FTS Real Time System Project: Assessing Intrinsic Value using the Free Cash Flow to Equity (FCFE) Approach

Question: What is the intrinsic value of a stock using the FCFE 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 quickly self correcting. This debate spilled over into Congressional hearings on Capitol Hill in October 2008 resulting in Alan Greenspan admitting 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 these issues using a two stage free cash flows to equity 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.

II. Overview

What is Intrinsic Value of IBM stock?

We 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, it does not really matter whether or not a stock *actually pays* dividends when assessing it's intrinsic value.

Example: Google (GOOG) has recently traded around $500 per share even though it pays zero (accounting) dividends. What is important is that Google is generating free cash flows regardless of whether or not it chooses to pay an accounting dividend.

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

The approach adopted in this exercise is to consider the three major sets of decisions that determine the intrinsic value of a stock. These are: *Investment Decisions*, *Financing Decisions* and *Dividend Decisions*. We define intrinsic value of a stock as the present value of future (economic) dividends discounted by the stock's cost of equity capital. This implies there are three major inputs required to assess intrinsic value. These are: Economic Dividends, Future Growth Behavior and the Discount Rate which we refer to as the Cost of Equity Capital.

Concept 1 (Economic Dividends): The investment decisions determine the cash flows. We can break up these cash flows into two important components. The first, is cash that is required to sustain the value of the firm's investment decisions and the second is cash that can be distributed by the firm *without*

affecting the firm's value. The latter component we will refer to as "*Free Cash Flow (FCF)*." The former we will refer to as "*Capital Expenditure*." The relationship is captured in the following definition:

Free Cash Flow = Cash Flow from Operations - Capital Expenditures (CAPEX)

To value a stock, however, we only care about the Free Cash Flow to *Equity* (FCFE). This second measure recognizes that when the financing decision involves both debt and equity then some of the Capital Expenditures is funded by Debt-holders. As a result FCFE > FCF for a firm that has debt and equity.

Concept 2 (Growth Behavior): To project free cash flows into the future we need to assess the firm's growth behavior. We will consider this behavior in two stages. In stage 1 we will refer to the growth behavior as "abnormal" only because stage 1 growth is not subject to an upper bound of economy wide growth rates. That is, it is not unusual for for stage 1 growth rates to be larger than the economy wide growth upper bound and sometimes very much larger. In stage 2 we refer to growth as normal growth and this number cannot exceed the growth rate for the economy as a whole.

Concept 3 (Cost of Capital): The discount rate used to compute the present value of future free cash flows is referred to the *cost of capital*. This is the rate of return required by investors in the capital markets if investing new capital into the firm.

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

IV. Concept 1 Estimating Free Cash Flow to Equity (FCFE)

First we start with the concept of Free Cash Flows (to the firm) and then we will break this down into free cash flow to equity so we can value the firm's stock.

Estimating Free Cash Flows from a 10-K Statement Filed with the SEC

It is easy to calculate the Free Cash Flow from information filed with the SEC in the 10-Q and 10-K reports. In their 2009 10-K annual report IBM provided some selected discussion of free cash flows followed by a table comparing across years:

"Management uses a free cash flow measure to evaluate the company's operating results, plan share repurchase levels, evaluate strategic investments and assess the company's ability and need to incur and service debt. Free cash flow is not a defined term under U.S. GAAP and it should not be inferred that the entire free cash flow amount is available for discretionary expenditures. The company defines free cash flow as net cash from operating activities less the change in Global Financing receivables and net capital expenditures. As discussed on page 24, a key objective of the Global Financing business is to generate strong returns on equity.

From the perspective of how management views cash flow, in 2009, free cash flow was $15.1 billion, an increase of $0.8 billion compared to 2008. This cash performance is driven primarily by the growth in net income of $1.1 billion, lower capital spending of $0.8 billion and higher cash from sales cycle working capital ($1.2 billion), partially offset by higher retirement-related funding ($0.9 billion) and workforce rebalancing payments ($0.6 billion).

Over the past five years, the company generated over $61 billion in free cash flow. During that period, the company invested $13.8 billion in strategic acquisitions and returned over $63 billion to shareholders through dividends and share repurchases. The amount of prospective returns to shareholders in the form of dividends and share repurchases will vary based upon several factors including each year's operating results, capital expenditure requirements, research and development investments and acquisitions, as well as the factors discussed below."

($ in billions)

For the year ended December 31:	2009	2008	2007	2006	2005
Net cash from operating activities per GAAP (Continuing Operations)	$ 20.8	$ 18.8	$ 16.1	$ 15.0	$ 14.9
Less: Global Financing receivables	(1.9)	(0.0)	(1.3)	(0.3)	1.8
Net cash from operating activities (Continuing Operations), e xcluding Global Financing receivables	18.9	18.8	17.4	15.3	13.1
Capital expenditures, net	(3.7)	(4.5)	(5.0)	(4.7)	(3.5)
Free cash flow (excluding Global Financing receivables)	15.1	14.3	12.4	10.5	9.6
Acquisitions	(1.2)	(6.3)	(1.0)	(3.8)	(1.5)
Divestitures	0.4	0.1	0.3	—	0.9
Share repurchase	(7.4)	(10.6)	(18.8)	(8.1)	(7.7)
Dividends	(2.9)	(2.6)	(2.1)	(1.7)	(1.2)
Non-Global Financing debt	(4.7)	(3.2)	10.9	(1.1)	1.2
Other (includes Global Financing receivables and Global Financing debt)	1.7	5.0	3.8	1.1	1.9
Change in cash, cash equivalents and short-term marketable securities	$ 1.1	$ (3.2)	$ 5.5	$ (3.0)	$ 3.1

In the above IBM has applied the definition provided earlier for free cash flow.

Free Cash Flow = Cash Flow from Operations - Capital Expenditures (CAPEX) 1)

Free Cash Flow = 15.1 billion

Tip: In the above example CAPEX is taken directly from the accounting statements. In practice this should be viewed as a first pass because the analyst is attempting to assess and understand future CAPEX behavior. That is, what are the drivers of CAPEX? This may result in the average CAPEX over the last 3 or 5-years providing a better estimate than the most recent CAPEX number. In addition, further adjustments may be required from your understanding of the firm's investment decision if the past is not a good predictor of future CAPEX behavior.

Accrual Accounting Adjustments to Capital Expenditure

Under US GAAP each firm must disclose certain items in their change to Stockholders Equity section that may not flow through the regular income statement. These additional items flow in the concept of "Comprehensive Income."

Conceptual Note on Capital Expenditure:

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. Of these three major items the pension liability represents the cost of human

capital component of capital expenditure. This item 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."

For example for the case of IBM inspection of the 10-K reveals the following:

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

Looking at the last three years for the Retirement Related Benefit Plan which is the sub component of Other Comprehensive Income It is evident that the year to year fluctuations are large. As a result, by taking the average:

Retirement Related Benefit Plan = (229+994-93-107+704) +(-136-15245+16-132+640) +(44+3611-85+1110-2)/3 = (2819) billion. As a result, an additional adjustment is made to Capital Expenditure to reflect the human capital and other components of Capital Expenditure.

($ in billions)

For the year ended December 31:	2009	2008	2007	2006	2005
Net cash from operating activities per GAAP (Continuing Operations)	**$ 20.8**	$ 18.8	$ 16.1	$ 15.0	$ 14.9
Less: Global Financing receivables	**(1.9)**	(0.0)	(1.3)	(0.3)	1.8
Net cash from operating activities (Continuing Operations), e xcluding Global Financing receivables	**18.9**	18.8	17.4	15.3	13.1
Capital expenditures, net	**(3.7)**	(4.5)	(5.0)	(4.7)	(3.5)
Free cash flow (excluding Global Financing receivables)	**15.1**	14.3	12.4	10.5	9.6
Acquisitions	**(1.2)**	(6.3)	(1.0)	(3.8)	(1.5)
Divestitures	**0.4**	0.1	0.3	—	0.9
Share repurchase	**(7.4)**	(10.6)	(18.8)	(8.1)	(7.7)
Dividends	**(2.9)**	(2.6)	(2.1)	(1.7)	(1.2)
Non-Global Financing debt	**(4.7)**	(3.2)	10.9	(1.1)	1.2
Other (includes Global Financing receivables and Global Financing debt)	**1.7**	5.0	3.8	1.1	1.9
Change in cash, cash equivalents and short-term marketable securities	**$ 1.1**	$ (3.2)	$ 5.5	$ (3.0)	$ 3.1

Adjusted Capital Expenditure = 3.7 + 2.819 = 6.519 billions

Adjusted FCF =$15.1 – 2.819 = 12.381 billions

From the consolidated statement of earnings the weighted average number of common shares outstanding for 2009 was 1,341,352,754 (assuming dilution).

FCF per share = 12.381/1.341 = $9.233

We next turn our attention to the measure that is relevant for valuing a stock – this is FCFE.

Free Cash Flow to Equity (FCFE)

In this current exercise we are really only interested in assessing the intrinsic value of IBM stock not the company as a whole. As a result, we next make adjustments for the fact that IBM's assets are funded using both debt and equity. Thus we need to make additional adjustments to take into account that some of the Capital Expenditure (CAPEX) is funded by debt-holders. Again as a first pass we will make a simplifying assumption.

Adjusting a Stock's CAPEX:
Suppose the firm's financing decision includes some "target debt ratio." That is, if the debt ratio remains approximately constant over time then the simplest adjustment is the following:

Free Cash Flow to Equity = Free Cash Flow + Capital Expenditures * (Debt Ratio) 2)

Notice by substituting in equation 1) above into the "Free Cash Flow" in equation 2) this is equivalent to:

Free Cash Flow Equity = Cash Flow from Operations – (1- Debt Ratio)* Capital Expenditures (CAPEX) 3)

This method adjusts capital expenditures for that part which is permanently financed by debt holders if debt ratios are relatively stable over time (i.e., debt is rolled over).

Note: The above heuristic does not apply to a financial institution for which the issue of debt is part of their investment as opposed to financing decision. For example, the above heuristic does not apply to a bank.

We now turn to applying this discussion to calculate the FCFE number for IBM.

Adjustments to CAPEX for the Financing Decision

The difference between FCF and FCFE is to adjust for the fact that debt-holders fund part of the CAPEX. We can estimate what this adjustment is from estimating what proportion of the firm's assets are funded by debt. To do this we will consider one additional ratio called the Debt Ratio:

Debt to Total Assets (D/A)

As a first pass it can be assumed that this is the proportion of CAPEX funded by debt-holders is measured by the Debt Ratio

Example: Working from the 2010 10-K annual report and the numbers for 2009 and 2008 are respectively provided below from left to right.

Liabilities and equity			
Current liabilities:			
Taxes	P	$ 3,826	$ 2,743
Short-term debt	K&L	4,168	11,236
Accounts payable		7,436	7,014
Compensation and benefits		4,505	4,623
Deferred income		10,845	10,239
Other accrued expenses and liabilities		5,223	6,580
Total current liabilities		36,002	42,435
Long-term debt	K&L	21,932	22,689
Retirement and nonpension postretirement benefit obligations	U	15,953	19,452
Deferred income		3,562	3,171
Other liabilities	M	8,819	8,192*
Total liabilities		86,267	95,939*
Contingencies and Commitments	O		
Equity:	N		
IBM Stockholders' equity:			
Common stock, par value $.20 per share and additional paid-in capital		41,810	39,129
Shares authorized: 4,687,500,000			
Shares issued (2009 — 2,127,016,668; 2008 — 2,096,981,860)			
Retained earnings		80,900	70,353
Treasury stock, at cost (shares: 2009 — 821,679,245; 2008 — 757,885,937)		(81,243)	(74,171)
Accumulated other comprehensive income/(loss)		(18,830)	(21,845)
Total IBM stockholders' equity		22,637	13,465*
Noncontrolling interests*		118	119*
Total equity		22,755	13,584*
Total liabilities and equity		$ 109,022	$ 109,524

Source 10-K report (Consolidated Statement of Financial Position).

The Debt to Total Assets Ratio (i.e., Debt Ratio) = (21,932 + 4,168)/109,022 = 0.239

FCFE = FCF + Debt Ratio*Adjusted CAPEX =12.381 +6.519*0.239 =13.939 billion because recall that FCFE is higher than FCF for a firm financed by both debt and equity.

Example: Cautionary Remark:

Care must be taken when applying this heuristic to a highly leveraged firm. For example, suppose leverage (Debt to Total Assets is around 90%. Under this heuristic virtually all of the CAPEX would be added back! As a result, the Debt ratio actually applied to the CAPEX adjustment should be reduced to be more conservative to allow for the fact that the high D/E is expected to mean revert to some lower long term average. In addition, conservative adjustments also provide insights into the scenario of what if credit suddenly dries up and a firm is no longer able to permanently finance a portion of it's CAPEX via debt?

Current Summary:

To date we have estimated the FCFE for IBM. This is our estimate of the current "economic dividend" that IBM could pay during a period and existing shareholders would be as well off at the end of the period as they were at the beginning of the period.

To assess intrinsic value we need to forecast what the future FCFE is likely to be. We turn to this task next. In doing so it is convenient to work on a per share basis so we will divide FCFE by the average number of shares outstanding.

Working with the 2008 10-K the shares outstanding for IBM is 1.341 billion.

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*

FCFE per share = 13.839/1.341 = $10.39

V. Concept 2 Forecasting Growth

A common way of projecting out future FCFE per share is to assess the future growth behavior for the firm. We adopt this approach next in two stages for a going concern. First, we will assume that FCFE can grow at some abnormal rate over the short run (i.e., stage 1) and then at some normal rate in perpetuity (i.e., stage 2). The latter normal rate is constrained by economy wide constraints to avoid the undesirable implication that a firm can grow at a larger rate than the economy as a whole.

Given the importance of this number financial analysts provide ongoing estimates for growth which today are freely available over the web.

Estimating Stage 1 Growth Example: What is the consensus 5-year growth forecast for IBM? (around June 2009)

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

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

Thus the current consensus appears to be between 10.86% and 10.0% for 5-years growth. MSN usually adjusts more frequently their reported growth numbers and so more weight can be placed on the MSN reported consensus.

Note: The consensus forecast is for 5-year growth. If you have assumed stage 1 to be more or less than 5-years then you need to decide whether you want to modify the consensus forecast for your stage 1 or leave it as is.

Important Remark:

The 5-year growth consensus is for Accounting Earnings. As a first pass we will apply this to FCFE growth, however, two immediate observations here are that per share FCFE for IBM is greater than EPS and second, management can manage EPS growth more easily than FCFE growth. As a result, the growth forecast for EPS may be different for IBM than the growth forecast for FCFE. Issues of this nature must be assessed at an individual company level. We will return to these issues later when we do some sensitivity analysis.

Normal Growth Example: This number we will assume is bound by the economy wide growth. As a result, 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%.

[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) the rounded down number of 4.5%.

Summary:

We now have three important inputs into the problem of assessing the intrinsic value for IBM.

1. FCFE per share ($10.39)
2. Stage 1 growth (0.10)
3. Stage 2 growth (0.045)

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 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

Cost of Equity Capital, using CAPM, for IBM

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

Current Summary:

FCFE = $10.39 per share. (input 1)

5-year Stage 1 Growth: 0.10 (input 2).

Normal Growth: 0.045 (input 3)

CAPM: Cost of Equity Capital = 0.0837   (input 4)

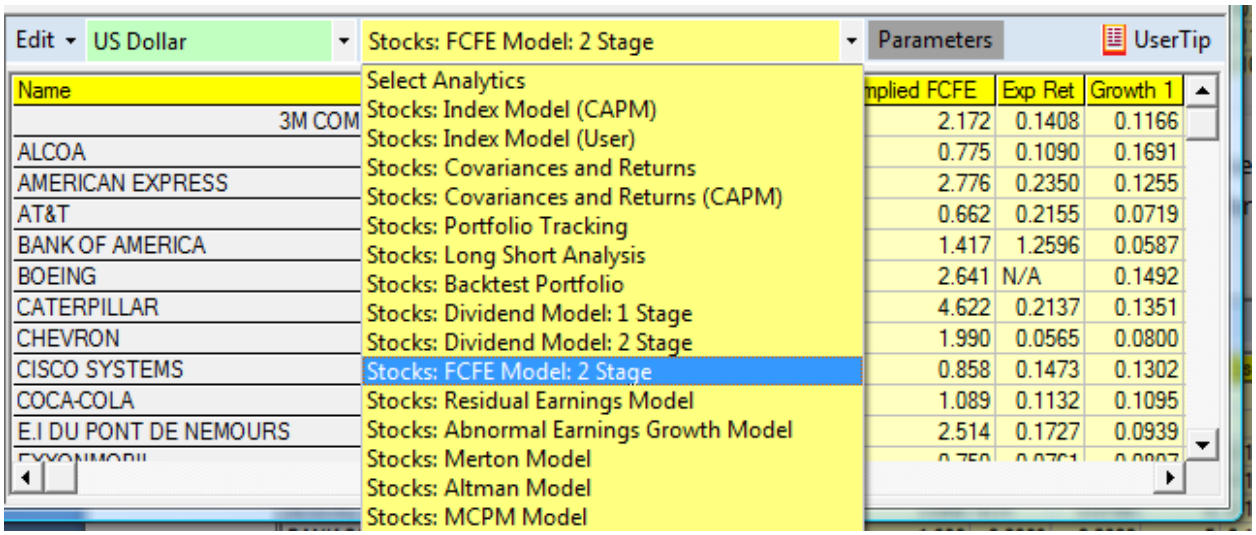
VII. Application Using the FTS System

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

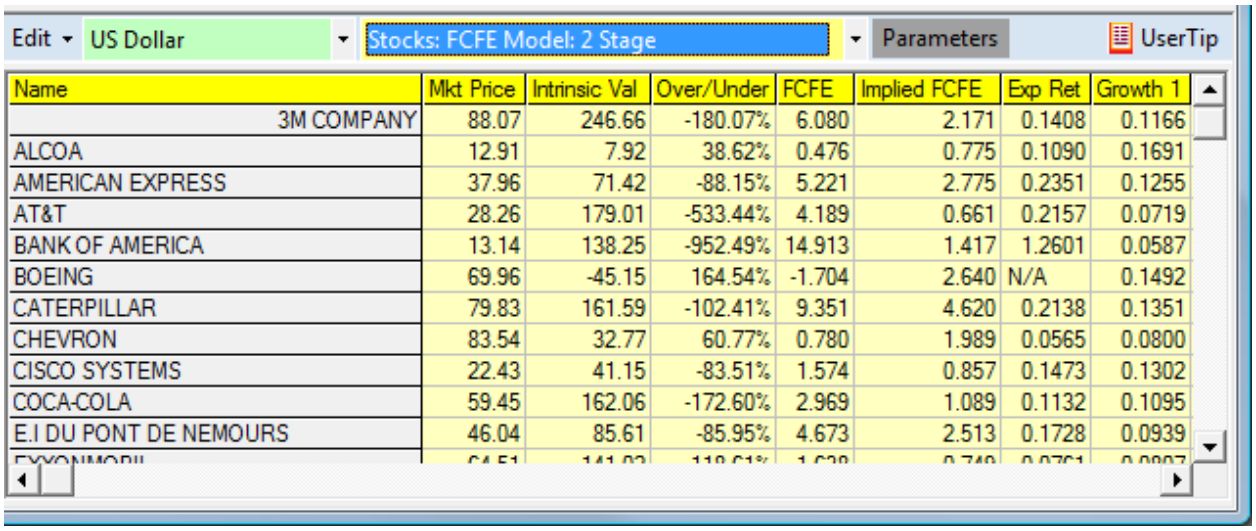
First launch the FTS Real Time Trader from the System Manager.

Once the FTS Real Time Client launches then select the trading exercise and enter your trading name, password and click on Login.

Once you have connected, the bottom RHS of the screen lets you select the analytical support from what is available. In this exercise we are using “Stocks: FCFE Model: 2 Stage” 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:

Mkt Price --- current spot price

Intrinsic Value – estimated from the 2-stage growth model

Over/Under – comparison between intrinsic value and the spot price

FCFE --- Per share free cash flow to equity

Exp Return --- Computed assuming investment at the current spot price relative to the assessed intrinsic value

Growth 1: Stage 1 growth rate

Years 1: Number of years in Stage 1.

Disc 1: Cost of equity capital for stage 1.

Growth 2: Normal growth (Stage 2)

Disc 2: Cost of equity capital to be applied for stage 2.

Recall the current summary of inputs computed as a first pass to date:

Current Summary: Important Inputs for 1st Pass Assessment of IBM's Intrinsic Value

FCFE = $10.32 per share. (FCFE per share above)

Stage 1 (Abnormal) Growth: 10.0% (Growth 1 above).

Stage 2 (Normal) Growth: 4.5% (Growth 2 above)

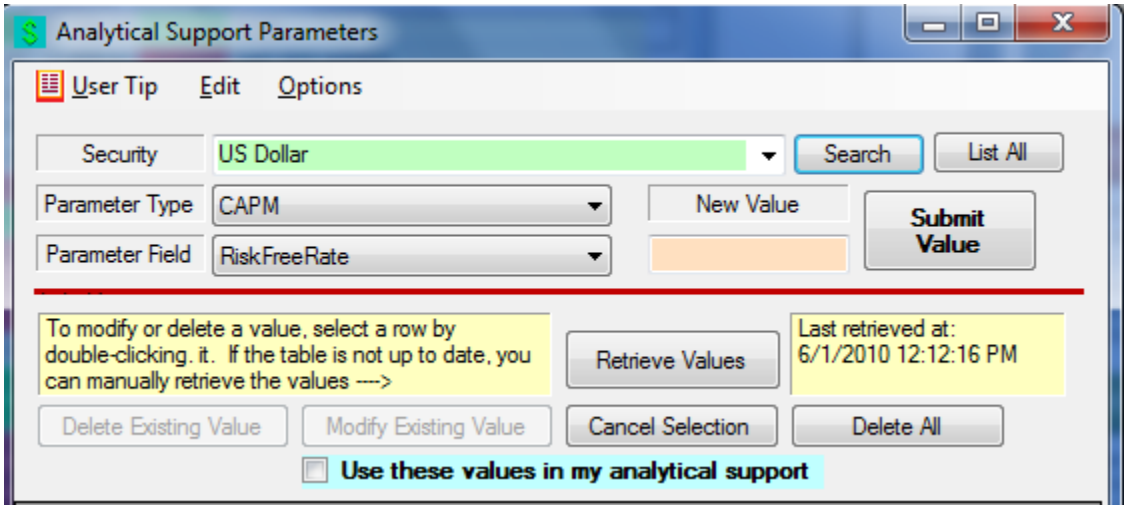
CAPM: Cost of Equity Capital = 0.0837 (Disc 1 and Disc 2 above)

Years 1: As a first pass we will keep this the same as the analyst growth forecast for stage 1 (i.e., 5-years).

The remaining fields are derived fields.

Entering Personal Estimates into the Analytical Support

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



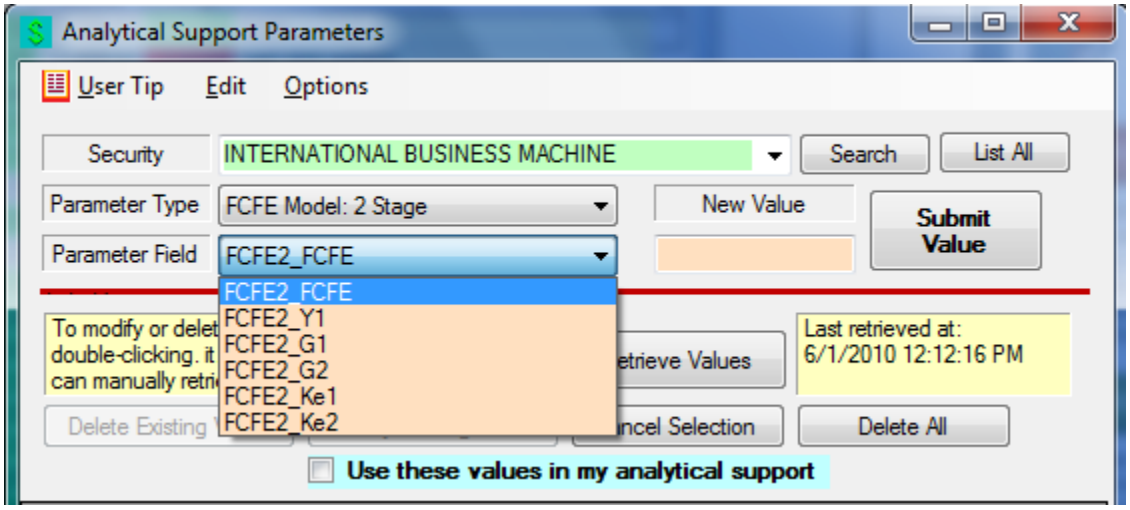
The values can be entered either manually or as a group from Excel. Once entered they are automatically stored on the FTS Server until you choose to delete or override with different inputs.

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.

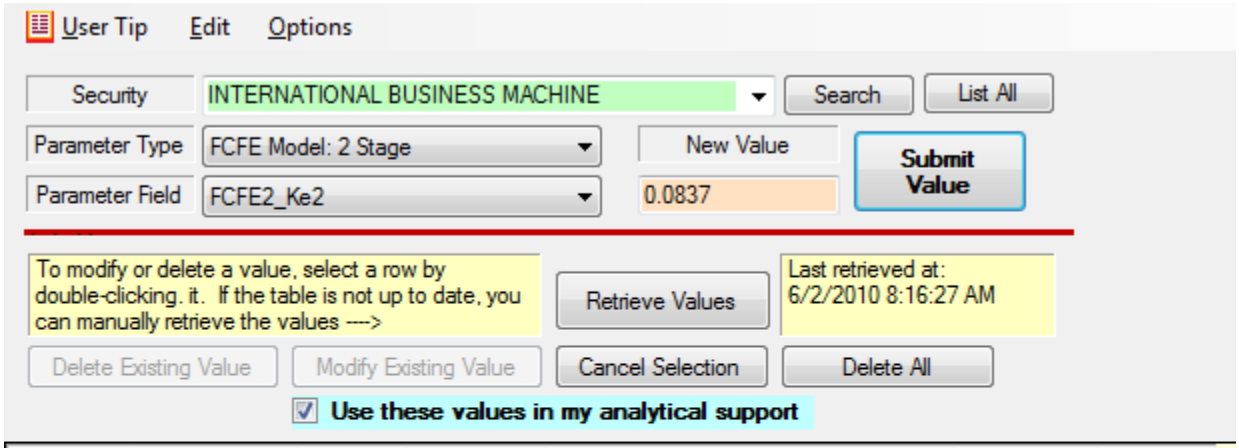
Entering Personal Values to Override FTS Default Values

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

Step 2: Select the Model FCFE Model: 2 Stage



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	6/1/2010	12:15:32 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_FCFE	10.32
jo0xdjia	jo0xDJIA	6/1/2010	12:15:39 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Y1	5
jo0xdjia	jo0xDJIA	6/1/2010	12:15:50 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G1	0.1
jo0xdjia	jo0xDJIA	6/1/2010	12:16:02 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G2	0.045
jo0xdjia	jo0xDJIA	6/1/2010	12:16:14 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke1	0.0837
jo0xdjia	jo0xDJIA	6/1/2010	12:16:20 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke2	0.0837

Note: Be careful to Check the Checkbox "Use these values in my analytical support" as illustrated above

The main trading screen now appears as follows:

Name	Mkt Price	Intrinsic Val	Over/Under	FCFE	Implied FCFE	Exp Ret	Growth 1	Years 1	Dis
HEWLETT-PACKARD CO	45.58	88.18	-93.46%	2.903	1.501	0.1400	0.1547	5	0.(
INTERNATIONAL BUSINESS MACHINE	124.34	354.24	-184.90%	10.320	3.622	0.1526	0.1000	5	0.(
INTEL CORP	21.18	49.76	-134.95%	2.110	0.898	0.1790	0.1250	5	0.(

Clearly our first pass estimate is not consistent with the market and this may often happen. 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. To check what is going on we will apply both sensitivity analysis as well observe what input values are implied from the current market.

VIII. Verifying the Calculations for Intrinsic Value

IBM						
	Abnormal Phase					
	2009	2010	2011	2012	2013	2014
Per Share		Analyst forecasts				
Cash Flow from Operations	14.094	15.503	17.054	18.759	20.635	22.698
CAPEX	4.861	5.347	5.882	6.470	7.117	7.829
FCF	9.233	10.156	11.172	12.289	13.518	14.869
Debt Ratio	0.239					
FCFE	10.395	11.434	12.577	13.835	15.219	16.740
PV Stage 1 FCFE		10.551	10.710	10.871	11.034	11.200
A. Sum PV for Stage 1 FCFE	54.365					
FV (End of Stage 1) Continuing Value						452.036
B. PV Continuing Value	302.432					
Intrinsic Value = A. + B.	356.797					
Stock Price	125.280					
ke	0.084	0.084	0.084	0.084	0.084	0.084
Time	2009	2010	2011	2012	2013	2014
Normal Growth						0.045
Analyst forecast 5-year growth						0.100

In the above grid the red numbers are the estimated inputs, expressed on a per share basis, into the 2-Stage FCFE valuation model. That is, FCFE 10.395 which was computed from cash flow from operations, adjusted CAPEX and the estimated debt ratio as described earlier. The stage 1growth was 0.10, normal growth 0.045 and cost of equity capital 0.084. The two stage growth model computes the intrinsic value as the PV of future economic dividends (i.e., FCFE) that the stock is assessed to generate.

Stage 1 covers 2010, 2011, … , 2014. The FCFE for 2010 is 10.395*1.10, 2011 = 10.395*1.10^2 and so on. Alternatively this can be computed from the projected growth in cash flows from operations, projected CAPEX, and the assessed debt ratio. Thus for 2010 11.434 = 15.503 – 5.347 + 0.239*5.347 (FCFE = FCF + Debt Ratio*CAPEX). The projected 2010 cash flow from operations is 14.094*1.10 = 15.503 and similarly for CAPEX.

Present Value of FCFE Stage 1

The PV FCFE for Stage 1 equals the sum of $FCFE_{2010}/(1.0837)+ FCFE_{2010}/(1.0837^2) + FCFE_{2010}/(1.0837^3) + FCFE_{2010}/(1.0837^4) + FCFE_{2010}/(1.0837^5) = \$54.36$

Present Value of FCFE Stage 2 (Going Concern)

IBM is presumed to be a going concern in this exercise. As a result, at the end of the Stage 1 IBM's FCFE is assumed to grow in perpetuity at the constant normal growth rate (0.045). As a result, at the end of 2014 IBM's stock price is assumed to be computed from Gordon's constant growth model.

$Terminal\ Price_{2014} = 16.740*1.045/(0.0837 – 0.045) = 452$

PV Continuing Value = 452.036/(1.0837^5) = $302

Important Note: The majority of the intrinsic value of a stock comes from the PV of continuing value. In other words events impacting the stock beyond the stage 1 growth phase of the stock and which is well beyond any reasonable estimate for a recession to last. The actual stock market would appear to be much more myopically focused such that the events from the labor figures released to the market Friday June 4, 2010 for the month of May triggered a large market response. This suggests that the longer term patient investor is well rewarded.

Intrinsic Value for IBM

Intrinsic Value = PV FCFE Stage 1 + PV Continuing Value (Stage 2) = 54 + 302 = $356

As an immediate comment this spot price prediction is well above the current market value for IBM. From the above analysis one could question whether the projection of $452 is realistic for the end of 2014! In other words the normal growth assumption in perpetuity of 0.045 appears to be much higher than what is implied in the market for IBM now. As a result, in sensitivity analysis we will reduce normal growth as one of the variables to assess the impact of this on IBM's assessed intrinsic value.

Decomposing the Intrinsic Value for IBM Further

Consider the following re-arrangement of IBM's assessed intrinsic value:

IBM						
	Abnormal Phase					
	2009	2010	2011	2012	2013	2014
Per Share		Analyst forecasts				
Cash Flow from Operations	14.094	15.503	17.054	18.759	20.635	22.698
CAPEX	4.861	5.347	5.882	6.470	7.117	7.829
FCF	9.233	10.156	11.172	12.289	13.518	14.869
Debt Ratio	0.239					
FCFE	10.395	11.434	12.577	13.835	15.219	16.740
A. PV Forward (Year 1) FCFE in Perpetuity (Zero Growth)	136.606					136.606
PV FCFE Stage 1		10.551	10.710	10.871	11.034	11.200
PV Stage 1 (FCFE(t) - FCFE(1))		0.000	0.974	1.887	2.744	3.550
Sum Stage 1 PV(FCFE)	54.365					
B. Sum Stage 1 PV(FCFE(t)-FCFE(1))	9.155					
FV(End of Stage 1) of Continuing Value (CV)						452.036
PV Continuing Value (PVCV)	302.432					
C. PVCV less Stage 2 Forward FCFE in Perpetuity	211.036					
Total PV (Intrinsic Value) = A. + B. + C.	356.797					
Stock Price	125.280					
ke	0.084	0.084	0.084	0.084	0.084	0.084
Time	2009	2010	2011	2012	2013	2014
Normal Growth						0.045
Analyst forecast 5-year growth						0.100

In the above arrangement we have broken up intrinsic value into three major components:

PV of $FCFE_{2010}$ in perpetuity assuming zero growth = $136.606

PV FCFE Stage 1 in Excess of $FCFE_{2010}$ = $9.155

PV Continuing Value beyond Stage 1 in Excess of the zero growth FCFE perpetuity = $211.036

The sum of the above two PV's = $356.797

What this illustrates that if the assessed FCFE is correct and the cost of equity capital is reasonable then IBM is being currently priced below is zero growth perpetuity value.

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?

This will provide important insights into whether we assess the current market price to be reasonable or not. By answering 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. Given there are three main inputs into the model then sensitivity analysis should focus on the three major inputs – growth behavior, free cash flows and the cost of equity capital. At the end of the last section it was inferred that IBM's value could be assessed independently of current growth behavior assumptions. As a result, the main

sensitivity analysis will focus on our assessment of FCFE. However, first we will reduce growth assessments.

Impact of Stage 1 Growth

We will work with the latter first. Suppose we predicted zero abnormal growth in excess of normal growth for IBM over stage 1. That is, assume that the FCFE grows at the normal rate in perpetuity. This is not realistic for IBM but it will serve as a benchmark.

Again using Parameters we can change FCFGrowth1 value to 0.045. That is, we are assuming a growth rate equal to the economy wide growth rate for both stages. So in summary current parameters appear as follows:

☑ Use these values in my analytical support

Trader	RealName	Date	Time	Security	Field	Value
jo0xdjia	jo0xDJIA	6/1/2010	12:15:32 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_FCFE	10.32
jo0xdjia	jo0xDJIA	6/1/2010	12:15:39 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Y1	5
jo0xdjia	jo0xDJIA	6/1/2010	12:15:50 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G1	0.045
jo0xdjia	jo0xDJIA	6/1/2010	12:16:02 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G2	0.045
jo0xdjia	jo0xDJIA	6/1/2010	12:16:14 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke1	0.0837
jo0xdjia	jo0xDJIA	6/1/2010	12:16:20 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke2	0.0837

This yields the modified assessed value as:

Name	Mkt Price	Intrinsic Val	Over/Under	FCFE	Implied FCFE	Exp Ret	Growth 1	Years 1	Di
HEWLETT-PACKARD CO	45.58	88.18	-93.46%	2.903	1.501	0.1400	0.1547	5	0.
INTERNATIONAL BUSINESS MACHINE	124.34	278.67	-124.12%	10.320	4.605	0.1317	0.0450	5	0.
INTEL CORP	21.18	49.76	-134.95%	2.110	0.898	0.1790	0.1250	5	0

This reduces IBM further to 278.67.

Second in our sensitivity analysis, we can consider our FCFE estimate.

Current financial projections for IBM from Yahoo are:

Analyst Estimates

Get **Analyst Estimates** for: GO

Earnings Est	Current Qtr. Jun 10	Next Qtr. Sep 10	Current Year Dec 10	Next Year Dec 11
Avg. Estimate	2.58	2.73	11.27	12.31
No. of Analysts	20	18	22	22
Low Estimate	2.50	2.67	11.20	11.62
High Estimate	2.67	2.80	11.40	12.80
Year Ago EPS	2.32	2.40	10.01	11.27

Next Earnings Date: Jul 19, 2010 - Set a Reminder

Revenue Est	Current Qtr. Jun 10	Next Qtr. Sep 10	Current Year Dec 10	Next Year Dec 11
Avg. Estimate	24.23B	24.54B	99.97B	104.11B
No. of Analysts	18	17	21	20
Low Estimate	23.90B	24.00B	98.81B	101.79B
High Estimate	24.73B	25.24B	101.62B	106.41B
Year Ago Sales	23.25B	23.57B	95.76B	99.97B
Sales Growth (year/est)	4.20%	4.10%	4.40%	4.10%

From MSN Investor these are:

Earnings Estimates	Qtr(6/10)	Qtr(9/10)	FY(12/10)	FY(12/11)
Average Estimate	2.57	2.73	11.26	12.34
Number of Analysts	18	16	22	21
High Estimate	2.62	2.80	11.35	12.80
Low Estimate	2.50	2.67	11.20	11.86
Year Ago EPS	2.32	2.40	10.01	11.26
Growth Rate	+10.80%	+13.91%	+12.47%	+9.60%

Nothing unusual jumping out apart from the Yahoo results which indicate Sales growth for IBM is much slower than EPS and is around 4.1% for the next year. As a result, if FCFE growth is more like sales growth than earnings growth then an even lower growth rate could be applied to IBM – say 0.04.

Entering this number into Parameters for both Stage 1 and Stage 2 growth reveals:

Trader	RealName	Date	Time	Security	Field	Value
jo0xdjia	jo0xDJIA	6/1/2010	12:15:32 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_FCFE	10.32
jo0xdjia	jo0xDJIA	6/1/2010	12:15:39 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Y1	5
jo0xdjia	jo0xDJIA	6/1/2010	12:15:50 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G1	0.04
jo0xdjia	jo0xDJIA	6/1/2010	12:16:02 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G2	0.04
jo0xdjia	jo0xDJIA	6/1/2010	12:16:14 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke1	0.0837
jo0xdjia	jo0xDJIA	6/1/2010	12:16:20 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke2	0.0837

Name	Mkt Price	Intrinsic Val	Over/Under	FCFE	Implied FCFE	Exp Ret	Growth 1	Years 1	Di
HEWLETT-PACKARD CO	45.58	88.18	-93.46%	2.903	1.501	0.1400	0.1547	5	0.
INTERNATIONAL BUSINESS MACHINE	124.34	245.60	-97.52%	10.320	5.225	0.1263	0.0400	5	0.
INTEL CORP	21.18	49.76	-134.95%	2.110	0.898	0.1790	0.1250	5	0.

However, the above assumption for IBM is extremely conservative because as revealed from Morningstar ratios for example IBM's Free Cash flow is growing along with net income (e.g., FCF/Net Income Ratio which is around 1.25):

Cash Flow Ratios 03-31-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TTM
Operating Cash Flow Growth-YOY	(8.3%)	53.8%	(8.4%)	10.3%	6.4%	(2.7%)	0.6%	7.2%	16.9%	10.4%	---
Free Cash Flow Growth-YOY	(11.9%)	135.2%	(3.4%)	20.5%	9.4%	1.1%	(11.1%)	7.6%	38.3%	18.3%	---
Cap Ex as a % of Sales	6.4%	6.6%	5.9%	4.9%	4.5%	4.2%	5.7%	5.6%	4.0%	3.6%	4.0%
Free Cash Flow/Sales	4.14%	10.02%	10.24%	11.24%	11.38%	12.15%	10.76%	10.71%	14.13%	18.09%	17.77%
Free Cash Flow/Net Income	0.45	1.12	2.32	1.32	1.30	1.40	1.04	1.02	1.19	1.29	1.25

The last remaining issue then have we greatly overestimated the FCFE?

Referring back to the FTS Real Time Client we can observe what the current implied FCFE is given some very conservative numbers (e.g., average growth is

FCFE Estimates

We next more closely examine the CAPEX assumptions (Source MSN Investor):

Income Statement | Balance Sheet | Cash Flow | 10 Year Summary

Annual / Interim

Financial data in U.S. Dollars
Values in Millions (Except for per share items)

	2009	2008	2007	2006	2005
Period End Date	12/31/2009	12/31/2008	12/31/2007	12/31/2006	12/31/2005
Period Length	12 Months	12 Months	12 Months	12 Months	12 Months
Stmt Source	10-K	10-K	10-K	10-K	10-K
Stmt Source Date	02/23/2010	02/24/2009	02/26/2008	02/27/2007	02/28/2006
Stmt Update Type	Updated	Updated	Updated	Updated	Updated
Net Income/Starting Line	13,425.0	12,334.0	10,418.0	9,492.0	7,934.0
Depreciation/Depletion	3,773.0	4,140.0	4,038.0	3,907.0	4,147.0
Amortization	1,221.0	1,310.0	1,163.0	1,076.0	1,041.0
Deferred Taxes	1,773.0	1,900.0	740.0	1,724.0	2,185.0
▶ Non-Cash Items	163.0	321.0	619.0	587.0	-489.0
▶ Changes in Working Capital	418.0	-1,193.0	-890.0	-1,780.0	56.0
Cash from Operating Activities	**20,773.0**	**18,812.0**	**16,088.0**	**15,006.0**	**14,874.0**
▶ Capital Expenditures	-4,077.0	-4,887.0	-5,505.0	-5,166.0	-4,634.0
▶ Other Investing Cash Flow Items, Total	-2,653.0	-4,398.0	830.0	-6,382.0	211.0
Cash from Investing Activities	**-6,730.0**	**-9,285.0**	**-4,675.0**	**-11,548.0**	**-4,423.0**

In IBM's 10-K estimate they work with $3.7billion as CAPEX (see earlier). One quick test for assessing the adequacy of CAPEX is to compare it to Depreciation Expense. In the normal growth phase we would expect CAPEX to be approximately equal to Depreciation expense. In the Stage 1 growth phase we would expect it to be higher. As a result, the IBM estimate for CAPEX is likely to be on the low side. From the above disclosures IBM's CAPEX exceeds Depreciation/Depletion in each year. If we take the 5-year average CAPEX then this equals: (4.077+4.887+5.505+5.166+4.634)/5 = 4.85 billion

Personal Remark: (Significant Other Investing Cash Flow Items):

Observe that Other Investing Cash Flow Items Total appear to have a re-occurring outflow component. In other words this pattern of re-occurrence can be interpreted as additional CAPEX. As a result, we will next adjust CAPEX by the 5-year average of these outflows/inflows = -2.653-4.398+0.830-6.382+0.211 = average ($2.478) billion.

Adjusted CAPEX = 6.519 + 2.478 = 8.997 billion

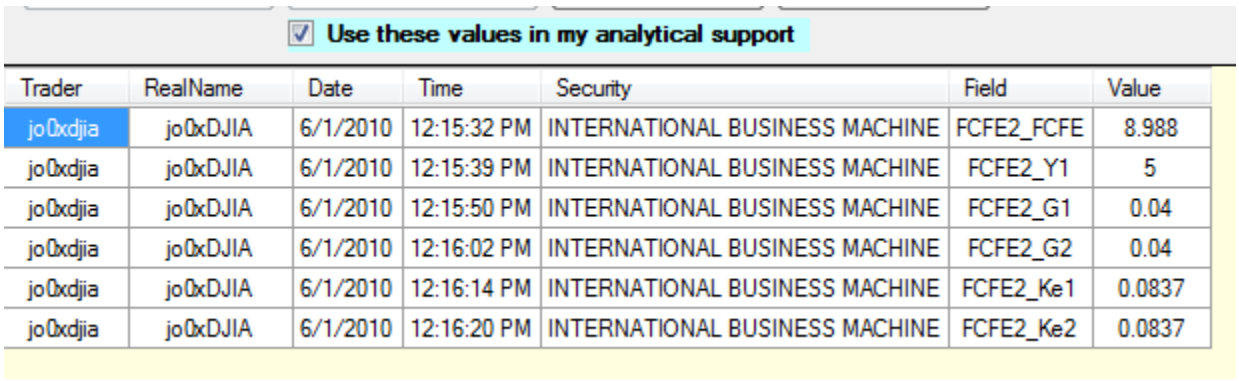
Adjusted FCF = 18.9 – 8.997 = 9.903 billion

Recall, from the earlier calculation of FCFE above the Debt Ratio = 0.239, and

FCFE = FCF + Debt Ratio*Adjusted CAPEX = 9.903 +8.997*0.239 = 12.053 billion

FCFE per share = 12.053/1.341 = $8.988

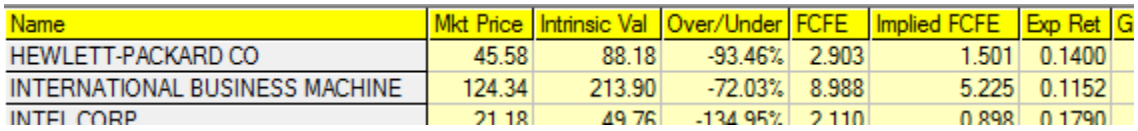
As a result, by still working with a complete set of conservative numbers for IBM as per the following input parameters:



☑ Use these values in my analytical support

Trader	RealName	Date	Time	Security	Field	Value
jo0xdjia	jo0xDJIA	6/1/2010	12:15:32 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_FCFE	8.988
jo0xdjia	jo0xDJIA	6/1/2010	12:15:39 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Y1	5
jo0xdjia	jo0xDJIA	6/1/2010	12:15:50 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G1	0.04
jo0xdjia	jo0xDJIA	6/1/2010	12:16:02 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_G2	0.04
jo0xdjia	jo0xDJIA	6/1/2010	12:16:14 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke1	0.0837
jo0xdjia	jo0xDJIA	6/1/2010	12:16:20 PM	INTERNATIONAL BUSINESS MACHINE	FCFE2_Ke2	0.0837

Again this reduces our intrinsic value estimate but not by a large amount:



Name	Mkt Price	Intrinsic Val	Over/Under	FCFE	Implied FCFE	Exp Ret	G
HEWLETT-PACKARD CO	45.58	88.18	-93.46%	2.903	1.501	0.1400	
INTERNATIONAL BUSINESS MACHINE	124.34	213.90	-72.03%	8.988	5.225	0.1152	
INTEL CORP	21.18	49.76	-134.95%	2.110	0.898	0.1790	

Estimated value is still $213.90 under very conservative assumptions.

Third, you can consider applying sensitivity analysis to the discount rate or cost of equity capital. This is left as an exercise.

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. By working through the above exercise in conjunction with the RT FTS Client you will quickly gain experience with the relative importance of the various drivers are for the stocks you are valuing. You can also create live links to Excel for your personal parameter support to create even more powerful trading support systems.