FTS Real Time System Project: Assessing Intrinsic Value using the Abnormal Earnings Growth (AEG) Model

Question: What is the intrinsic value of a stock using the AEG approach to valuation?

Contents:

I. Motivating Question:

The relationship between intrinsic or fair value and market prices is controversial. The efficient markets hypothesis asserts that market prices generally provide an unbiased and the best estimate of fair values because they immediately self correct when they deviate too far away from predicted equilibrium values. Behavioral finance argues that cognitive biases and other imperfections can prevent prices from self correcting. This debate has spilled over into Congressional hearings on Capitol Hill after the financial crisis of 2008. Bailout bill debates in Congress late September 2008 resulted in sections providing the SEC with the power of suspending fair value accounting.

The SEC would have the authority to "suspend, by rule, regulation, or order, the application of Statement Number 157 of the Financial Accounting Standards Board for any issuer...if the Commission determines that is necessary or appropriate in the public interest and is consistent with the protection of investors," Section 132 of the bill.

However, Hewitt the chief accountant at the SEC until January 2009 refused to suspend FAS 157 but instead worked to improve the standards by developing additional guidance and other tools for determining fair value. Similarly, the ex Federal Reserve Chairman, Alan Greenspan came under fire on Capitol Hill in October 2008 when he admitted that he had placed too much faith in efficient markets which led him to overlook important fundamentals when implementing regulatory policies.

In this project we address the issue of assessing the intrinsic or fair value of a stock using a residual earnings model applied to companies that we expect are going concerns. You are required to adopt the role of an analyst/investor whose problem it is to assess whether the stocks you are working with are under, over or appropriately priced in the market place. By understanding how the accounting numbers can be used to assess value for stocks where active markets exist provide relevant insights for dealing with cases where no active market exists as required by current accounting standards.

II. Overview

What is Intrinsic Value of IBM stock?

Conceptually we can define the intrinsic value of a firm's stock as the present value of future *economic* dividends discounted back at the firm's cost of equity capital. Formally, an economic dividend is the dividend that *could* be paid by a stock over some period of time without affecting the beginning period value of the stock. That is, intrinsic value is tied to the Hicks concept of economic income. In addition, it does not matter whether or not a stock *actually pays* dividends when assessing it's intrinsic value.

Example: Google (GOOG) has recently traded around $430 per share even though it pays zero (accounting) dividends. What is important is that Google is generating earnings regardless of whether or not it chooses to pay an accounting dividend. Irrespective of whether or not dividends are paid what is important to intrinsic value is the opportunity cost associated with those dividends. In this current Abnormal Earnings Growth exercise you will learn how the actual dividend decision does not matter in

this model of intrinsic value because the opportunity cost of dividends is accounted for in the concept of "Cum-dividend earnings."

III. Assessing the Intrinsic Value of a Firm: Key Concepts

To assess intrinsic value in practice, we need to work with some alternative formulation of the concept of economic income. In accounting there are two equivalent approaches, residual earnings (RE) and abnormal earnings growth (AEG). Both approaches are analytically equivalent when applied using the same valuation assumptions. However, each approach highlights different drivers of intrinsic value.

In this exercise we will apply the AEG approach which assesses value starting from capitalized earnings and then further adjusts this value for the added value from forecast earnings growth. The three main concepts underlying this approach are: Normal Earnings, Abnormal Earnings Growth and the Cost of Equity Capital. The latter equals the investors' required rate of return in the capital markets.

Concept 1 (Normal Earnings): The firm's normal earnings is defined as earnings that are due to growth at the investors' required rate of return. This is defined as:

$\text{Normal Earnings}_t = \text{Cost of Equity Capital} * \text{Comprehensive Earnings}_{t-1}$

Concept 2 (Abnormal Earnings Growth): This concept is designed to capture the value added from anticipated earnings growth. In a two stage growth model of intrinsic value the growth behavior for stage 1 is often referred to as "abnormal growth." This is because during stage 1 growth behavior is permitted to exceed economy wide growth bounds. The interval of time covered by stage 1 is often assumed by analysts to be in the range of 5-7 years, but the exact length is subject to economic considerations. For example, a software firm may only have 2-years of large growth before competition sets in, whereas a monopolist who is protected by strong barriers to entry may have 10-years! As a result, analysts must take into account these economic considerations when deciding how many years to define stage 1 over plus the assumed growth rate for this period of time. Stage 2, immediately follows stage 1. For a going concern stage 2 is assumed to last forever for mathematical convenience for computing present values as perpetuities. As a practical note, because the required rate of return is positive, discounting eliminates the "forever part" by applying smaller and smaller present value weightings to cash inflows further out in time. In this stage growth is referred to as normal and it is bound from above by economy wide growth.

The abnormal earnings growth refers to earnings growth over time and is defined each year (time = t) to be the difference between dividend protected earnings and earnings that grow at the required rate of return. This is defined as follows:

$\text{Abnormal Earnings Growth}_t = \text{Cum-Dividend Earnings}_t - \text{Normal Earnings}_t$

And Cum-Dividend Earnings are defined as:

$\text{Cum-dividend earnings} = \text{Comprehensive Earnings} + \text{Cost of Equity Capital} * \text{Accounting Dividend}_{t-1}$

Note: Both Abnormal Earnings Growth and Residual Earnings approaches to valuation are based upon the clean surplus accounting using "Comprehensive Income" which attempts to measure the total of all operating and financial events that have changed the shareholders' equity over the period.

To project residual earnings into the future the second important input for this concept is assessed growth behavior of earnings. This allows earnings to be projected out over time by growing at the assessed growth rates. Under these projections if abnormal earnings growth is expected to be positive over time then intrinsic value will exceed the capitalized earnings and vice-versa.

Concept 3 (Cost of Capital): The cost of capital is the investors' required rate of return from the investment. This is the discount rate used to compute the present value of future residual earnings per share. It is equivalently referred to as the stock's *cost of equity capital*.

Next we will apply the above concepts to assess the intrinsic value of IBM.

IV. Concept 1 Normal Earnings

Normal earnings are earnings that grow at the required rate:

Normal Earnings$_t$ = Cost of equity capital * Earnings$_{t-1}$

IBM Example: The 10-K filings from IBM provide the source data as follows: From Left to Right being 2009, 2008, and 2007:

Net income		**$ 13,425**	$ 12,334	$ 10,418
Earnings/(loss) per share of common stock:				
Assuming dilution:				
Continuing operations	R	**$ 10.01**	$ 8.89*	$ 7.15*
Discontinued operations	R	**—**	—	(0.00)
Total	R	**$ 10.01**	$ 8.89*	$ 7.15*
Basic:				
Continuing operations	R	**$ 10.12**	$ 9.02*	$ 7.27*
Discontinued operations	R	**—**	—	(0.00)
Total	R	**$ 10.12**	$ 9.02*	$ 7.27*
Weighted-average number of common shares outstanding:				
Assuming dilution		**1,341,352,754**	1,387,797,198*	1,456,880,751*
Basic		**1,327,157,410**	1,369,367,069*	1,433,935,221*

Source 2008 selected parts from the 10-K IBM SEC Filing

From the above the **Earnings per share** = $13,425/1,341 = $10.01

For this model the concept of earnings applied is Comprehensive income. This is defined as follows:

Comprehensive income = Net income + Other Comprehensive income

In the 10-K statements the last three years for "Other Comprehensive Income" is available in the Stockholders Equity Statement.

Conceptual Note:

In dirty surplus accounting some items are adjusted to the stockholder's equity as opposed to the income statement. The main three items are: foreign currency translation, pension liability and hedge accounting adjustments. As a result, these items can fluctuate from year to year and so we will take the average over the three years provided in the 10-K as a first pass for "Other Comprehensive Income."

The three years provided (2009, 2008 and 2007) respectively are:

Consolidated Statement of Changes in Equity
INTERNATIONAL BUSINESS MACHINES CORPORATION AND SUBSIDIARY COMPANIES

($ in millions)

	Common Stock and Additional Paid-in Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income/ (Loss)	Total IBM Stockholders' Equity*	Non-controlling Interests*	Total Equity*
2009							
Equity, January 1, 2009	$ 39,129	$ 70,353	$ (74,171)	$ (21,845)	$ 13,465	$ 119	$ 13,584
Net income plus other comprehensive income/(loss):							
Net income		13,425			$ 13,425		$ 13,425
Other comprehensive income/(loss), net of tax:							
Net unrealized gains/(losses) on cash flow hedge derivatives (net of tax benefit of $256)				(556)	(556)		(556)
Foreign currency translation adjustments (net of tax benefit of $57**)				1,732	1,732		1,732
Retirement-related benefit plans:							
Prior service costs/(credits) (net of tax expense of $146)				229	229		229
Net (losses)/gains (net of tax expense of $439)				994	994		994
Curtailments and settlements (net of tax benefit of $33)				(93)	(93)		(93)
Amortization of prior service (credits)/costs (net of tax benefit of $55)				(107)	(107)		(107)
Amortization of net gains/(losses) (net of tax expense of $402)				704	704		704
Net unrealized gains/(losses) on marketable securities (net of tax expense of $71)				111	111		111
Total other comprehensive income/(loss)					3,015		3,015
Subtotal: net income plus other comprehensive income/(loss)					$ 16,440		$ 16,440
Cash dividends declared–common stock		(2,860)			(2,860)		(2,860)
Common stock issued under employee plans (30,034,808 shares)	3,011				3,011		3,011
Purchases (1,550,846 shares) and sales (6,408,265 shares) of treasury stock under employee plans–net		(19)	462		443		443
Other treasury shares purchased, not retired (68,650,727 shares)			(7,534)		(7,534)		(7,534)
Changes in other equity	(330)				(330)		(330)
Changes in noncontrolling interests						(1)	(1)
Equity, December 31, 2009	$ 41,810	$ 80,900	$ (81,243)	$ (18,830)	$ 22,637	$ 118	$ 22,755

Consolidated Statement of Changes in Equity
INTERNATIONAL BUSINESS MACHINES CORPORATION AND SUBSIDIARY COMPANIES

($ in millions)

	Common Stock and Additional Paid-in Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income/ (Loss)	Total IBM Stockholders' Equity*	Non-controlling Interests*	Total Equity*
2008**							
Equity, January 1, 2008	$ 35,188	$ 60,640	$ (63,945)	$ (3,414)	$ 28,470	$ 145	$ 28,615
Net income plus other comprehensive income/(loss):							
Net income		12,334			$ 12,334		$ 12,334
Other comprehensive income/(loss), net of tax:							
Net unrealized gains/(losses) on cash flow hedge derivatives (net of tax expense of $79)				301	301		301
Foreign currency translation adjustments (net of tax benefit of $153+)				(3,552)	(3,552)		(3,552)
Retirement-related benefit plans:							
Prior service (credits)/costs (net of tax benefit of $86)				(136)	(136)		(136)
Net (losses)/gains (net of tax benefit of $8,436)				(15,245)	(15,245)		(15,245)
Curtailments and settlements (net of tax expense of $9)				16	16		16
Amortization of prior service (credits)/costs (net of tax benefit of $73)				(132)	(132)		(132)
Amortization of net gains/(losses) (net of tax expense of $358)				640	640		640
Net unrealized gains/(losses) on marketable securities (net of tax benefit of $207)				(324)	(324)		(324)
Total other comprehensive income/(loss)					(18,431)		(18,431)
Subtotal: Net income plus other comprehensive income/(loss)					$ (6,097)		$ (6,097)
Cash dividends declared–common stock		(2,585)			(2,585)		(2,585)
Common stock issued under employee plans (39,374,439 shares)	3,919				3,919		3,919
Purchases (1,505,107 shares) and sales (5,882,800 shares) of treasury stock under employee plans–net		(36)	391		355		355
Other treasury shares purchased, not retired (89,890,347 shares)	54		(10,618)		(10,563)		(10,563)
Changes in other equity	(33)				(33)		(33)
Changes in noncontrolling interests						(26)	(26)
Equity, December 31, 2008	$ 39,129	$ 70,353	$ (74,171)	$ (21,845)	$ 13,465	$ 119	$ 13,584

Consolidated Statement of Changes in Equity
INTERNATIONAL BUSINESS MACHINES CORPORATION AND SUBSIDIARY COMPANIES

($ in millions)

	Common Stock and Additional Paid-in Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income/ (Loss)	Total IBM Stockholders' Equity*	Non-controlling Interests*	Total Equity*
2007**							
Equity, January 1, 2007	$ 31,271	$ 52,432	$ (46,296)	$ (8,901)	$ 28,506	$ 129	$ 28,635
Cumulative effect of change in accounting Principle +		117			117		117
Net income plus other comprehensive Income/(loss):							
Net income		10,418			$ 10,418		$ 10,418
Other comprehensive income/(loss), net of tax:							
Net unrealized gains/(losses) on cash flow hedge derivatives (net of tax benefit of $32)				(123)	(123)		(123)
Foreign currency translation adjustments (net of tax benefit of $553++)				726	726		726
Retirement-related benefit plans:							
Prior service costs/(credits) (net of tax expense of $31)				44	44		44
Net gains/(losses) (net of tax expense of $1,913)				3,611	3,611		3,611
Amortization of prior service costs/(credits) (net of tax benefit of $50)				(85)	(85)		(85)
Amortization of net gains/(losses) (net of tax expense of $654)				1,110	1,110		1,110
Amortization of transition assets (net of tax benefit of $1)				(2)	(2)		(2)
Net unrealized gains/(losses) on marketable securities (net of tax expense of $132)				206	206		206
Total other comprehensive income/(loss)					5,487		5,487
Subtotal: net income plus other comprehensive income/(loss)					$ 15,905		$ 15,905
Cash dividends declared–common stock		(2,147)			(2,147)		(2,147)
Common stock issued under employee plans (49,137,038 shares)	4,332				4,332		4,332
Purchases (1,282,131 shares) and sales (9,282,055 shares) of treasury stock under employee plans–net		(179)	729		550		550
Other treasury shares purchased, not retired (178,385,436 shares)	(405)		(18,378)		(18,783)		(18,783)
Changes in other equity	(10)				(10)		(10)
Changes in noncontrolling interests						16	16
Equity, December 31, 2007	$ 35,188	$ 60,640	$ (63,945)	$ (3,414)	$ 28,470	$ 145	$ 28,615

It is evident that the year to year fluctuations are large. As a result, by taking the average:

Other Comprehensive Income = (3015 +(18431) + 5487)/3 = (3309.67)

The Comprehensive income that we will apply for valuation purposes is:

Comprehensive income = $13,425 + ($3310) = $10115 million

Comprehensive Earnings per share = $10,115/1,341 = $7.5428

In part VI. We will compute the investors' required rate of return to complete the inputs required for Normal Earnings.

V. Concept 2 Estimating Abnormal Earnings Growth

In the previous section we computed the Comprehensive Earnings per share for 2009 as $7.5428. To estimate Abnormal Earnings Growth we need to estimate 2010 Cum-dividend earnings.

2009 Earnings_t = Earnings_t + Cost of Equity Capital*Dividend_{t-1}

Operational Details

Dividend Information is available from the Owners Equity part of the Balance Sheet:

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INTERNATIONAL BUSINESS MACHINES CORPORATION AND SUBSIDIARY COMPANIES

($ in millions)

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Cash dividends declared–common stock		(2,860)			(2,860)		(2,860)
Common stock issued under employee plans (30,034,808 shares)	3,011				3,011		3,011
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Other treasury shares purchased, not retired (68,650,727 shares)			(7,534)		(7,534)		(7,534)
Changes in other equity	(330)				(330)		(330)
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Equity, December 31, 2009	$ 41,810	$ 80,900	$ (81,243)	$ (18,830)	$ 22,637	$ 118	$ 22,755

Source 2009 10-K IBM SEC Filing

From the Income Statement:

Weighted-average number of common shares outstanding:			
Assuming dilution	**1,341,352,754**	1,387,797,198*	1,456,880,751*
Basic	**1,327,157,410**	1,369,367,069*	1,433,935,221*

Continuing the example using the 10-K filings then the dividend per share for IBM equals:

Dividend per Share = Dividends/(Shares issued – Treasury Stock) = 2,860/1341 = $2.132 equals the dividend per share.

Dividend Payout Ratio (Relative to Comprehensive Earnings) = 2860/10115 = 0.283

Comprehensive Earnings per share = $10,115/1341 = $7.543

Dividend forecast information from analysts is available on the web. For example, Yahoo finance reports for IBM:

Dividends & Splits	
Forward Annual Dividend Rate[4]:	2.60
Forward Annual Dividend Yield[4]:	2.10%
Trailing Annual Dividend Yield[3]:	2.30
Trailing Annual Dividend Yield[3]:	1.90%
5 Year Average Dividend Yield[4]:	0.80%
Payout Ratio[4]:	21.00%
Dividend Date[3]:	Jun 9, 2010
Ex-Dividend Date[4]:	May 6, 2010
Last Split Factor (new per old)[2]:	2:1
Last Split Date[3]:	May 27, 1999

The forward annual dividend is predicted to be $2.60 per share.

Dividend Summary

Dividend per Share = Dividends/(Shares issued – Treasury Stock) = 2,860/1341 = $2.132 equals the dividend per share.

What is the consensus abnormal growth forecast for IBM?

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Here we will check two general sources from the web Yahoo Finance and MSN Money. These numbers are constantly revised over time in response to changes in the economy. For example, around April 2009 these numbers were:

Yahoo Finance

Yahoo Finance

Growth Est	IBM	Industry	Sector	S&P 500
Current Qtr.	11.20%	17.10%	63.10%	21.80%
Next Qtr.	13.80%	14.30%	33.00%	19.00%
This Year	12.60%	13.10%	39.30%	35.00%
Next Year	9.20%	13.00%	11.90%	17.80%
Past 5 Years (per annum)	19.50%	N/A	N/A	N/A
Next 5 Years (per annum)	10.86%	11.87%	11.96%	N/A
Price/Earnings (avg. for comparison categories)	11.11	13.93	13.57	13.23
PEG Ratio (avg. for comparison categories)	1.02	1.17	1.13	N/A

MSN Investor

Earnings Growth Rates	Last 5 Years	FY 2010	FY 2011	Next 5 Years	10 P/E
Company	+15.20%	+12.50%	+9.60%	+10.00%	11.10
Industry	-2.40%	+8.90%	+33.30%	+15.90%	16.10
S&P 500	-3.00%	+39.80%	+18.10%	NA	13.70

From the above the reported consensus forecasts for earnings are:

Current Year (FY2010): 12.6% and 12.5%

FY 2010: 9.2% and 9.6%

5-year projection: 10.86% and 10.00%

We will use the average of these estimates: 12.55%, 9.4% and 10.43% respectively as a first pass.

In a two stage growth model growth behavior is accurately forecast out for some period of time which is usually 5-years. Then a simplifying assumption is made that the income grows in perpetuity at some constant rate. This constant rate is referred to as the normal growth rate. The normal growth rate is constrained by economy wide growth as we cannot assume that a stock grows in perpetuity at a greater rate than this constraint. Otherwise, the stock (in the distant future) is implied to grow larger than the economy as a whole – a contradiction.

Normal Growth Example: We will use 4.5% for the stage 2 normal growth estimate as a conservative long term average growth rate for IBM. This number can be justified from long term macroeconomic data for the US economy.

First, refer to 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."

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%.

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) the rounded down number of 4.5%.

Current Summary of Key Inputs:

Dividend per Share = Dividends/(Shares issued – Treasury Stock) = 2,860/1341 = $2.132 equals the dividend per share.

Dividend Payout Ratio (Relative to Comprehensive Earnings) = 2860/10115 = 0.283

Comprehensive Earnings per share 2009 = $10,115/1341 = $7.543

Expected Comprehensive EPS FY 2010 $7.543*1.1255 **=** $8.49

Expected Comprehensive EPS FY 2011 $8.49*1.094 = $9.288

5-Year Growth = 0.1043

Normal Growth = 0.045

Projected Dividend Per Share (Next Year) = $8.49*0.283 = $2.403

Years in Stage 1: 5-years

We next turn our attention to the discount rate – that is assessing IBM's Cost of Equity Capital.

VI. Concept 3 Estimating the Cost of Equity Capital

The cost of equity capital for the firm as a whole is different from the cost of equity capital for the stock issued by the firm. The difference arises whenever a firm uses both debt and equity in their financing mix. For the firm as a whole as introduced in the beginning of this write-up the cost of capital is a weighted average cost of capital. The usual formulation is in terms of the after tax weighted average cost of capital.

$$WACC = \frac{D}{D+E}\, k_d(1-\tau_c) + \frac{E}{D+E} k_e$$

Where τ_c is the effective corporate tax rate, k_d is the cost of debt capital and k_e is the cost of equity capital. The above equation works with the after tax cost of debt because interest expense is tax deductible whereas dividend payments are not. For the stock (k_e) the most widely used first pass

[1] Source www.InflationData.com

estimate is provided from the Capital Asset Pricing Model (CAPM) estimate. This implies that k_e is a function of three major inputs:

i. Risk free rate (Estimated from US Treasury bonds)
ii. Beta (Measures how much volatility the stock contributes to the market as a whole)
iii. Equity Premium (Excess return expected from stocks over the risk free rate)

i. First, you can get current estimates for the risk free rate from www.bloomberg.com:

U.S. Treasuries

	COUPON	MATURITY DATE	CURRENT PRICE/YIELD	PRICE/YIELD CHANGE	TIME
3-MONTH	0.000	08/26/2010	0.15 / .15	-0.002 / -.002	11:00
6-MONTH	0.000	11/26/2010	0.21 / .21	-0.005 / -.005	11:28
12-MONTH	0.000	05/05/2011	0.31 / .31	-0.002 / -.002	11:00
2-YEAR	0.750	05/31/2012	99-30+ / .77	-0-00+ / .008	11:53
3-YEAR	1.375	05/15/2013	100-15 / 1.21	0-02 / -.022	11:46
5-YEAR	2.125	05/31/2015	100-08½ / 2.07	0-03½ / -.023	11:50
7-YEAR	2.750	05/31/2017	100-04½ / 2.73	0-04+ / -.022	11:50
10-YEAR	3.500	05/15/2020	101-28 / 3.28	0-02 / -.007	11:53
30-YEAR	4.375	05/15/2040	103-01+ / 4.19	0-05½ / -.010	11:53

We will assume a 30-year investor and set R_f = 4.19%

ii. We will work with popular web sites to get an estimate of Beta for IBM from. For example, MSN Money, Yahoo Investor and Google Finance all provide estimates. For the current example, beta for IBM was taken from the Google finance site:

International Business Machines Corp. (Public, NYSE:IBM) Watch this stock

125.68 **+0.42 (0.34%)**
Real-time: 11:58AM EDT
NYSE real-time data - Disclaimer

Range	124.35 - 126.88	Mkt cap	161.17B	Shares	1.28B
52 week	99.50 - 134.25	P/E	12.22	Beta	0.76
Open	124.69	Div/yield	0.65/2.07	Inst. own	59%
Vol / Avg.	2.55M/9.01M	EPS	10.28		

Beta = 0.76

iii. Again, like expected return the equity premium cannot be observed because it requires an estimate of the expected return from the market. So again this needs to be estimated. We do so from historical averages as discussed below.

The average real return from 1872 to 2000 in the US on the S&P500 index is 8.81% (Fama and French, JF April 2002). If we combine this with the estimate for long term inflation in the US (as discussed in the Normal Growth section above) which equals 3.24% then the long term average equity premium for the US is 5.57%. As a first pass we will use the estimate of 5.5% however we note that the equity premium

fluctuates over time. For example, in the 1990's it was commonly speculated that the equity premium had declined and some estimates were as low as 3.5%. For example, interested readers are encouraged to read the speech by Allan Greenspan "Measuring Financial Risk in the 21st Century"

http://www.federalreserve.gov/BOARDDOCS/SPEECHES/1999/19991014.htm

Similarly, an interesting paper by Pablo Fernandez at the University of Navarra, has extensively surveyed textbooks and professors to provide international estimates of current equity premiums:

http://ssrn.com/abstract=1344209

This paper provides estimates for the Australia, Canada, Europe, UK and US.

Cost of Equity Capital, using CAPM, for IBM

Collecting above together $k_e = r_f + \beta_i*(E(R_M) - r_f) = 0.0419 + 0.76*0.055 = 0.0837$

Summary

Dividend per Share = Dividends/Shares issued = 2,860/1341 = $2.132 equals the dividend per share.

Dividend Payout Ratio (Relative to Comprehensive Earnings) = 2860/10115 = 0.283

Comprehensive Earnings per share 2009 = $10,115/1341 = $7.543

Expected Comprehensive EPS FY 2010 $7.543*1.1255 = $8.49

Expected Comprehensive EPS FY 2011 $8.49*1.094 = $9.288

5-Year Growth = 0.1043

Normal Growth = 0.045

Projected Dividend Per Share (Next Year) = $8.49*0.283 = $2.403

Years in Stage 1: 5-years

Cost of Equity Capital (k_e) = 0.0837

Concept Review: Implied Equivalence Relationship in the IBM Example

We can verify the calculation the various earnings estimates and then apply these to illustrate the relationship between AEG at a point in time and the change in Residual Income over time.

Equivalence Relationship between Abnormal Growth and the Change in Residual Earnings

As is well presented in the textbooks the AEG model is directly related to the residual income model because the AEG for a particular year can be expressed as the difference between Residual Income for

that year and the previous year. Recall, that Residual Income is measured in terms of the dollar earnings over and above what is required by investors' in the market relative to the book value of owners equity. That is,

In the current IBM example context this applies as follows:

$AEG_{2010} = (C.\ Earn_{2010} + k_e Div_{2009} – (1+ke)C.\ Earn_{2009}$

$= C.\ Earn_{2010} – C.\ Earn2009 – k_e\ (C.\ Earn_{2009} – Div_{2009})$

From the clean surplus relationship and comprehensive earnings

$Book\ Value_{2009} = Book\ value_{2008} + C.\ Earn_{2009} – Div_{2009}$

Substituting in:

$AEG_{2010} = C.\ Earn_{2010} – C.\ Earn_{2009} – k_e\ (\ Book\ Value_{2009} - Book\ value_{2008})$

Rearranging we express as the differences between two residual incomes

$= C.\ Earn_{2010} – k_e(\ Book\ Value_{2009}\ ) – C.\ Earn2009 – k_e(Book\ value_{2008})$

Verification of Equivalence

Inputs

Comprehensive Earnings per share 2009 = \$10,115/1341 = \$7.543

Expected Comprehensive EPS FY 2010 \$7.543*1.1255 = \$8.49

Expected Comprehensive EPS FY 2011 \$8.49*1.094 = \$9.288

Projected Dividend Per Share (2010) **=** \$8.49*0.283 = \$2.403

Cost of Equity Capital (k_e) = 0.0837

Normal Earnings

2009 Normal earnings = 1.0837*\$7.543 = \$8.174

2010 Normal earnings = 1.0837*\$8.49 = \$9.200

Recall that Abnormal Earnings Growth = $Comprehensive\ Income_t$ + Cost of Equity Capital * $Dividends_{t-1}$ – $Normal\ Earnings_t$

2010 Abnormal earnings growth = \$9.288 + 0.0837*\$2.403 - \$9.200 = \$9.489 - \$9.200 = 0.289

So given current growth forecasts we expect IBM to return to positive Abnormal earnings growth.

FTS Residual Income exercise: This is verified for the same cost of equity capital as follows:

Residual Earnings Calculations for IBM:

IBM	2009	2010	2011
Per Share			
Earnings	7.543	8.490	9.288
Dividends	2.132	2.400	2.625
Book Value	16.881	22.971	29.634
ROCE (Return on Common Equity)		0.503	0.404
Residual Earnings		7.077	7.365

Difference: RE 2011 7.365 and RE2010 7.077 = 0.289 which equals the abnormal earnings growth above.

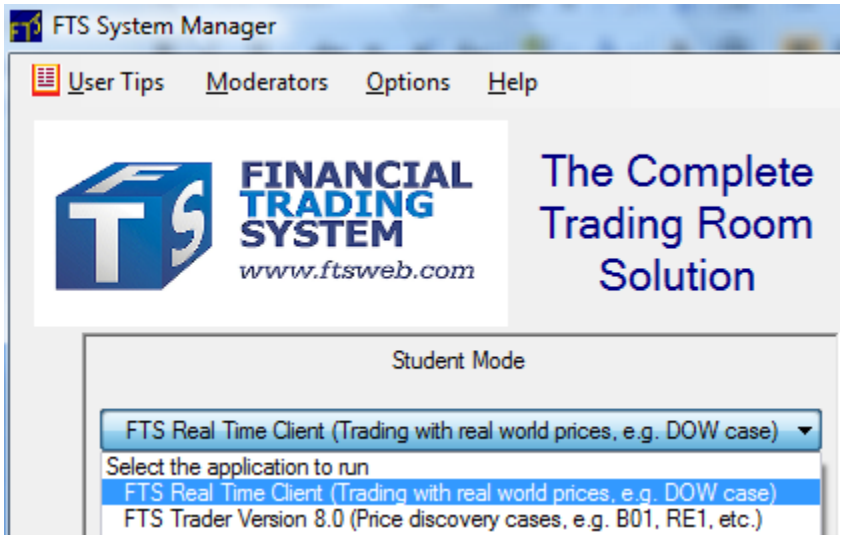
This verifies the analytical result for IBM

Finally, in the next section we apply this model to assess intrinsic value.

VII. Application Using the FTS System

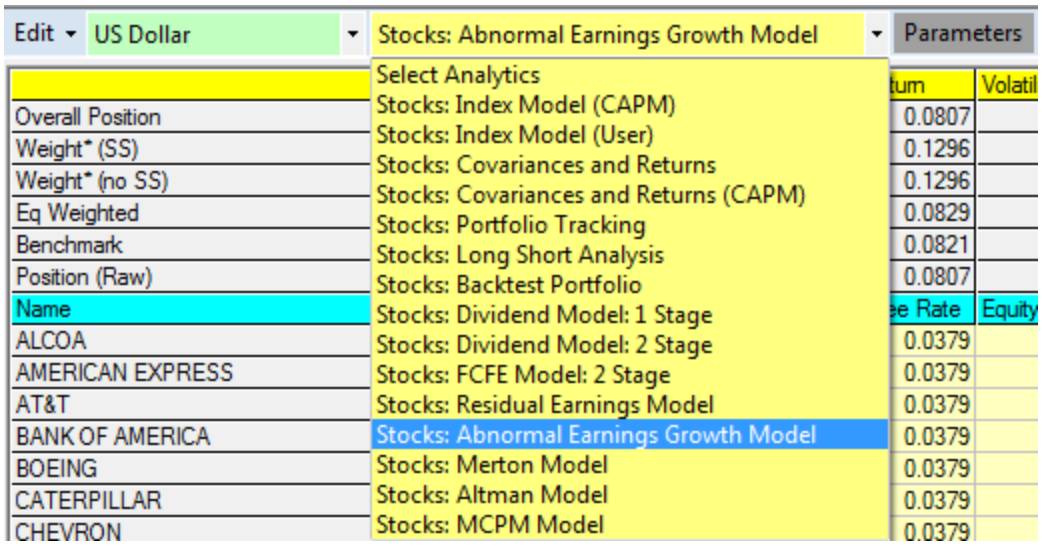
We will enter the values for IBM by gathering them together into a single location in the spreadsheet.

First launch the FTS Real Time Trader from the System Manager.

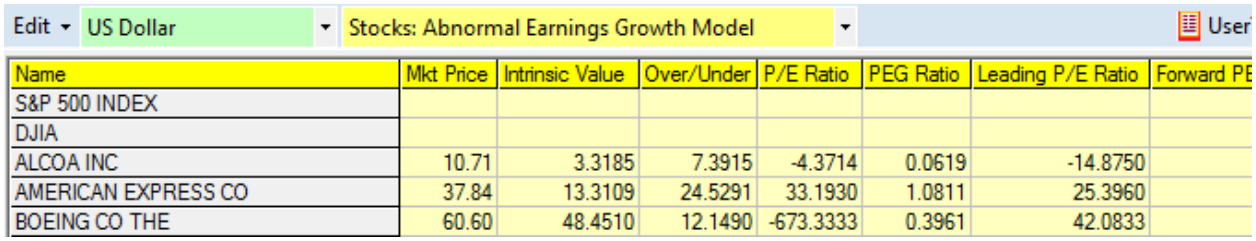


Once the FTS Real Time Client launches then select the trading exercise and enter your trading name, password and click on Login. If all is entered correctly it will connect to the market.

In the FTS Real Time Client the bottom RHS of the screen lets you select the analytical support from what is available. In this exercise we are using "Stocks: Abnormal Earnings Growth Model" so select this support from the yellow part of the screen below.



The bottom RHS will now appear as follows. It has the main inputs from the exercise to date as well as derived values from this model. The derived values will let you make additional inferences from the current market price.



In particular the following fields are available:

RE_BV (Book Value)
RE_D (Current Dividend)
RE_D1 (Next year's dividend)
RE_EPS (Current EPS)
RE_EPS1 (Next year's EPS)
RE_EPS2 (Following year's EPS)
RE_Y1 (Number of years in stage 1)
RE_G1 (Abnormal growth --- e.g., 5-year abnormal growth)
RE_G2 (Normal Growth)
RE_Ke1 (Cost of Equity Capital Stage 1)
RE_Ke2 (Cost of Equity Capital Stage 2)
RE_PR (Payout Ratio)

In addition the derived fields are:

Market Price – Current spot stock price

PV Abnormal Earnings --- PV of abnormal earnings in Stage 1

PV Continuing Value – PV of abnormal earnings in Stage 2

Intrinsic Value (Sum of PV of year 1 (forward) earnings in perpetuity (zero growth) + PV Abnormal Earnings from Stage 1 + PV Continuing Value from Stage 2)

Premium over Book --- Value of future residual earnings stream

Over/Under --- market price relative to intrinsic value

Current Summary of Key Inputs:

Dividend per Share = Dividends/Shares issued = 2,860/1341 = $2.132 equals the dividend per share.

Dividend Payout Ratio (Relative to Comprehensive Earnings) = 2860/10115 = 0.283

Comprehensive Earnings per share 2009 = $10,115/1341 = $7.543

Expected Comprehensive EPS FY 2010 $7.543*1.1255 = $8.49

Expected Comprehensive EPS FY 2011 $8.49*1.094 = $9.288

5-Year Growth = 0.1043

Normal Growth = 0.045

Projected Dividend Per Share (Next Year) = $8.49*0.283 = $2.403

Years in Stage 1: 5-years

Cost of Equity Capital (k_e) = 0.0837

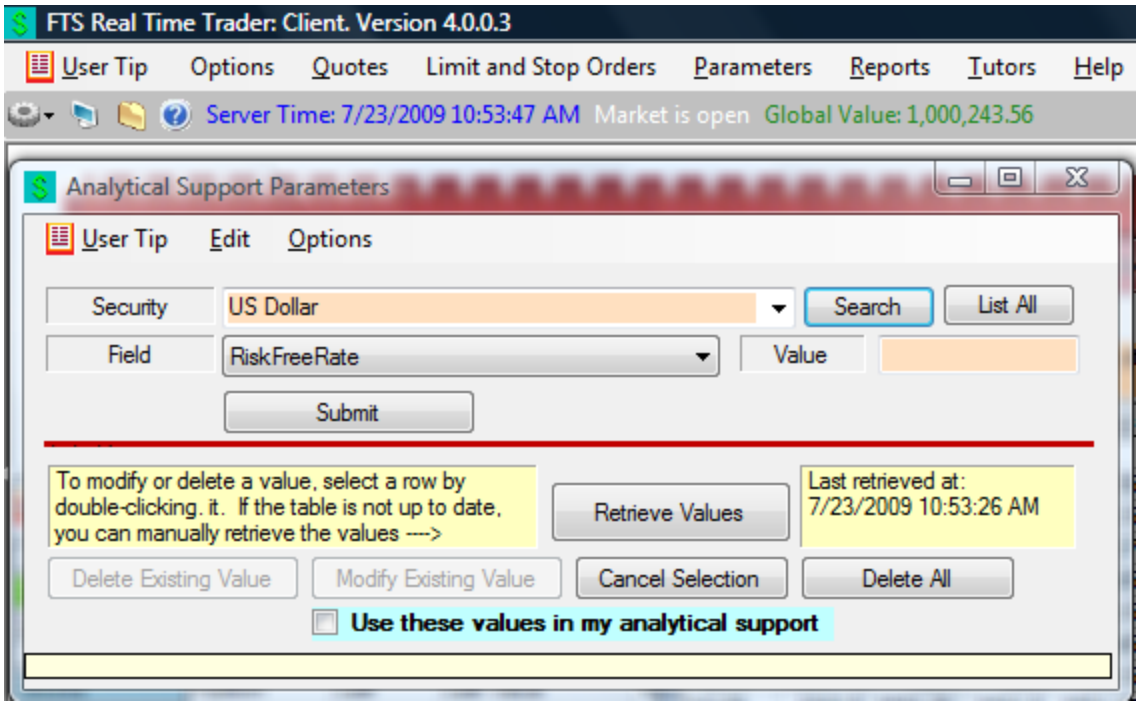
The remaining fields are derived fields.

Working with the FTS Real Time Client

You are encouraged to override the base set of inputs with your own inputs. These can be entered as follows.

Entering Personal Estimates into the Analytical Support

First, in the FTS Real Time Trader click on Menu item Parameters,



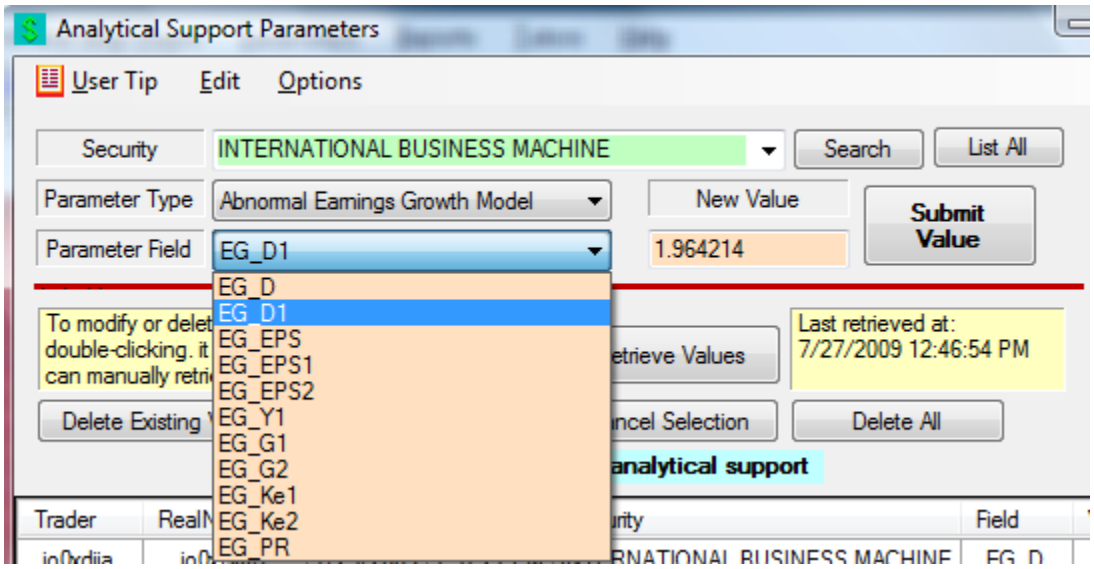
The values can be entered either manually or as a group from Excel. Once entered they are automatically stored on the FTS Server until you choose to delete or override with different inputs.

Tip: The Parameter menu item lets you store your current working set so that if you have multiple parameter sets you should keep other sets in your personal Excel workbook.

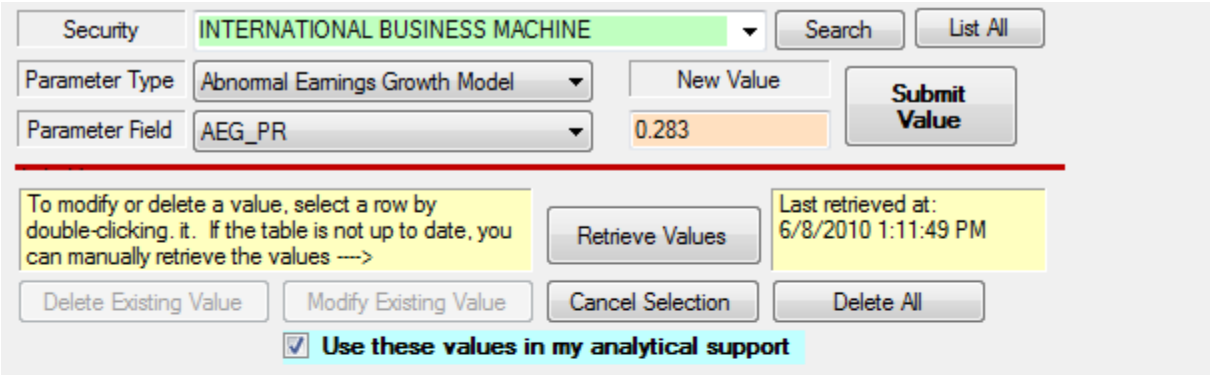
Entering Personal Values to Override FTS Default Values

Step 1: Click on List All above and then select IBM as the security from the dropdown

Step 2: Select the Residual Earnings Model



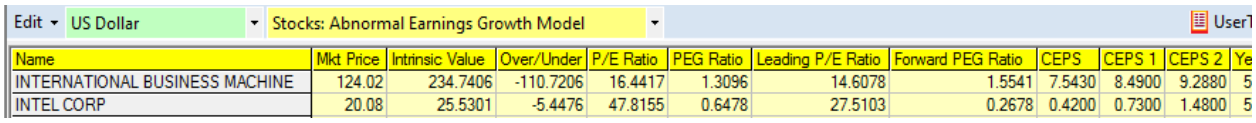
Step 3: For Parameter Field you can select all inputs depicted above and enter your personal override values. Your screen will appear as follows:



Trader	RealName	Date	Time	Security	Field	Value
jo0xdjia	jo0xDJIA	6/8/2010	1:11:10 PM	INTERNATIONAL BUSINESS MACHINE	AEG_G1	0.1043
jo0xdjia	jo0xDJIA	6/8/2010	1:11:20 PM	INTERNATIONAL BUSINESS MACHINE	AEG_G2	0.045
jo0xdjia	jo0xDJIA	6/8/2010	1:11:30 PM	INTERNATIONAL BUSINESS MACHINE	AEG_Ke1	0.0837
jo0xdjia	jo0xDJIA	6/8/2010	1:11:35 PM	INTERNATIONAL BUSINESS MACHINE	AEG_Ke2	0.0837
jo0xdjia	jo0xDJIA	6/8/2010	1:11:50 PM	INTERNATIONAL BUSINESS MACHINE	AEG_PR	0.283
jo0xdjia	jo0xDJIA	6/8/2010	1:09:58 PM	INTERNATIONAL BUSINESS MACHINE	AEG_D	2.132
jo0xdjia	jo0xDJIA	6/8/2010	1:10:10 PM	INTERNATIONAL BUSINESS MACHINE	AEG_D1	2.403
jo0xdjia	jo0xDJIA	6/8/2010	1:10:25 PM	INTERNATIONAL BUSINESS MACHINE	AEG_CEPS	7.543
jo0xdjia	jo0xDJIA	6/8/2010	1:10:36 PM	INTERNATIONAL BUSINESS MACHINE	AEG_CEPS1	8.49
jo0xdjia	jo0xDJIA	6/8/2010	1:10:47 PM	INTERNATIONAL BUSINESS MACHINE	AEG_CEPS2	9.288
jo0xdjia	jo0xDJIA	6/8/2010	1:10:58 PM	INTERNATIONAL BUSINESS MACHINE	AEG_Y1	5

Finally be careful to Check the Checkbox "Use these values in my analytical support"

The main trading screen now appears as follows:

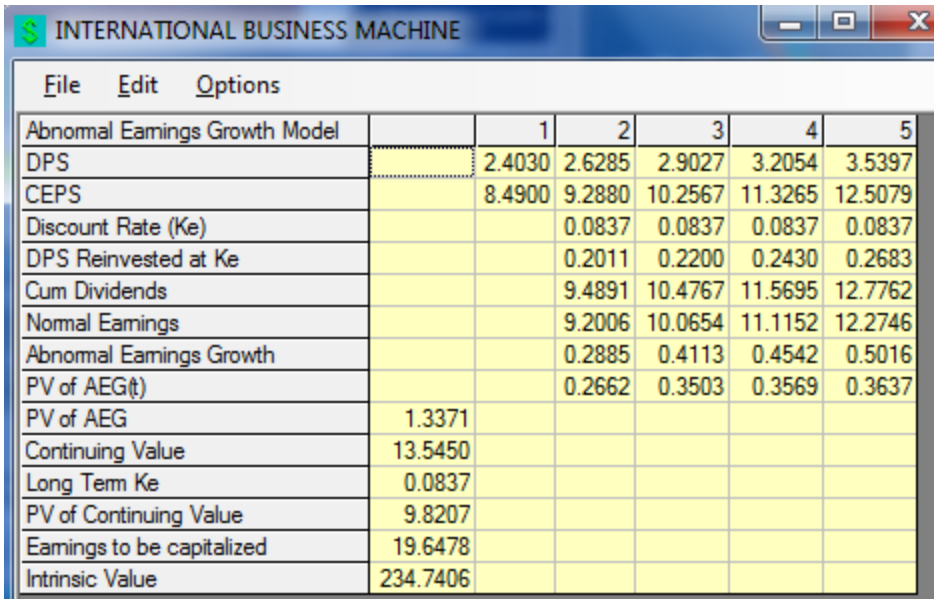


Name	Mkt Price	Intrinsic Value	Over/Under	P/E Ratio	PEG Ratio	Leading P/E Ratio	Forward PEG Ratio	CEPS	CEPS 1	CEPS 2	Ye
INTERNATIONAL BUSINESS MACHINE	124.02	234.7406	-110.7206	16.4417	1.3096	14.6078	1.5541	7.5430	8.4900	9.2880	5
INTEL CORP	20.08	25.5301	-5.4476	47.8155	0.6478	27.5103	0.2678	0.4200	0.7300	1.4800	5

For this first pass the AEG assessment is that IBM is currently undervalued.

VIII. Verifying the Calculations for Intrinsic Value

By double clicking on the name above International Business Machine in the Abnormal Earnings Growth Model's analytical support reveals the following grid:



Abnormal Earnings Growth Model		1	2	3	4	5
DPS		2.4030	2.6285	2.9027	3.2054	3.5397
CEPS		8.4900	9.2880	10.2567	11.3265	12.5079
Discount Rate (Ke)			0.0837	0.0837	0.0837	0.0837
DPS Reinvested at Ke			0.2011	0.2200	0.2430	0.2683
Cum Dividends			9.4891	10.4767	11.5695	12.7762
Normal Earnings			9.2006	10.0654	11.1152	12.2746
Abnormal Earnings Growth			0.2885	0.4113	0.4542	0.5016
PV of AEG(t)			0.2662	0.3503	0.3569	0.3637
PV of AEG	1.3371					
Continuing Value	13.5450					
Long Term Ke	0.0837					
PV of Continuing Value	9.8207					
Earnings to be capitalized	19.6478					
Intrinsic Value	234.7406					

1=2010, 2=2011, 3=2012, 4=2013, 5=2014

DPS equals projected Dividends per share. Here 2.403 = Dividend payout ratio times the Comprehensive Earnings per share for 2010 (8.49), and so on for 2011 etc.,.

CEPS for years 2012, 2013 are respectively 9.288*1.1043, 10.2567*1.1043 ….

DPS Reinvested at Ke = Opportunity cost associated with the dividends per share. For 2011 = 2.4030*0.0837 and so on.

CEPS Cum Dividends = Comprehensive Earnings$_t$ + ke * Dividends$_{t-1}$

For 2011 this equals 9.2880 + 0.2011 = 9.4891 and so on.

Normal Earnings$_t$ = (1+Cost of Equity Capital)*Comprehensive Earnings$_{t-1}$

For 2011 this equals 8.49*1.083 = 9.2006, 2012 = 9.288*1.0837 = 10.0654 and so on.

Abnormal Earnings Growth = Cum-Dividend Comprehensive Income$_t$ – Normal Earnings $_t$ = (Earnings$_t$ + (ke*Dividends$_{t-1}$) – (1+ke)*Earnings$_{t-1}$ = 9.4891 – 9.2006 = 0.2885 for 2010 and so on.

The time value of money now uses the discount rate each year equal to the cost of equity capital (0.0837).

The total earnings to be capitalized (19.6478) consists of three components at the end of 2010:

Earnings$_{2010}$ + PV$_{2010}$ Abnormal Earnings Growth + PV$_{2010}$ Continuing Value

Aside: Continuing value is the value under normal growth for years greater than year 5. In year 5 this is: 0.5016*(1+0.045)/(0.0837 – 0.045) = 13.545. Finally this is discounted back to present (beginning of 2010) (13.545/(1.0837^5) = 9.8207

Earnings to be capitalized = 8.49 + 1.3371 + 9.8207 = 19.6478

Intrinsic $Value_{Beginning\ of\ 2010}$ = 19.6478/0.0837 = $234.74

IX. Sensitivity Analysis

By how much do we need change the value of key inputs to make IBM's assessed value more consistent with the market price?

Your goal is to understand the underlying economics of the company you are valuing in terms of how from the firm side the three major decisions impact upon your assessments as well as how economy wide constraints impact upon your analysis. This will provide important insights into whether we assess the current market price to be reasonable or not. By attempting to answer the above question provides rich insight into how IBM is being valued by the market as well as which inputs of our "first pass" analysis may be optimistic. This will also provide useful experience for assessing the relative importance of the various inputs into this intrinsic value exercise. For the current exercise sensitivity analysis on Comprehensive Income is clearly a primary target for additional analysis.

X. Conclusions

The above analysis is clearly a first pass analysis and one that you can modify using the current best of estimates you can get your hands on. After working through the IBM example you should then focus attention on the stock that you are working with. You can also create live links to Excel for your personal parameter support to create even more powerful trading support systems if desired.