is revised down to 3.5%, which is consistent with our yield curve analysis.

What would our prediction for KO now look like from a 2-stage dividend model?

To answer this question we need to update the stage 1 growth rate to 0.08 and stage 2 to 0.035. You do this again via the parameter support as follows:

With the check box checked (Use these values in my analytical support). Now choose Stocks Dividend Model 2-Stage:

Now KO's intrinsic value is much close to the market price. In other words the market currently has reduced growth forecasts for KO when valuing the stock around $66.

Implied Dividend from Analyst Consensus and Economy Wide Growth Forecasts:

If we return to the initial "Implied Intrinsics screen for KO" given the above revised normal growth forecasts and the current stock price you can first see that the implied Stage 1 Growth Rate is now 0.0871 or 8.71% (see circled in below). This is now higher than the consensus forecast suggesting that KO is overvalued given it's current market price!

In addition, the implied dividend growth rate from the current price is $1.8155 (see below under Implied Div). As a result, the remaining question is what are the analyst assessing KO's current dividend rate to be?

If we look at what the current forward annual dividend rate for KO from Yahoo's statistics, they have:

If we use Parameters to update dividend rates we get the following:

Again by checking Use these values in my analytical support and going back to the screen "Stocks Dividend Model 2-Stage" reveals:

Name	Mkt Price	Intrinsic Val	Over/Under	Dividend	Implied Div	Exp Ret	Growth 1	Years 1	Disc 1	Growth 2	Disc 2
3M COMPANY	76.68	85.26	-11.19%	2.100	1.889	0.0863	0.1305	5	0.0823	0.0450	0.0823
ALCOA	9.98	1.74	82.53%	0.120	0.687	0.0739	0.2430	5	0.2430	0.0450	0.1547
AMERICAN EXPRESS	44.89	10.98	75.54%	0.720	2.943	0.0694	0.1301	5	0.1409	0.0450	0.1409
AT&T	28.89	83.23	-188.08%	1.690	0.587	0.1135	0.0721	5	0.0690	0.0450	0.0690
BANK OF AMERICA	6.19	0.40	93.55%	0.040	0.620	0.0529	0.0777	5	0.1639	0.0450	0.1639
BOEING	63.98	41.40	35.30%	1.680	2.597	0.0820	0.1136	5	0.1016	0.0450	0.1016
CATERPILLAR	78.40	28.53	63.61%	1.740	4.781	0.0791	0.1341	5	0.1358	0.0450	0.1358
CHEVRON	97.68	107.78	-10.34%	2.840	2.574	0.0782	0.0649	5	0.0751	0.0450	0.0751
CISCO SYSTEMS	17.05	0.00	100.00%	0.000	0.648	N/A	0.1133	5	0.0981	0.0450	0.0981
COCA-COLA	66.58	68.90	-3.49%	1.880	1.817	0.0707	0.0800	5	0.0695	0.0350	0.0695
E.I DU PONT DE NEMOURS	43.05	30.12	30.04%	1.640	2.344	0.0950	0.0981	5	0.1159	0.0450	0.1159

Now the assessment of intrinsic value is very close to the current market price at the time of this example.

Conclusion: The market appears to be pricing KO approximately correctly relative to current forecasts. As a result, from a long term investors' perspective we would rate Coca-Cola as a hold currently given the implied values from a two stage abnormal growth model.

Recommendation: Hold for a long term investor.

The implied expected return for KO is 7.07% circled above. From this we can forecast KO's price in 1-year's time to be: Spot Price * (1 + E(Return) = 66.43*1.0707 = $71.13.