Valuing Illiquid Equity Securities in Light of the Financial Crisis of 2007-2009

Niso Abuaf

Though practitioners and academics rely on similar conceptual frameworks when valuing illiquid equity securities, they emphasize different aspects of the framework. In contrast to academics, practitioners emphasize market multiples, implied equity market risk premiums, industry betas, and market sentiment; while deemphasizing delevering and relevering betas, debt betas, and historical equity market risk premiums. Moreover, experienced practitioners and the courts prefer a holistic approach to valuation ensuring that inputs such as discount rates, cash flows, and terminal value multiples are consistent with underlying economic fundamentals – a point that has been driven home during the recent crisis.

■Personally, I have learned more about economics in the last two years than I have in the last 30 plus years leading to the start of the crisis. Though the current financial crisis has not made me or my colleagues completely throw out our basic conceptual frameworks, it has painfully made us reconsider some of our long-held "sacred views," crutches, and empirical estimates. Most importantly, I believe that the Financial Crisis of 2007-2009 has taught both academics and practitioners the need to bridge the theory-practice divide.

The practitioner needs to bridge the gap between mathematical models and the behavior of decision makers such as asset managers, accountants, regulators, and the government. During the crisis days, seemingly esoteric issues such as mark-to-market vs. "steady-state value," and international coordination of accounting procedures entered the daily public debate, underscoring the need to understand the pragmatic business management and government policy implications of the "finer points" of various academic positions.

To clarify some of these "finer points," this paper summarizes how mergers and acquisitions specialists and hedge fund portfolio managers adapt academic valuation techniques to fluid business situations. The paper focuses on the valuation of illiquid equity investments in light of the lessons we have learned during the financial crisis of 2007-2009.

Section I of the paper summarizes the main theoretical and practical aspects of fair-value valuation, while Section II summarizes the impact of the financial crisis on valuation methodologies in the business world. Section III is the main technical part of the paper highlighting the various shortcuts that practitioners take, contrasted with the "purist" academic approach. Section IV extends section III by detailing various other considerations that area of paramount practical importance, though of less academic importance. Finally, Section V summarizes the main conclusions and the importance of having a holistic view.

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I. Fair-Value Valuation

In sardonic Wall Street parlance, assets can be marked to market, marked to model, or marked to myth. In my business meetings, I have long advocated the view that valuing financial assets is like evaluating the purchase of a house. When buying a house we typically consider two questions:

- Is this house fairly valued compared to other houses that have recently sold in the neighborhood?
- Is this house fairly valued from a historical, or market timing perspective?

The first question is the easier one and is very much of a technical nature akin to discounted cash flow or comparables analysis. This first question fits well within the framework of the Efficient Markets Hypothesis (EMH). Most Wall Street professionals that I know are fairly comfortable in answering this question.

The second question, however, is far more difficult to answer, less technical, and more philosophical. This is the domain of people like Warren Buffett, the star disciple of the Graham-Dodd approach, covered in encyclopedic detail in Cottle et al. (1988).

One might argue that this question is somewhat at odds with the EMH. Most Wall Street bankers that I know are uncomfortable in this area and usually take the view that the market is the market, and that is only what a "fairness opinion" needs to reflect. In my experience, fairness opinions written by investment bankers to support mergers and acquisitions transactions take the "market is the market" viewpoint. On the other hand, portfolio managers of illiquid investments are typically reluctant to make drastic mark-to-market adjustments of their portfolios, and tend to mitigate the accounting volatility of their portfolios by adjusting for factors such as market sentiment, and long-term fair value.

Figure 1 illustrates the difficulty of answering the second question. As can be seen in Figure 1, the forward P/E multiple of the S&P500 is just around its medium-term median, whereas the trailing P/E multiple of the S&P500 is significantly above its medium-term median. This simple example shows the difficulty of deciding whether the equity market is currently over or under-valued. Shiller (2000) demonstrates that price-earnings ratios are negatively correlated predictors of ten-year stock returns, thereby underscoring the point that markets can indeed be under or over-valued.

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Despite my Chicago and EMH intellectual origins, I must say that the current financial crisis has made us painfully aware that we cannot ignore this question of asset over or under-valuation.

As Smithers (2009) states, the markets are moderately, rather than perfectly efficient. From a valuation perspective, this observation means that our analysis may need to incorporate aspects of market over or under-valuation, and market sentiment as captured by momentum, or fair-value models. Indeed, most portfolio managers that I have interacted with tend to take this view. Self-serving as he may be, Citigroup's Vikram Pandit is one of the most vocal proponents of this approach as it relates to mortgage-backed securities. Mr. Pandit may well be right in that market prices may not be unbiased estimators of fair value, especially when markets are illiquid and when markets may be experiencing extremes of euphoria, or dysphoria.

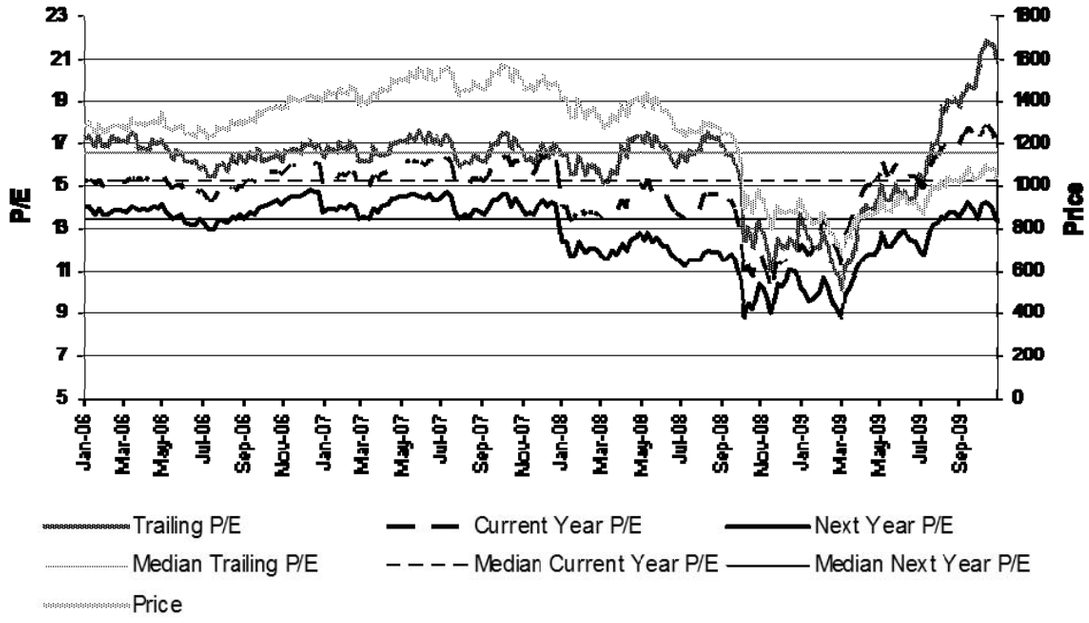
In my view there are three different ways of analyzing market behavior:

- The EMH, or today's market price is the best gauge of the underlying asset's value and the best predictor of tomorrow's price, maybe with a trend factor thrown in.
- The Graham and Dodd value approach (bet against the market), or the notion that episodically the market may be under, or over-valued.
- Momentum , or "the trend is your friend," i.e. bet with the market.[1]

I now think that these views are not mutually exclusive. That is, they can all be true at the same time, or at different

[1]See Akerloff and Shiller (2009) for an academic exposé of this behavior.

Figure 1. Forward & Backward P/Es for the S&P 500, 2006-Present



Source: Bloomberg

times. Stated simply, we might argue as Warren Buffett has that the market is a voting mechanism in the short-term (momentum), and a value mechanism in the long-term (Graham and Dodd). To that we might add that the market is always subject to news, or shocks, i.e. by definition unexpected events (the EMH).

II. Impact of the Financial Crisis on Valuation

As a result of the crisis, we have re-learned that:

- We always need to go back to the underlying first principles of our social science – financial economics, and not ignore the soft aspects of our science such as incentive-reward structures, the principal-agent problem, moral hazard, selection bias, and the too-big to fail problem, among others.
- Unlike the physical sciences, the quantum particles of our field (i.e. homo sapiens) think and have emotions which may episodically exhibit animal spirits.
- Though mathematical models emanating from physics envy have helped us make significant advances in our understanding of economics, these models have numerous Achilles' Heels.
- Sometimes history may be a better guide than mathematical models.
- The need to differentiate between prices associated with orderly versus distressed markets.
- When conditions deteriorate, asset correlations approach one.
- As detailed in Section I, markets may be episodically under or over-valued.

Specifically when it comes to valuation, we may need to apply each of the above lessons and be extremely careful when estimating:

- Cash flows and their sensitivity to economic conditions.
- Terminal values and other multiples.
- Discount rates.
- Illiquidity discounts.

For a detailed analysis of the current financial crisis, see Acharya (2009), El-Arian (2008), and Reinhart and Rogoff (2009).[2]

Though valuation methods and fundamental approaches have not changed as a result of the financial crisis, practitioners have realized the need to consider the following factors:

- The longest duration post-war recession and unprecedented negative GDP growth rates have led to decreased earnings estimates.
- Increased market volatility (see Figure 2) and the flight to safety have led practitioners to increase their valuation ranges.
- Rising financial distress conditions (see Figures 3, 4, and 5) have caused analysts to become increasingly timid.
- The rising price of liquidity (see Figure 4) has caused analysts to go beyond standard academic pricing models such as the Capital Asset Pricing Model (CAPM).

Most practitioners triangulate among the three approaches. Triangulation shows scientific humility and legal prudence. That is, if we do not know what the truly correct approach is, we might as well be non-dogmatic and consider all the reasonable approaches, cross-check them against each other, and estimate the final result by quoting a range and not a point estimate. The results of this approach are easier to defend in court, in case there is a legal challenge.

To summarize, prudent analysts in the post-crisis world now value assets by:

- Running their "standard" mathematical models.
- Stress testing the numerical outputs of their mathematical models against the check points, or sensitivity factors previously listed.

III. Common Valuation Techniques

When valuing equity investments, three common and one not-so-common technique comes to mind. The common techniques are:

1) Discounted Cash Flow Analysis (DCF).
2) Public Multiples-Based Valuation.
3) Acquisition- (Transaction-) Based Valuation.[3]

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Typically, a fundamental analyst such as an equity research analyst prefers the DCF method, a syndicate manager or a trader prefers the public multiples-based valuation, while a mergers and acquisition specialist prefers the acquisition-based valuation. The signatory of the fairness opinion triangulates among the three approaches thereby covering his bases and drawing on all the areas of professional expertise residing within the investment bank, while hedging his legal risks.

Either when the above three approaches fail, or when an additional reference point is needed, a practitioner will also use an approach based on:

4) Real-Option Theory.

Though this approach is rarely used in practice, there are times when it comes in handy particularly when valuing mining investments, or distress and bankruptcy situations, as described in the following section.

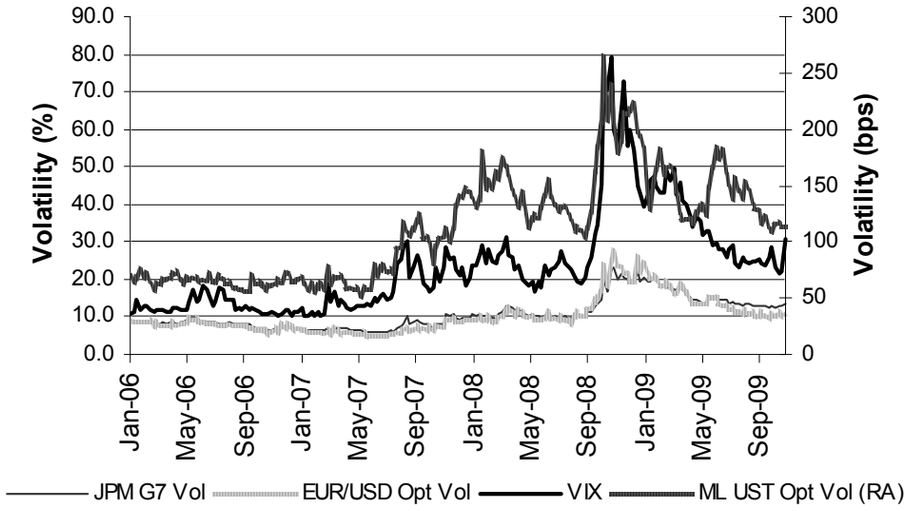
A. Discounted Cash Flow Analysis (DCF)

This is the approach most-favored by academics and least-favored by investment bankers. Though investment bankers begrudgingly use this approach to satisfy their due-diligence requirements, they rarely bring it up in their day-to-day business dealings. When they do use this approach, investment bankers mostly follow the advice of academics, while deviating from it for the sake of expediency and

[2]For a classic explanation on the origins of crises, see Kindleberger and Aliber (2005).

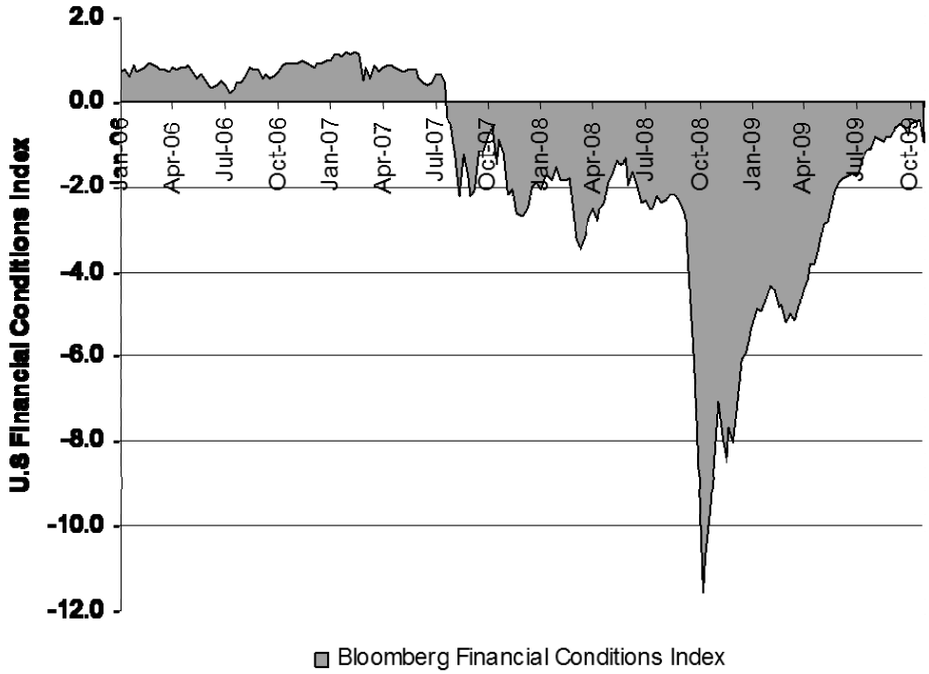
[3]For traditional approaches to valuation, see Arzac (2005), Damodaran (2006), Koller et al. (2005), and Titman et al. (2008).

Figure 2. Foreign-Exchange, Fixed-Income and Equity-Markets Volatility, 2006-Present



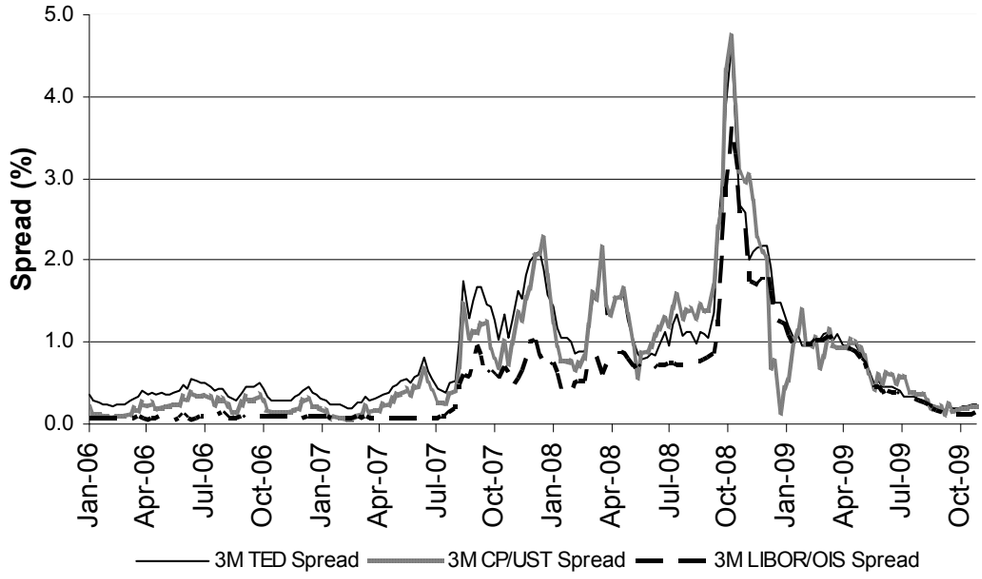
Source: Bloomberg

Figure 3. US Financial Conditions Index, 2006-Present



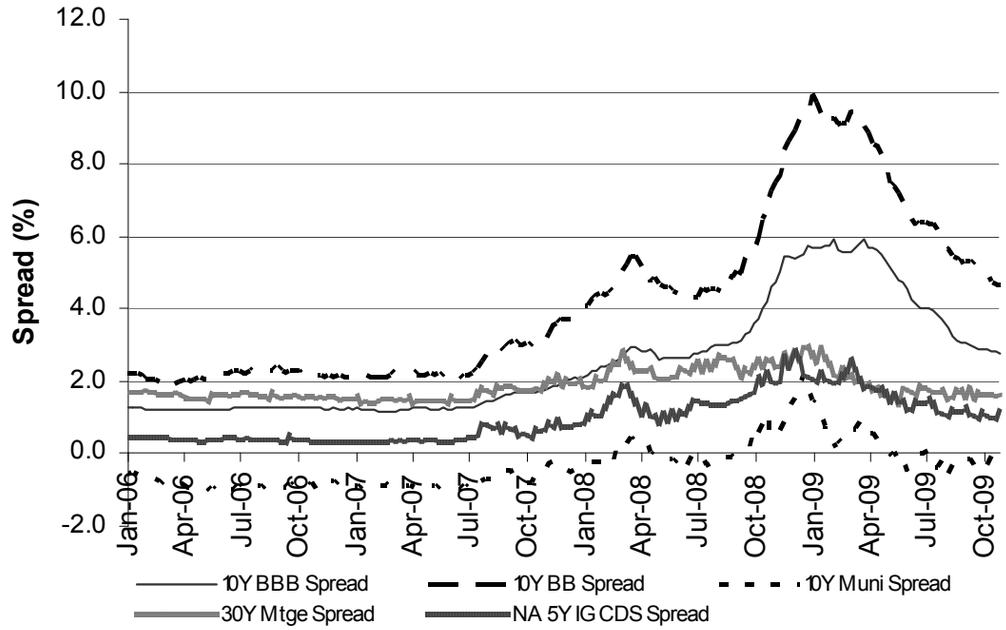
Source: Bloomberg

Figure 4. US Short-Term Spreads, 2006-Present



Source: Bloomberg

Figure 5. US Long-Term Spreads, 2006-Present



Source: Bloomberg

pragmatism. Estimating a firm's value using discounted cash flow analysis is tedious but relatively straightforward and involves the following:

- Estimating future cash flows, usually up to five years.
- Estimating international cash flows, if necessary.
- Estimating a terminal value, usually in the fifth year by applying a suitable enterprise value to EBITDA multiple to terminal EBITDA.
- Discounting the cash flows to the present by using a discount rate such as the weighted-average-cost-of-capital (WACC), with the following inputs:
  1) The cost of debt.
  2) The appropriate tax rate.
  3) Target debt-to-capital ratios, i.e. the market-weighted proportions of debt and equity in the capital structure.
  4) The cost of equity.
     a) The risk-free rate.
     b) The equity market risk premium (EMRP).
     c) The beta.
     d) A small-cap risk premium, if any.
     e) The cost of hybrid securities, if any.

Unfortunately, estimating the previous inputs is laden with land mines and can be made unnecessarily complex. Most practitioners unknowingly follow the advice of Roger Ibbotson, the doyen of the cost of capital, and use simpler models when possible.

Most importantly, the above inputs need to be consistent with overall macroeconomic conditions. When viewed from a macroeconomic perspective, all the inputs in a valuation exercise need to make holistic sense. In my experience, even highly-paid Wall Street analysts miserably fail to pass the test.

To elaborate:

- **Cash flow projections need to be economically sensible.**

For example, most developed economies grow at 2.5%-3.5% per year, in real terms. As such, if cash flows are growing at a rate significantly different than that, the analyst needs to have a good explanation.

One would expect that cash flows associated with mature industries will grow at about the mentioned real rates of growth as products in mature industries such as autos in the United States have an income elasticity of demand around one. On the other hand, technological products will likely have an income elasticity greater than one until they reach maturity. This implies that cash flows associated with such products will grow at rates higher than the real rate of growth of the economy, but not forever. Unfortunately, during the dotcom bubble of the 1990s, many Wall Street analysts, to their chagrin, assumed that the cash flows of their companies would grow at rates far higher than the real rate of growth of the economy in perpetuity.

In principle, we model cash flows to reflect expectations under each future scenario weighted by the probability of that scenario. In practice, however, the analyst frequently estimates cash flows to reflect the most likely or the most optimistic outcomes.

This ambiguity can create large misvaluations in evaluating projects that have substantial downside risk such as offshore projects. In my opinion, investment bankers do a poor job in projecting cash flows as their main goal is to satisfy their clients, i.e. their paymasters. Equity analysts, on the other hand, are supposed to be objective, particularly after the reforms instituted subsequent to the bursting of the telecom-media-technology bubble in the early part of the past decade. In practice, however, equity analysts tend to be optimistic issuing far more buy recommendations than sell recommendations and with revenue projections far exceeding the growth rate of the economy. Because the aggregate revenue projections of all equities covered by analysts cannot far exceed the overall growth rate of the economy, we conclude that equity analysts' projections must be unrealistic.

- **In valuing international projects, the analyst needs to critically consider the currency of the forecasted cash flows.**

Typically, in developed countries, we use local currencies to model cash flows. In developing countries, conversely, we use the US dollar or another stable currency such as the Euro or the Japanese yen to model cash flows. Though this matter has significant practical relevance, it is of little academic importance, receiving scant academic treatment.

Because international projects have significant cross-border cash flows, which are subject to inflation and exchange rate risk, we model these cash flows assuming purchasing power parity (PPP). That is, the analyst assumes that exchange rates move to offset inflation differentials among countries. However, PPP may not hold all of the time, especially in the short term, and we need to make adjustments to account for possible expected deviations from it.

Theoretically, international cash flows need to be adjusted for political risk, particularly in developing countries. Such risk includes currency inconvertibility, expropriation, civil unrest, and institutional instability. In contrast, political risk does not pose a major concern for developed countries, unless projects in such countries have significant import or export exposures to emerging economies. In practice, however, political risk finds its way into the WACC and not the cash flows. See Abuaf and Chu (1994) for a detailed practitioners guide on how to value international projects

and for the empirical evidence supporting the view that political risk, as measured by international bond spreads, affects equity valuations.

The analyst also needs to reflect other considerations such as taxes and concessional financing arrangements when modeling cash flows. In some cases, the target project's cash flows may interact with the firm's other activities. For example, the international project's marginal contribution to the overall tax profile of the parent rather than the local tax rate determines the appropriate tax rate to be applied to a project's cash flows. In a competitive bidding situation, however, various market participants may have varying taxation levels. Because of such taxation differences, bidders (particularly from different countries) may tend to value projects differently. In such situations, we need to remember that the ultimate price will be determined by the highest bidders, regardless of internal valuation differences.

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- **Terminal value multiples need to be economically sensible.**

Most analysts apply current multiples to obtain terminal values. Though this practice may be acceptable most of the time, sometimes it leads to nonsensical results. For example, during the dotcom boom years of the late 1990s, Wall Street equity analysts were using inflated bubble-multiples to obtain terminal value estimates, thereby creating a vicious cycle (positive feedback loop) of nonsensical, unsustainable valuations. A non-profit motive driven academic would have easily spotted the flaw in the vicious cycle previously described.

Intelligent analysts break this vicious cycle by creating a stream of sustainable, perpetual cash flows and present valuing them to the terminal point by using a sensible discount rate. As Widen (2008) reports, the Delaware courts prefer this "perpetuity-growth method" to terminal value multiples and even go as far as advocating the use of several growth stages in modeling cash flows. As an academic-practitioner, I am also partial to this approach as it is derived from a relatively robust economic forecast, i.e. the long-term real growth rate of the economy.

We should also remember that in a typical DCF valuation, most of the time 60%-80% of the final value is attributable to the terminal value. For example, over a five-year horizon, if cash flows are growing at 5% per year, at a terminal value multiple of 15 times, and at a 10% discount rate, 73% of the final value is attributable to the terminal value and 27% to the cash flow stream. At a 15% discount rate, the breakdown would be 71%-29%. At a terminal value multiple of 10 times, and at a 15% discount rate, the breakdown would be 62%-38%; while under the same assumptions but at a discount rate of 10%, the breakdown would be 65%-35%.

As can be seen from the previous examples and in Figure 6, final valuation estimates are far more sensitive to terminal value multiples such as firm-value-to-EBITDA, than to discount rates. So, a sensible analyst should spend most of his time picking the right comparables as opposed to agonizing over the numerous theoretical and empirical underpinnings of the discount rate.

- **The Weighted Average Cost of Capital (WACC) is used to discount the appropriately determined unlevered after-tax asset cash flows (the investment's cash flows assuming that no interest payments are made).**

Three of the four inputs that determine a WACC are readily observable – debt financing rates, marginal tax rates and target debt-to-equity ratios. The fourth input, the expected equity cost of capital, involves more complexity than the first three.

- **The Equity Cost of Capital.**

Most Wall Street practitioners use the Capital Asset Pricing Model (CAPM) to estimate the cost of equity. Though most practitioners recognize the flaws in CAPM, it is nonetheless the lingua franca of valuation specialists. Flaws in the CAPM are frequently addressed by judgmentally adjusting the beta or the equity market risk premium, in much the same way that options traders dump all the flaws of standard option pricing models into their volatility estimates.

Applying the CAPM to estimate the cost of equity requires knowledge of three measures: The risk-free rate, the equity market risk premium (EMRP), and the equity beta.

Figure 6. Valuation is More Sensitive to EBITDA Multiples than to Discount Rates

Discount Rate	Terminal Multiple					
	10x	11x	12x	13x	14x	15x
10%	100	101	113	119	126	132
15%	83	84	93	98	104	109

Current EBITDA Multiple					
10x	11x	12x	13x	14x	15x
100	110	120	130	140	150

- **The risk-free rate.**

Of the three inputs into the CAPM equation -- the risk-free rate is the easiest to measure. Because equity is a long-term investment, the best measure is the yield on the longest US Treasury bond (currently a 30-year bond). Typically short- and long-term rates move in tandem. Nonetheless, short- and long- term rates can differ by quite a bit, particularly during economic turning points or crises. Consequently, being consistent and sticking with a long-term risk-free rate is good practice.

Estimating the other two inputs is trickier. The size of the EMRP is one of the most controversial issues in finance theory and in the investment industry alike. Because EMRP should be considered as a forward-looking measure of market returns, market practitioners rarely agree on the "right" EMRP.

- **The equity market risk premium (EMRP)**.

The three most common views are:

1. The historical/statistical view.

From a statistical point of view and as a first-order approximation, equity market returns follow a random process that is normally distributed with a mean and variance that are time-invariant. According to this view, Ibbotson Associates estimates the historical EMRP and calculates the expectation of excess equity returns. This value – measured in the US market over the available horizon varies from year-to-year and depends on the exact nature of the calculation. Namely, whether the returns are measured as geometric, or arithmetic means. Without getting into the details, it suffices to say that this value is in the 4.5%-6.5% range.

Fernandez (2009) reports that the average EMRP used in 2008 by professors in the United States was 6.5%, and higher than the 5.3% used by their colleagues in Europe. See, also, Welch (2008) where he reports that based on a survey of 400 finance professors, the sample interquartile range for the EMRP is 4% to 6%.

Other developed markets exhibit similar performances. Though some practitioners use different EMRPs for different countries, most major Wall Street houses assume that world capital markets largely behave as if they were perfectly integrated. This is especially true when local projects compete globally for funds. As such, most analysts use the equity market risk premiums that have been observed in the US equity market – the world's most efficient and mature (with the longest uninterrupted and most reliable historical record). For example, in a Salomon Brothers publication, Abuaf and Chu (1994) statistically demonstrate that developed market EMRPs are indistinguishable.

2. The survey view.

Another way of evaluating the EMRP is to look at the current market estimates used by corporations and finance firms in setting the cost of capital. An opportunity to peek into these estimates is given by a 1995 "best practices" study among investment banks' mergers and acquisitions (M&A) groups and 27 leading North American corporations. This study reports that most corporations use an EMRP of about 5%, while M&A groups of investment banks cluster around 7%. Both groups, however, base their estimates on historical data rather than on forward-looking estimates, see Abuaf and Solomon (1999).

3. The market expectations view.

This view matches forward-looking P/E ratios with the EMRP. According to this view,

$$P/E = 1/(k-g), \quad (1)$$

Where P/E is the price-to-earnings multiple, E is the forward earnings, k is the cost of equity, and g is the growth rate of earnings.

Alternatively,

$$P/E = 1/(r+EMRP-g), \quad (2)$$

Where r is the risk-free rate, or

$$EMRP = (E/P) - (r-g). \quad (3)$$

A P/E multiple of 20x, a real rate of interest of 3%, and a real growth rate of 4% for the S&P500 implies an EMRP of 6%. And, under the same assumptions, a P/E multiple of 15 implies an EMRP of 7.7%.

Note that, unlike most academics I am not worried about dividends or share buybacks. I am implicitly assuming that the equity holder is entitled to all the earnings of the company, regardless whether these earnings are used to pay dividends or buy back shares. Indeed, Shiller (2000) demonstrates that stock prices have decoupled from the present values associated with their dividends since the mid 1950s.

Debating the above is moot simply because in valuation assignments, we apply the WACC to all of the cash flows that are rightfully owned by the debt and equity holders. And these cash flows are all the cash flows generated by the investment, not merely the dividend and share buy back payouts to equity holders. As such, we do not need to adjust the above formulae for dividends or share buybacks.

Currently, most Wall Street practitioners use a range estimate for the EMRP. They believe that such a practice would be more defensible in a court of law.

As seen in Figures 7 and 8, EMRP varies over time. The historical EMRP is more stable than the market implied EMRP, and the market implied EMRP is strongly correlated with high-yield interest rates.

- **The Beta.**

As for beta coefficients, one needs to differentiate between what is theoretically correct and what is empirically relevant. I would say that there are three different approaches to estimating the beta:

1) The theoretical approach.
2) The statistical approach detailed by Abuaf and Solomon (1999).
3) Barra's black-box approach.

For obvious reasons, I am partial to the statistical approach.

Most market practitioners follow the following theoretical recommendations when calculating the WACC:

1) Delever observed betas, and then relever them to the target capital structure.
2) In theory, the delevering and relevering formulas need to account for the existence of debt betas, in practice however analysts rarely incorporate debt betas into their analysis; and even when they do, the results are empirically insignificant.
3) Adjust raw beta estimates towards one by weighing estimated betas by two thirds, and the number one by one third.
4) Use weekly or monthly data in the estimation process.
5) Use historical estimation windows of somewhere between one to three years.

Empirically, however, Abuaf and Solomon (1999) demonstrate the following:

1) Estimating industry betas yields more robust estimates than estimating company-specific betas.
2) The levered cost of equity tends to be stable within an industry. This is probably because companies within the same industry tend to gravitate towards similar capital structures.
3) For most industries, beta coefficients and leverage are not statistically correlated, despite what theory predicts.
4) Nonetheless, betas change considerably and statistically significantly from one industry to the next.
5) Industry betas do not vary significantly statistically when measured over time periods of one year, two years, and five years.

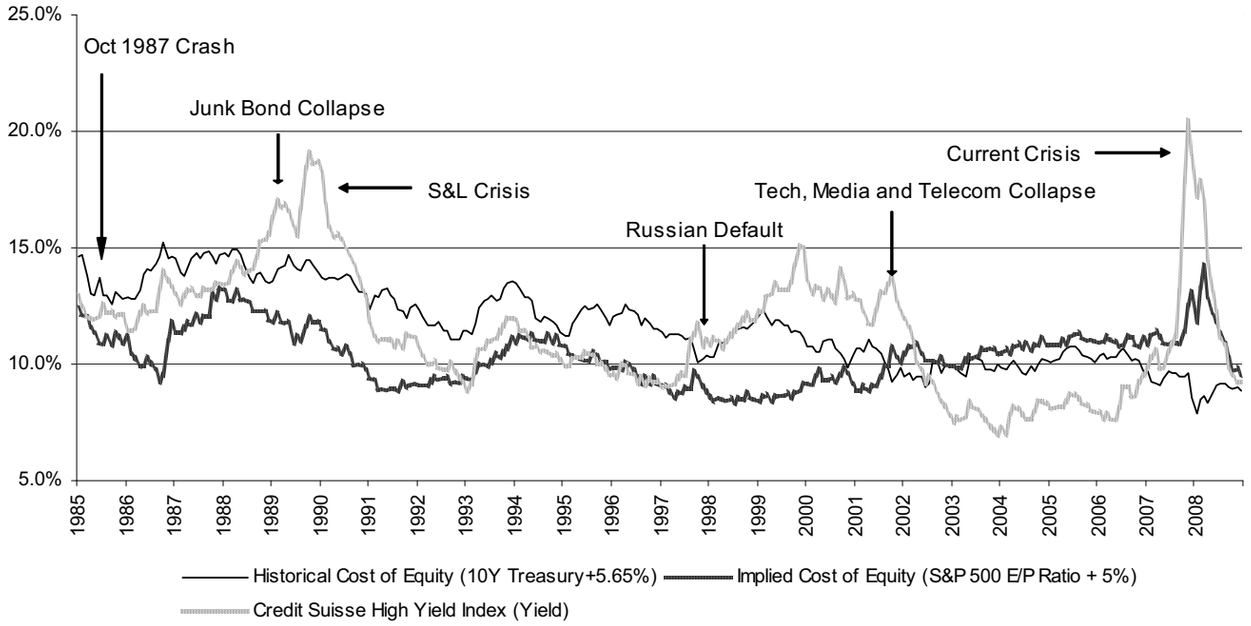
Indeed, Fernandez (2003) reports that alternative valuation theories proposed in the literature to estimate the relationship between levered and unlevered betas do not have any empirical support.

As Figure 9 illustrates estimating historical betas by using daily data yields robust estimates for the pharmaceutical industry. Because this is true for most industries, Figure 10 reports beta ranges for select industry groups.

As a result, Abuaf and Solomon (1999) recommend a statistical approach and several market practitioners follow their advice by:

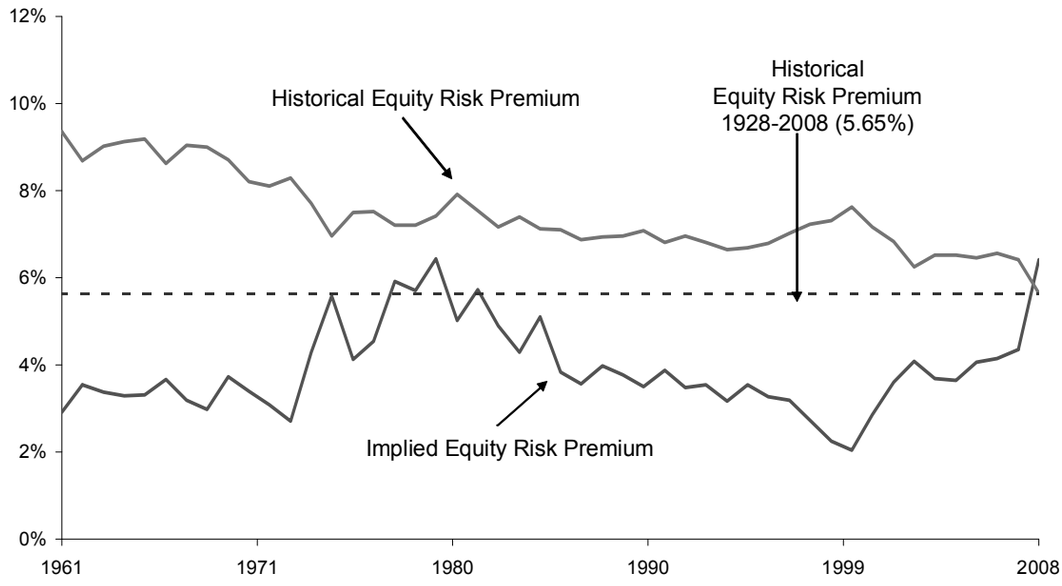
1) Using the median industry beta coefficient – rather than a company's own beta coefficient -- to determine a company's cost of equity.
2) Viewing the levered cost of equity as fixed by industry as companies tend to optimize capital structure to match the inherent industry cost of equity. As such, there is no need to delever and relever equity betas.

Figure 7. High Yield Trades Like Equity, 1986-2009



Source: Bloomberg

Figure 8. Has the Market Price of Risk Gone up?
Implied vs. Historically Equity Risk Premium, 1961-2008



Source: Bloomberg

Figure 9. Five-Year Historical Beta Estimates for the Pharmaceutical Industry, 2004-2009

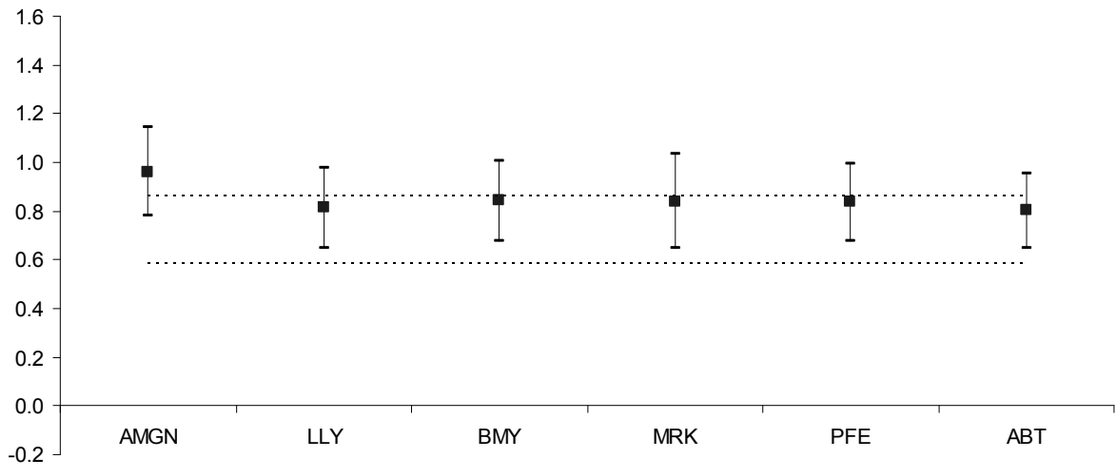


Figure 10. Summary of Beta Ranges, 2009

Industry	Range	Range Width
Energy	0.54 - 0.72	0.18
Household Products	0.45 - 0.63	0.18
Electric Industrials	0.96 - 1.16	0.20
Electric Utilities	0.41 - 0.61	0.20
Foods	0.46 - 0.67	0.21
Telecom	0.68 - 0.92	0.24
Pharmaceuticals	0.58 - 0.86	0.28
Retail	0.63 - 0.93	0.30
Chemicals	1.05 - 1.37	0.32
Aluminum	1.00 - 1.39	0.39
Technology	1.21 - 1.64	0.43
Health Networks	0.94 - 1.37	0.43
Internet	1.34 - 1.90	0.56
Steel	1.73 - 2.30	0.57
Semiconductors	1.80 - 2.54	0.74
Solar Energy	1.18 - 2.31	1.13

3) Using raw rather than adjusted betas as statistically, a company's beta remains stable when measured over varying time horizons.

Though many investment bankers use Barra predicted betas in their calculations, in my experience, betas estimated by using the above methodology are not statistically different than Barra betas. Moreover, Barra predicted betas are derived from Barra's proprietary model and suffer from the predicament that they are the result of a black-box model whose logic is not readily available to market participants.

In summary, I recommend the statistical approach as it is the most robust, easiest to estimate, and the most transparent.

B. Public Multiples-Based Valuation (Comparables Analysis)

Though investment bankers use both Discounted Cash Flow (DCF) and Comparables Analysis in valuing companies, they use DCF begrudgingly, mainly to satisfy their due diligence requirements. As such, and despite its theoretical shortcomings, multiples analysis is far more frequently used in practice than DCF analysis. In sales pitches, negotiations, and other daily business interactions to say that Company XYZ trades at an N times EBITDA multiple is far handier than rolling out an EXCEL spreadsheet with cash flows, WACC estimates, and the like.

When using Comparables Analysis, we need to ask the following questions to remain at least somewhat faithful to theory:

- Are the companies being compared truly comparable, in terms of:
  1) Growth opportunities.
  2) Capital structure.
  3) Shareholder payout policies?

- Are market prices reliable estimates of value in distressed markets, in light of :
  1) Illiquidity.
  2) Possible pockets of irrationality?

When considering comparables transactions, we need to ask the following questions:

- Did general market conditions change since the time of the particular transaction?
- Was the transaction a distressed sale?

Figures 11-12 illustrate the following points about comparables and multiples analyses:

- Firm value to EBITDA multiples vary across industries and through time.
- High growth telecom, media, and technology companies tend to have higher multiples than in other industries.
- When earnings are negative, or de minimis, as has been recently the case in the banking industry, analysts use other multiples such as price-to-book, or price-to-revenue.

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C. Acquisition Multiples-Based (Transaction) Valuation

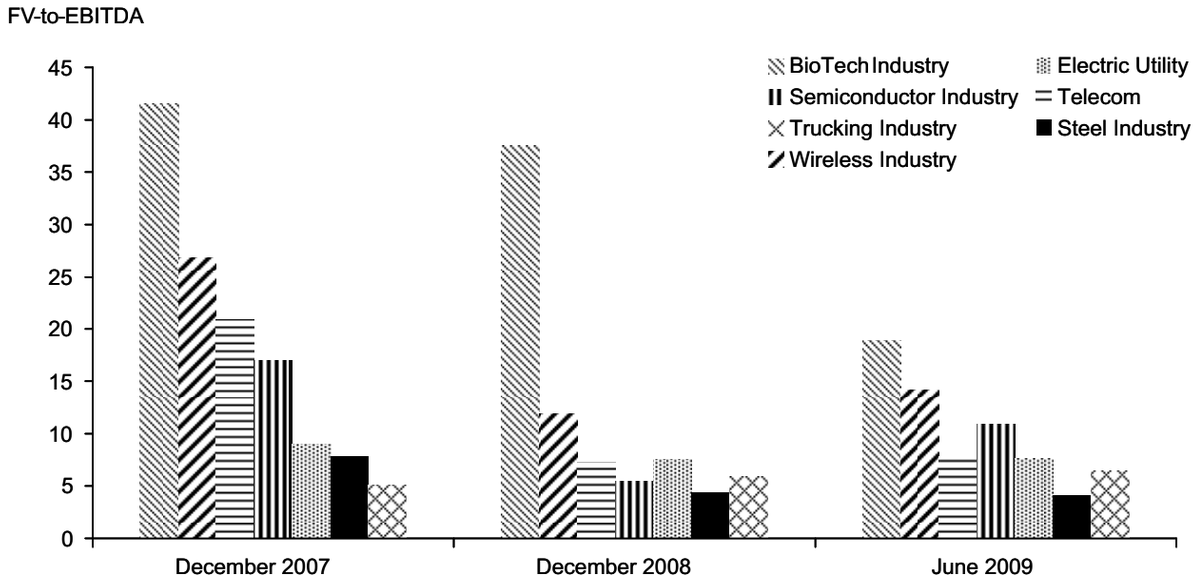
In addition to the previous two methods, Investment Banks use an acquisition-multiples-based valuation when issuing fairness opinions. The use of this approach suggests that publicly-traded-comparables analysis may imply a minority discount. A minority discount is defined as the difference in the value of share owned by a minority share holder versus the value of a share owned by a controlling shareholder. As such, definitionally we can say that a publicly traded share suffers from a minority discount compared to the value of a share owned by a controlling shareholder. Analogously, the value of a share owned by a majority (controlling) shareholder would enjoy a control premium versus a publicly-traded share. As described below, the existence of a minority discount, or its mirror image, a control premium, is a controversial subject.

As Widen (2008) reports, Deleware courts have consistently ruled that comparable-company analyses contain an implicit minority discount. Widen continues: "As a result, whenever they have relied on such a methodology in an appraisal case, they have applied a 'gross up' to the value resulting from a comp company analysis to reach a fair, or intrinsic value. The most frequently used gross-up percentage has been 30%, but 20% has also been approved."

I present the theoretical and empirical views on control premiums:

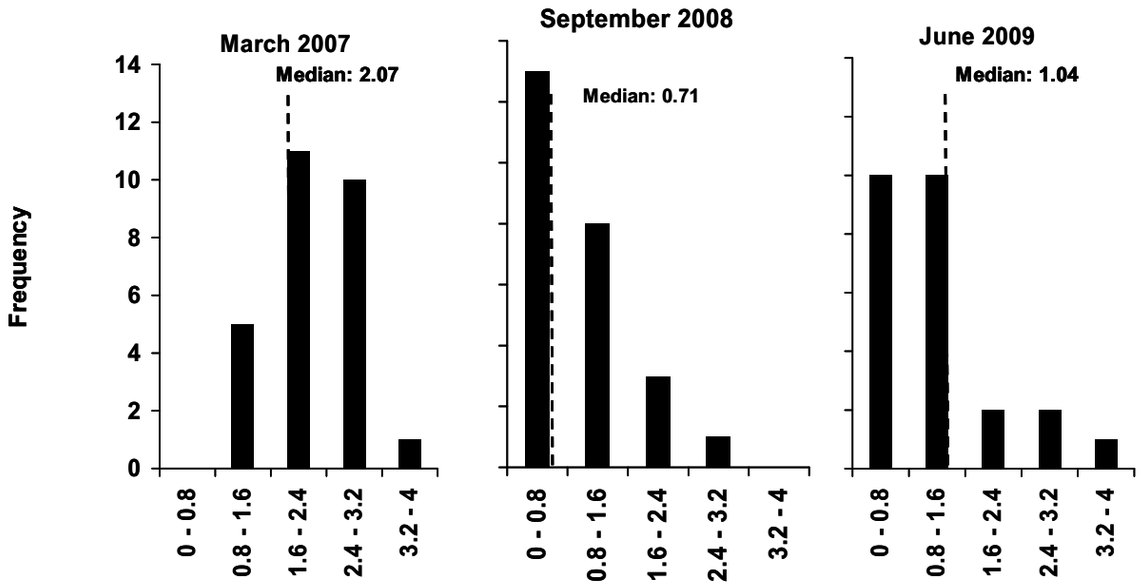
- Acquisition (Control) Premium vs. DCF Value
  1) In theory, there should be no control (acquisition) premium when properly present valuing cash flows at the correct discount rate, see Damodaran (2006).
  2) This assumes that all the synergies arising from the acquisition are properly accounted for:
     a) whether they are due to cost savings from labor or other sources.
     b) whether they are from top line revenue estimates.
  3) This further assumes that the discount rate also properly reflects the acquisition:
     a) e.g. if the acquisition reduces the beta of the combined entity due to diversification, this should be reflected in the discount rate.
- Acquisition Premiums vs. Share Price, as stated in Arzac (2005):
  1) "It is common for the acquirer to pay a premium over the share price of a publicly traded firm to induce the target shareholders to tender their shares. A premium is a payment in excess to the value improvements that the market has already impounded into the target pre-acquisition price."

Figure 11: Firm Value to EBITDA Varies Across Industries, 2007-2009



Source: Bloomberg

Figure 12: Bank P/B Values Have Declines Drastically as a Result of the Crisis



Source: Bloomberg

2) "The average acquisition premium paid for public companies during 1996 to 2002 was 31% in the United States and 34% in Europe."

3) "Whether the premium is justified from the point of view of the shareholders of the acquirer depends on the value created by the merger. Hence, a crucial consideration in a merger is how the premium paid to the shareholders will be recovered, and hopefully exceeded by the additional value created by the merger."

- A review of the academic literature suggests that most mergers and acquisitions destroy value for the acquiring shareholders. As such, the academic literature seems to suggest that control premiums have not been justified.
- On the other hand, according to the Mergers and Acquisitions department of a leading investment bank:
  1) In 4Q08, control premiums were 46% for all cash transactions and 35% for all stock transactions.
  2) Before 4Q08, control premiums were in the 25%-30% range.
- As stated in Damodaran (2006):
  1) "There can be no rule of thumb on control premium: Since control premium will vary across firms, there can be no simple rule of thumb that applies across all firms. Thus, the notion that control is always 20% to 30% of value cannot be right."
- The bottom line:
  1) To the extent that there is a control premium:
     a) It should be reflected in the DCF and if need be in the discount rate.
     b) There is no uniform view in the literature regarding what the control premium is.

D. Implications of Real-Options Theory

As Damodaran (2009) states, DCF analysis under-estimates firm value when firms are highly levered, or distressed. Damodaran suggests that real-option theory might prove useful in such cases. In valuation practice however, the few times that I have observed analysts applying real-option theory has been when valuing gold mines and oil fields.

Nonetheless, the implications of real-options theory are still relevant in practice. That is when valuing firms that are highly levered, or distressed, the analyst needs to estimate the best market value of the underlying assets of the company, and accordingly price the value of the debt and equity of the company. Stated differently, I am suggesting that if a proper auction were held to sell off the assets of a distressed company, the winning bid would reflect the optionalities embedded in the assets of the company.

In my experience, equity analysts sometimes use the real-options approach when valuing mining companies, especially gold-mining companies. Infrequently, in complex distress situations optionality may be invoked, particularly when attempting to gain an upper hand in negotiations. To my knowledge, such calculations are not reflected in fairness opinions.

IV. Other Considerations

Other practical considerations revolve around the following:

1) The existence of hybrid securities in the capital structure.
2) The tax rate and net operating losses.
3) The existence of excess cash.
4) The existence of a small-cap premium.
5) Illiquidity discounts.

A. The Existence of Hybrid Securities in the Capital Structure

When hybrid securities such as convertibles and non-deductible preferred stock exist in the capital structure, the analyst assigns a cost of capital to these securities that is consistent with theory and market practice. If non-deductible preferred stock, out-of-the-money convertibles and hybrid securities individually represent less than 10% of the total capitalization, the analyst typically counts them as debt.

B. The Tax Rate and Net Operating Losses (NOLs)

In theory and in practice, the analyst uses the marginal tax rate in the cost of capital analysis. If, however, the company has large international operations or tax credits, the analyst uses the average tax rate.

If a company has material NOLs, the analyst calculates the value of the NOLs separately and does not reduce the marginal tax rate.

C. The Existence of Excess Cash

Excess cash refers to large cash balances on companies' balance sheets that are not necessary for the day-to-day operations of the company. Microsoft, for example, is a company that holds significant amounts of excess cash on its balance sheet. When calculating the WACC, the analyst needs to impute the amount of excess cash and its after-tax yield.

D. The Small-cap Premium

Widen (2008) reports that the Delaware courts have recently begun to use models in addition to, or in lieu of the CAPM. In particular, the Fama-French model whose two additional factors to the CAPM include a small-cap premium and a price-to-book ratio (an academic nod to Graham and Dodd) has received wide-spread acceptance in the Delaware courts. In contrast, Welch (2008) reports that only 10% of finance professors recommend the Fama-French model.

Investment banking practitioners that I have worked with do give quite a bit of attention to whether the small-cap premium exists. The academic literature on this question is inconclusive. In my opinion, the best way to resolve this question is to calculate the implied EMRP embedded in the S&P600 and the Russell 2000 P/E multiples.

On the other hand, many Investment Banks assign the following small-cap risk premiums according to size:

Equity Market Capitalization	Size Premium
Below $170MM	6.25%
$170MM<$270MM	3.00%
$270MM<$300MM	1.50%

E. Illiquidity Discounts

Illiquidity discounts usually range in the 25%-35% range. However, one can find significant exceptions to that rule as can be seen from the following example.

As reported in a New York Times article on September 18, 2009: "In 1968, the Mates Fund bought restricted stock in Omega Equities, which was then selling in the over-the-counter market for $24 a share. The Mates Fund paid only $3.25 a share – a price that turned out to be a lot more than the shares were really worth."

V. Conclusions and the Importance of Having a Holistic Economic View

This paper highlights the approximations and pragmatic ways practitioners resolve questions surrounding the valuation question. Though practitioners, by and large, remain faithful to the academic approach, they frequently need to make quick, decisive, and approximately correct decisions, which we document.

Both practitioners and academics need to make sure that all aspects of their valuation modeling are consistent with economic fundamentals and make "horse sense." For example, a consulting assignment that I have recently worked on demonstrates the importance of understanding the full economic picture. In this case, a company had entered into a debt-for-debt swap to reduce its outstanding debt. The valuation question became: "how should the equity be marked-to-market?" The transaction, where debt investors exchange their $80 worth debt for $60 worth debt is summarized in Figure 13.

The client's initial reaction was to mark up the equity, but obviously that did not make sense as the company was in distress. The analyst had to realize that the assets needed to be marked down after the debt-for-debt exchange.■

Figure 13. A Concluding Puzzle

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