Track B

Technical Valuation Issues

Company-Specific Risk Premiums: Application and Methods

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Company-Specific Risk Premiums: Application and Methods

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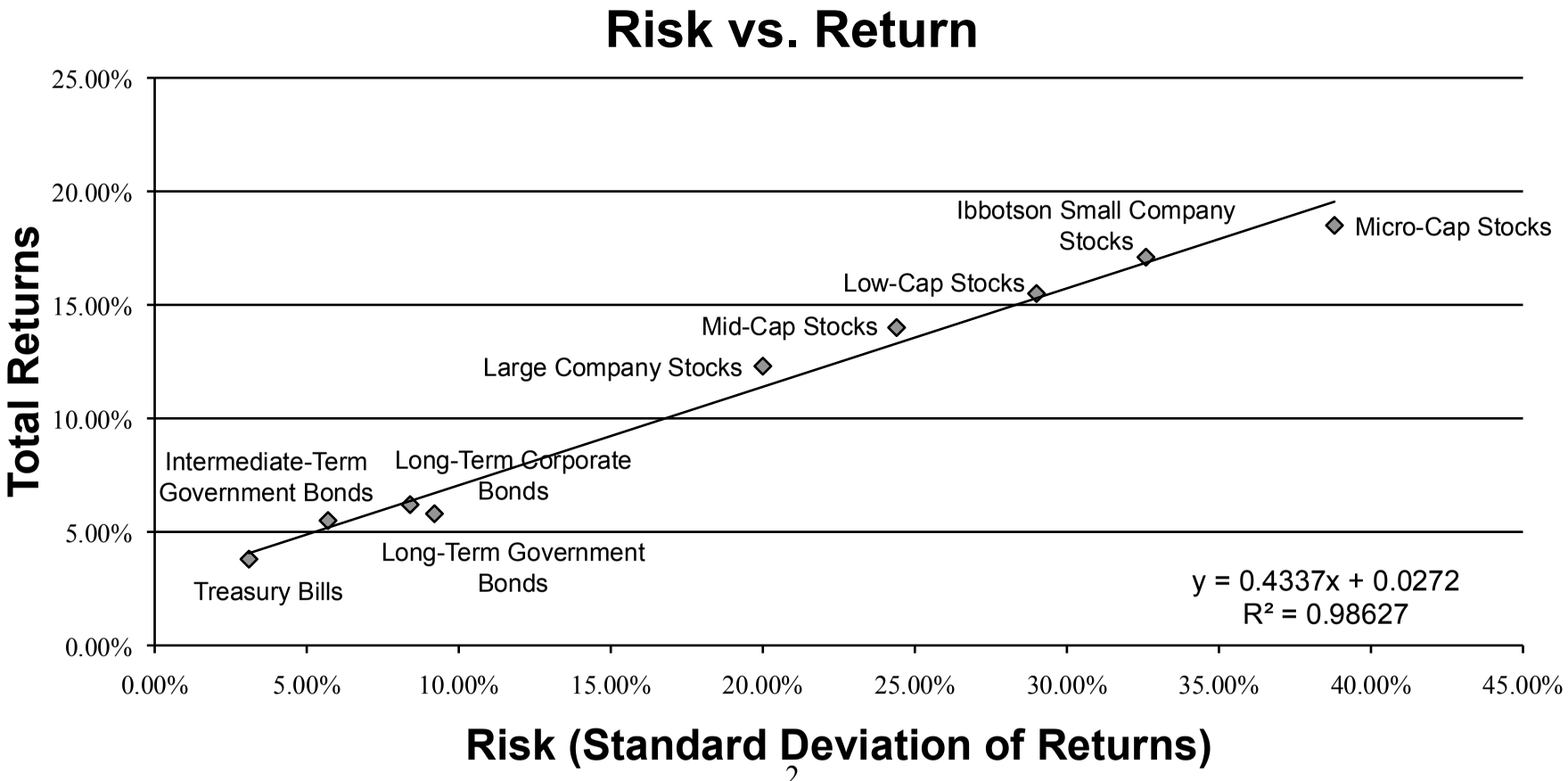
February 24, 2010

Introduction

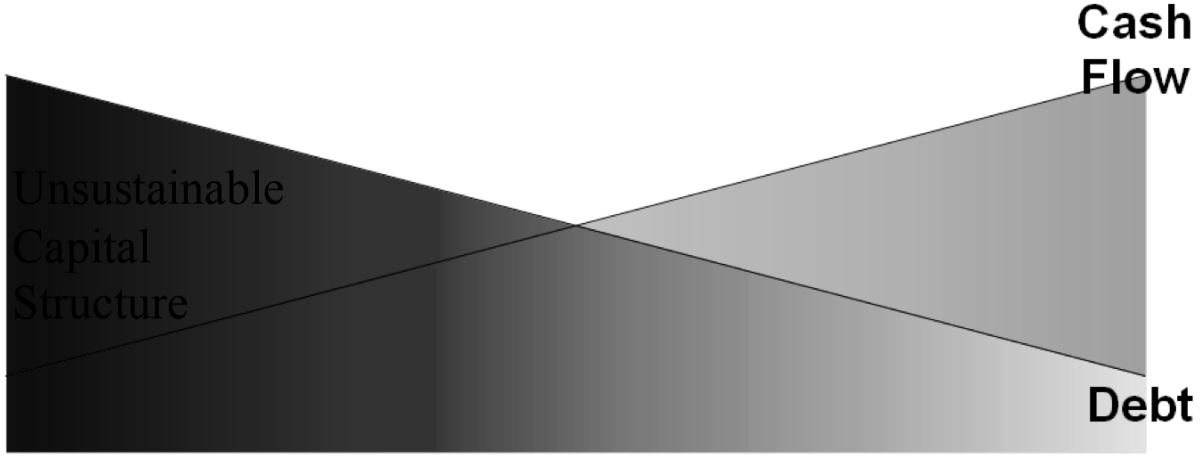
- **Cost of capital is the rate of return required to compensate investors for accepting the financial risk of investing in a business or other financial asset**



Introduction

- **Businesses in distress face unique challenges in raising capital**

- **Companies in distress are at an unsustainable capital structure**



CAPM

- **Traditional CAPM**

  E(r) = R(f) + B(ERP)

- **CAPM assumes investors hold well diversified portfolios**
  - **Systematic risk is the only "relevant risk" under CAPM**
- **Modified CAPM (MCAPM)**

  E(r) = R(f) + B(ERP) + RP(s) + Alpha

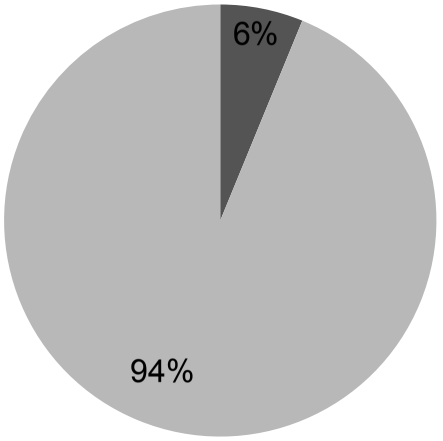
- **MCAPM includes additional adjustment for size effect and unsystematic (company specific) risk or alpha**

Applicability of Historical Betas of Guideline Companies

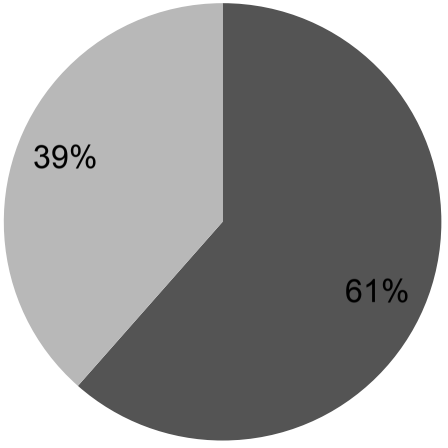
- **Historical beta may not be applicable for a distressed company**
  - **Company specific risks become more significant**
  - **Stock prices of distressed companies often behave erratically resulting in non-meaningful beta as measured by R^2**
- **Caution must be used in selecting guideline companies as the entire industry may be in distress**
  - **Automotive Industry**
- **"Healthy" companies within the industry may be used, but an additional adjustment in the alpha factor for restructuring risk may be required**

Components of Risk

Circuit City



Best Buy



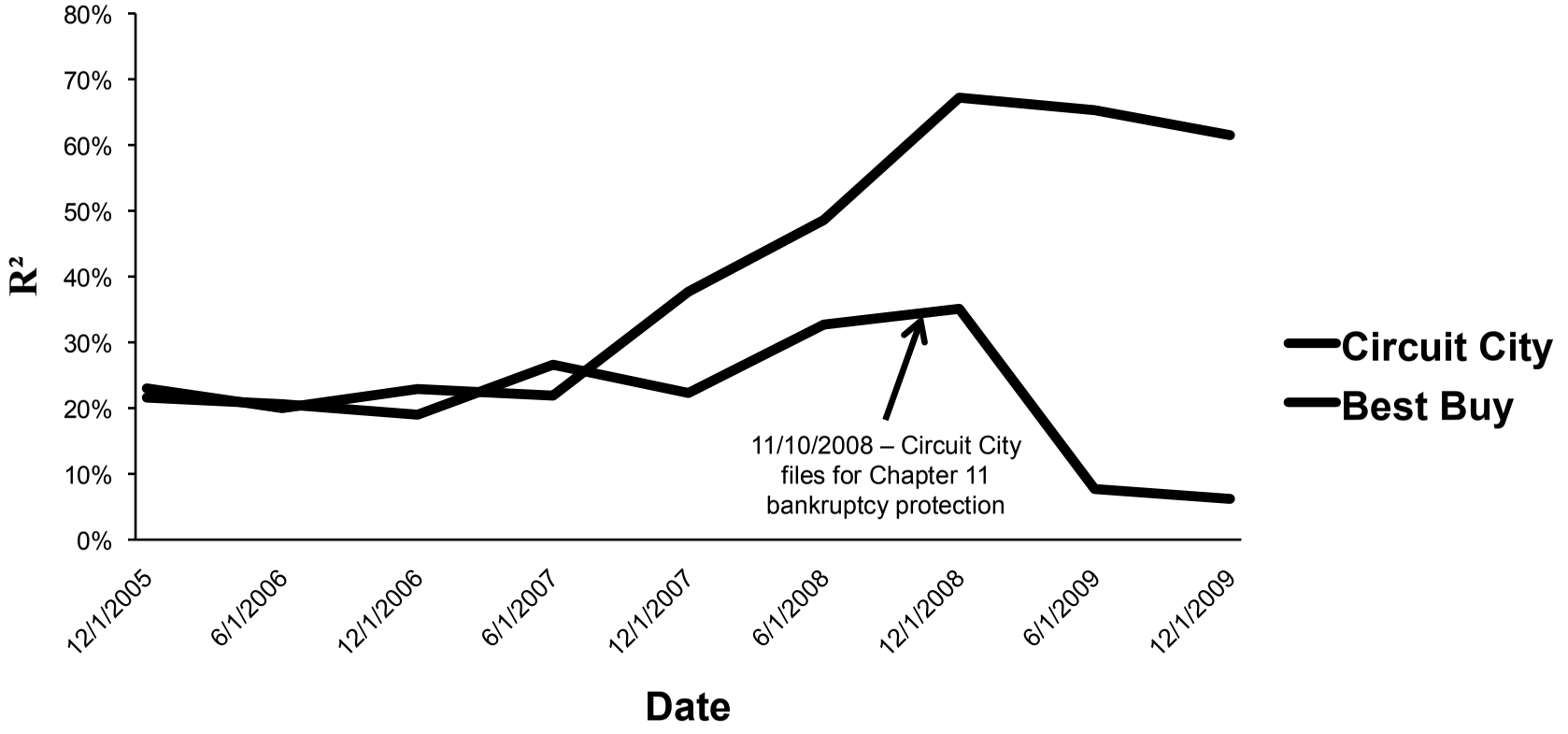
Systematic Risk

- Risk associated with aggregate market returns
- Measured by Beta
- Cannot be reduced through diversification

Unsystematic Risk

- Company Specific Risk
- Measured by Alpha
- Can be reduced through diversification

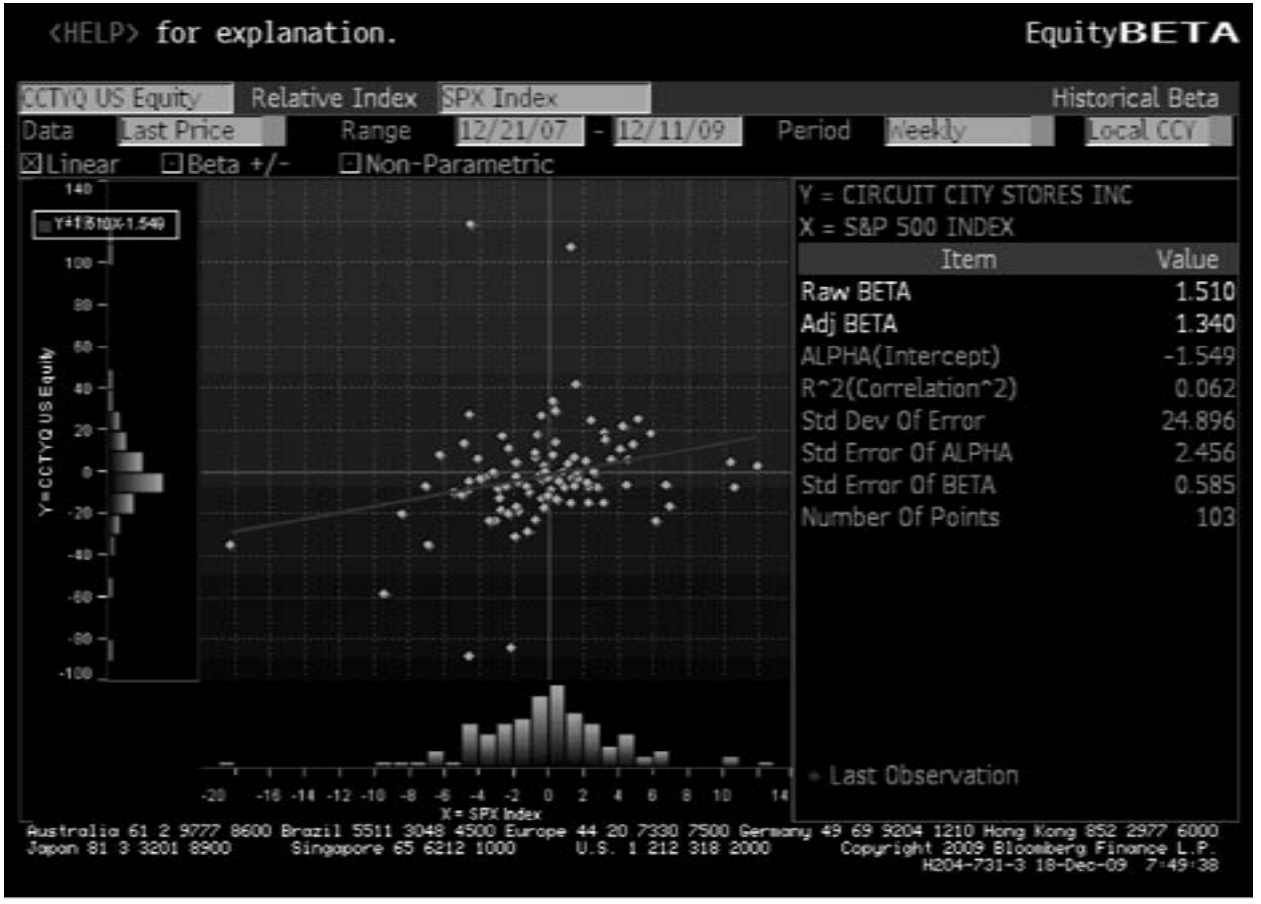
Historical R² of Circuit City and Best Buy



- R² is the proportion of stock price performance that is accounted for by the performance of the aggregate market (as represented by a suitable index)
- The above chart is based on R² values from rolling two-year weekly betas over the period from December 31, 2005 through December 11, 2009 Source: Bloomberg

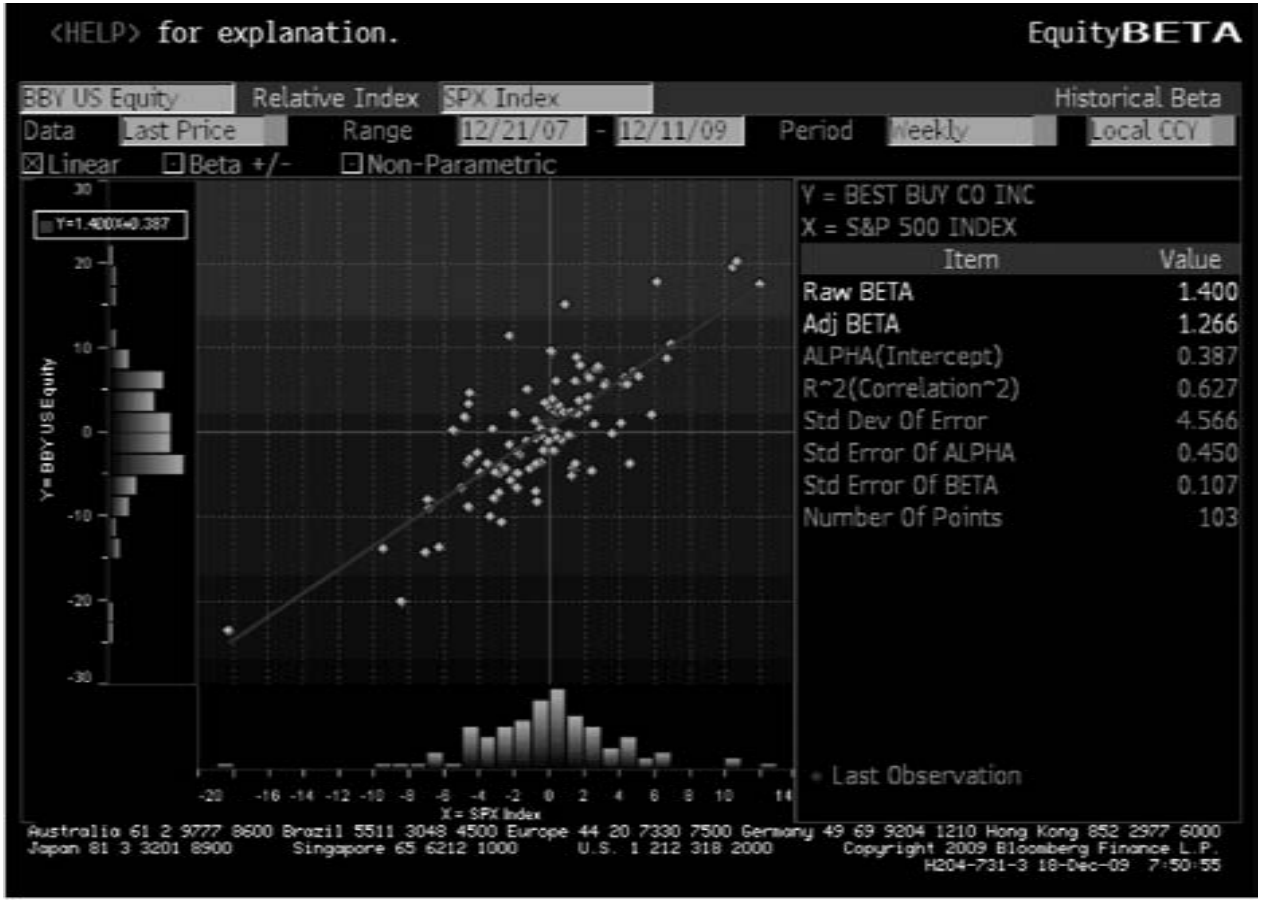
Historical Beta

- **Bloomberg R^2 Correlation calculation for Circuit City**



Historical Beta

- **Bloomberg R^2 Correlation calculation for Best Buy**



Restructuring Risk

- **Restructuring Risk Includes:**
  - **Restructuring execution risk**
  - **Operational risk during restructuring**
- **Two types of financially distressed companies**
  - **Good companies with bad balance sheets**
    - **Over-leveraged, but otherwise operationally healthy**
    - **Typically profitable at EBIT level**
    - **Principally face financial restructuring risk**
    - **Very low probability that result of restructuring will be liquidation**
  - **Bad companies with bad balance sheets**
    - **Significant operational problems in addition to being over-leveraged**
    - **Typically unprofitable at EBIT level**
    - **Principally face operational and financial restructuring risk**
    - **Moderate to high probability that result of restructuring will be liquidation**

Additional Unsystematic Risks

- **Key Supplier Dependence**
  - **Dependence on single supplier for a product or a favorable sales arrangement with a key supplier that would be hard to replace**
- **Key Customer Risk**
  - **Small number of customers constitute large percentage of sales**
  - **Customer may look for new supplier if it believes supplier will have trouble delivering products in timely manner**
- **Key Person Dependence**
  - **Key executives often look for employment at less risky firms**
- **Size**
  - **Small companies often don't have the resources to deal with financial distress**

Additional Unsystematic Risks

- **Litigation Risk**
  - **Reduction in workforce resulting from restructuring plans may result in employment litigation**
  - **Litigation may arise out of inability to fulfill delivery of products and services**
  - **Shareholder agreement disputes**
- **Forecast Bias**
  - **Forecasts may be overly optimistic or overly pessimistic based on certain motivations**
- **Leverage Risk**
  - **May be factored into Cost of Capital through a leveraged beta and the appropriate borrowing rate**
- **Industry Risk**
  - **Already factored into Cost of Capital through beta and the appropriate borrowing rate**

Issues with Estimating Cost of Equity Capital in Today's Economy

"Standard" methods of estimating Cost of Equity Capital,

Cost of Debt Capital and the Weighted Average Cost of Capital

that worked in periods of stability fell apart in 2008 and 2009.

Company-specific risk adjustments may be applicable but only if the base components of the cost of capital are properly estimated.

Company-specific risk adjustments are not substitutes or corrections for poorly estimated cost of capital components.

Issues: Equity Risk Premium

Beta estimation

Company-specific risk adjustments

Distressed company issues

Issues with estimating RP_m = Equity Risk Premium (ERP)

- The *ERP* , the rate of return ***expected*** on a diversified portfolio of common stocks in excess of the rate of return on an investment in T-bonds, has likely increased as the broad stock market level has declined.
- Long-term study of realized premiums in excess of the return on T-bonds indicates that realized premiums, on the average, have decreased as the T-bond yields decrease.

  Morningstar *SBBI* Historic *ERP at end of 2007 = 7.1%*

  at end of 2008 = 6.5%

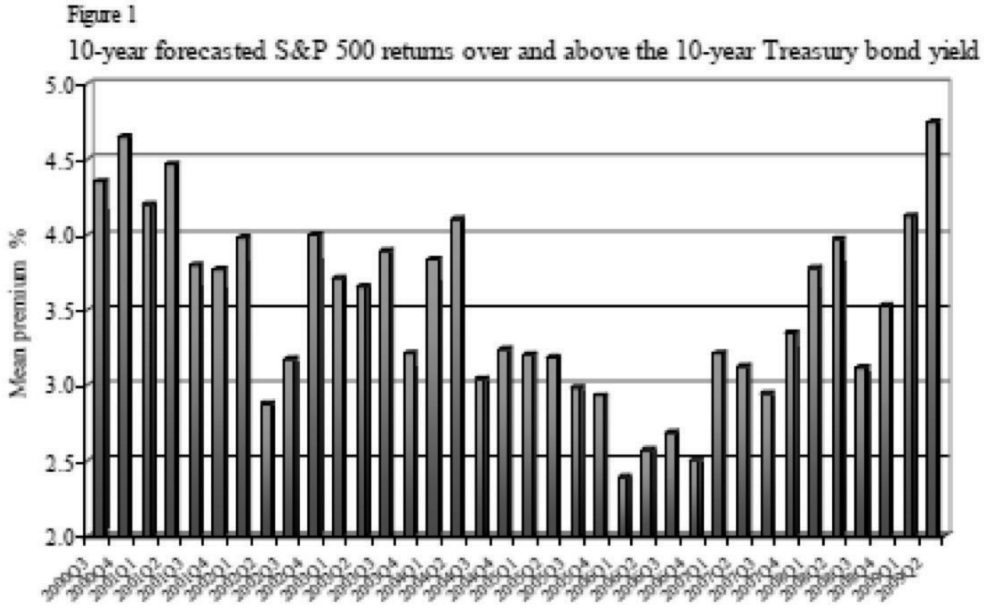
- But these are not ordinary times. If one simply adds an estimate of the *ERP* derived during "normal" economic times to the "spot" yield on 20-year T-bonds on December 31, 2008, one will likely arrive at too low of an estimate of the cost of equity capital.

Forward-Looking ERP estimates – "Top Down"

Graham and Harvey, "Expectations of Equity Risk Premia, Volatility and Asymmetry from a Corporate Finance Perspective," working paper (July 2003); "The Equity Risk Premium amid a Global Financial Crisis," working paper (May 2009); updated quarterly by *Duke CFO Outlook Survey* (www.cfosurvey.org).

- Estimate expected risk premium on multi-year survey of CFOs.
- Followed up with continuing quarterly surveys:
  - Survey attracts about 400 respondents (10% from companies with less than $10 million in revenue; 50% from companies with less than $500 million in revenue; 40% are private companies)
  - Ask for 1-year and 10-year risk premia (expected return on S&P 500; premium calculated over 10-year Treasury bond)
- Estimate at beginning of 2009: 4.8% arith avg. – *highest since 2001*

Forward-Looking ERP estimates– "Top Down"

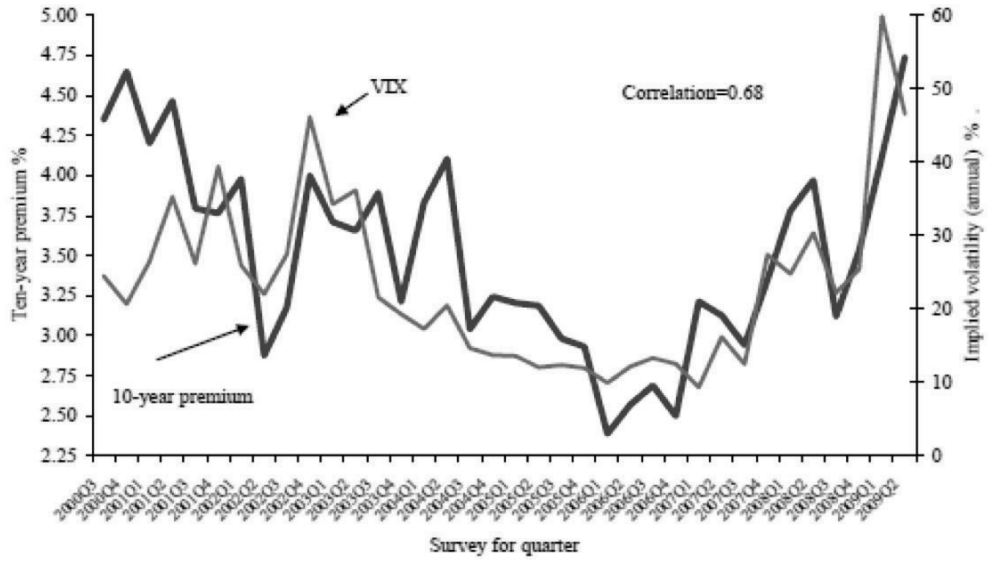


Source: "The Equity Risk Premium amid a Global Financial Crises," p. 7.

Forward-Looking ERP estimates – "Top Down"

Figure 5

The equity risk premium and the implied volatility on the S&P 100 index option (VIX)



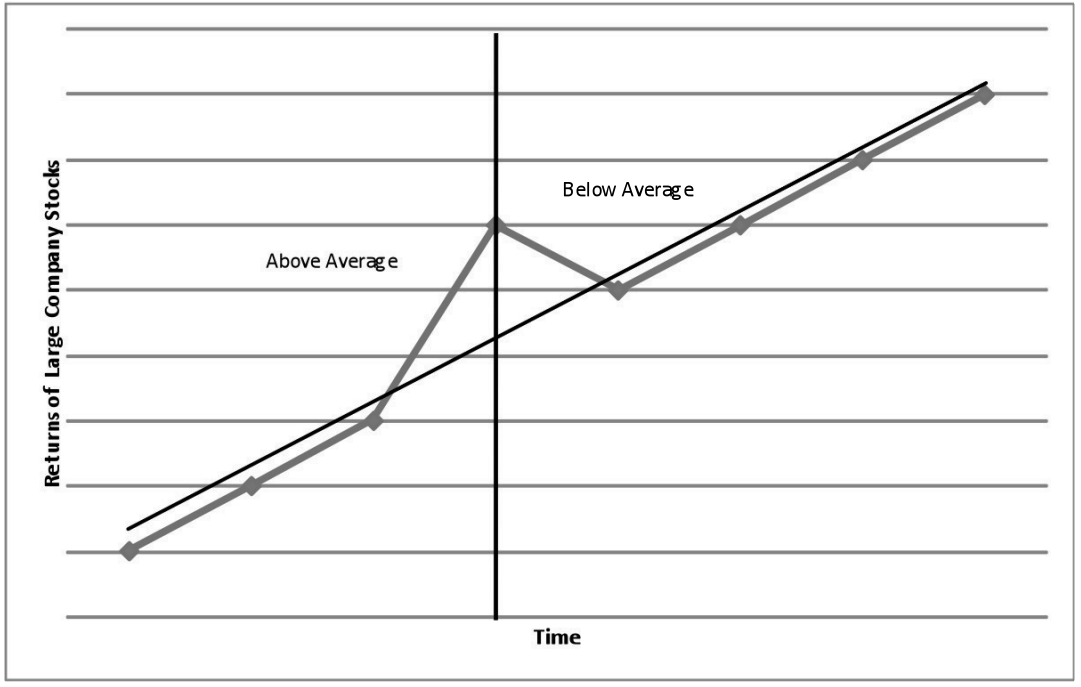
Source: "The Equity Risk Premium amid a Global Financial Crises," p. 11.

Issues with estimating ERP

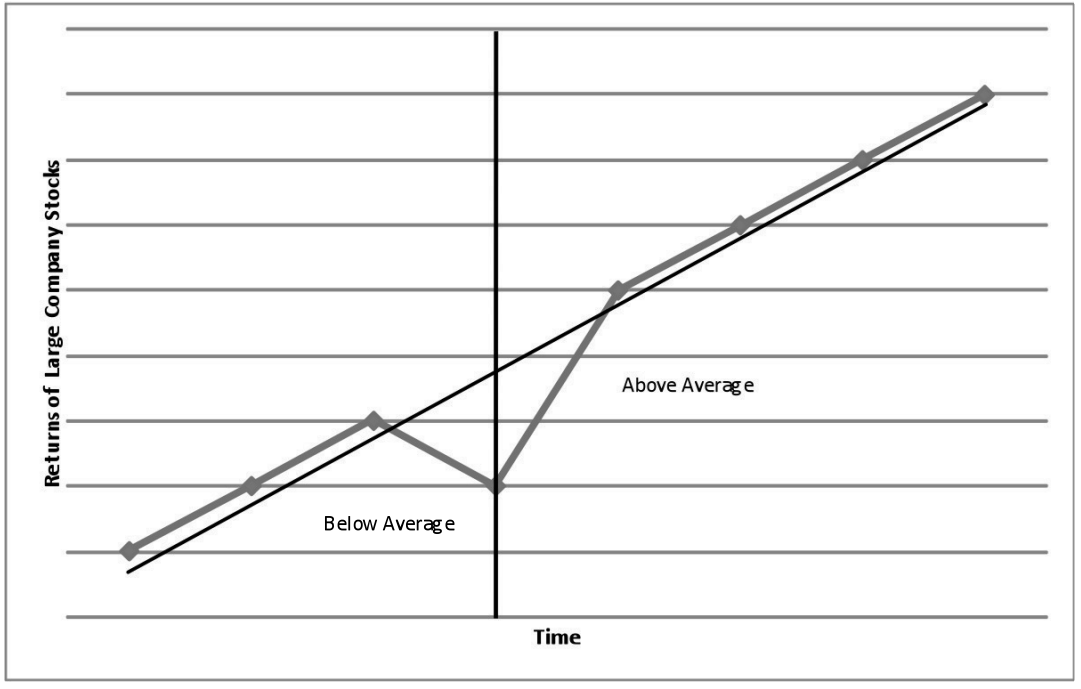
The evidence presented [that the long-run *ERP* is between 3.5% and 6%] represents a long-term average or unconditional estimate of the *ERP*. That is, what is a reasonable range of *ERP* that can be expected over an entire business cycle? Where in this range is the current *ERP*? Research has shown that *ERP* is cyclical during the business cycle. We use the term "conditional *ERP*" to mean the *ERP* that reflects current market conditions. For example, when the economy is near or in recession (and reflected in recent relatively low returns on stocks), the conditional *ERP* is more likely at the higher end of the range. When the economy improves (with expectations of improvements reflected in recent increasing stock returns), the conditional *ERP* moves toward the mid-point of the range. When the economy is near its peak (and reflected in recent relatively high stock returns), the conditional *ERP* is more likely at the lower end of the range.

Pratt and Grabowski, *Cost of Capital: Applications and Examples* 3rd ed, Chapter 9.

Conditional ERP Estimate at Peak of Stock Market Cycle : ERP below average



Conditional ERP Estimate at Trough of Stock Market Cycle: ERP above average



Implied ERP estimates benchmarked against actual and normalized 20-year U.S. government bond yields (should be compared to geometric avg of realized risk premiums)

		Bond Yield		Merrill Lynch ERP		Damodaran ERP	
Estimate as of	**S&P 500**	**Actual**	**Normalized**	**Actual**	**Normalized**	**Actual**	**Normalized**
December 31, 2008	903.25	3.03%	4.50%	9.17%	7.70%	5.61%	4.14%
January 31, 2009	825.88	3.94%	4.50%	8.45%	7.89%	5.80%	5.24%
February 28, 2009	735.09	4.01%	4.50%	9.18%	8.69%	6.69%	6.20%
March 31, 2009	797.87	3.55%	4.50%	9.44%	8.49%	6.17%	5.22%
April 30, 2009	872.81	4.10%	4.50%	8.49%	8.09%	5.38%	4.98%
May 31, 2009	919.14	4.32%	4.50%	8.07%	7.89%	5.09%	4.91%
June 30, 2009	919.32	4.29%	4.50%	8.10%	7.89%	5.10%	4.89%
July 31, 2009	987.48	4.30%	4.50%	7.69%	7.49%	4.68%	4.48%
August 31, 2009	1020.62	4.15%	4.50%	7.83%	7.48%	4.55%	4.20%
September 30, 2009	1057.08	4.03%	4.50%	7.75%	7.28%	4.13%	3.66%

Source: *Quantitative Profiles* and www.damodaran.com and Duff & Phelps calculations
Source: Shannon Pratt and Roger Grabowski, *Cost of Capital 4th ed* (Wiley, 2010)

Issues with Measuring Beta

In theory, Beta equals:

$$\beta_s = \frac{cov(R_s, R_m)}{var(R_m)}$$

where:

β_s	=	Expected Beta of the stock of company "s"
$Cov(R_s, R_m)$	=	Expected covariance between the excess return $(R_s - R_f)$ on security "s" and the excess market return $(R_m - R_f)$
$Var(R_m)$	=	Expected variance of excess return on the overall stock market

- Covariance measures the degree to which the return on a particular security and the overall market's return move together
- In practice, these forward variables are estimated using historical data over a "look-back" period.

Interpretation of Beta – correlation vs. relative volatility

Let $\rho = \sigma_{s,m} / [\sigma_s * \sigma_m]$ **= *correlation coefficient*** between the returns on the security, *s.* and the market, *m*, then

$$\beta_s = \rho * [\sigma_s / \sigma_m]$$

Issue:

- Does beta come primarily from correlations of stock returns with the market index (i.e., ρ) or
- Does beta come primarily from the relative return volatilities $[\sigma_s / \sigma_m]$ or
- From other source as well?

The formula for standard beta mixes together relative volatility and correlation. A low beta could actually represent a high relative volatility that is masked by a low correlation. Investors would be misled into thinking they had selected an investment whose volatility is low.

Interpretation of Beta - correlation (cont'd)

- Covariance is not volatility
- Covariance is a measure of their tendency to vary in the same way and in the same relative amounts
  - Positive correlation: do large values of one variable tend to be associated with large values of the other variable or

    small values of one variable tend to be associated with small values of the other – whether negative or positive
  - Negative correlation: do large values of one variable tend to be associated with small values of the other – does not require that one value be negative while the other is positive

Beta Measurement for Traded Assets Using Historical Data over Look-back period

$$R_s - R_f = \alpha_s + \beta_s \times (R_m - R_f) + \varepsilon_s$$

R_s	= Return on security "s"
R_f	= Risk-free rate
α_s	= Regression constant
β_s	= Estimated beta of security "s" based on historical data
R_m	= Historical return on Market Portfolio
ε_s	= Regression error term

Beta Estimation Issues:

- Appropriate Market Portfolio proxy
- Amount of history
- Incremental time interval

Beta Measurement - Levered vs. Unlevered Betas

Theory:

- Company risk comprised of operating risk and financial risk (leverage)
- More leverage means more risk (higher beta)

Problem:

- Publicly traded guideline or comparable companies may have leverage that differs from our subject company

Solution:

- "Unlever" the guideline or comparable companies betas
  - Removing the effect of financial leverage leaves the effect of operating risk only – unlevered beta often termed "asset beta".
- "Relever" estimated unlevered beta to reflect leverage of subject company

Beta Measurement - Levered vs. Unlevered Betas (cont'd)

- **Basic relationship underlying formulas for unlevering/relevering beta**

Value of a Levered Firm

Assets	**Capital**
Value of Unlevered Firm	**Value of Debt Capital**
plus	**plus**
Value of Tax Shield	**Value of Equity Capital**

- **In this formulation, the cost of debt capital is measured prior to the tax affect because the value of the tax deduction on the interest payments equals the value of the tax shield.**

Beta Measurement - Levered/Unlevered /Relevered Formulae

Hamada, "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks," *Journal of Finance* 27(2) (1972).

$$B_u = \frac{B_L}{1 + (1 - t)W_d / W_e}$$

$$B_L = B_u(1 + (1 - t)W_d / W_e)$$

Beta Measurement - Levered/Unlevered/Relevered Formulae (cont'd)

The Hamada formulas are consistent with theory that:

- Discount rate used to calculate the tax shield equals the cost of debt capital (i.e., the tax shield has same risk as debt).
- Debt capital has negligible risk that interest payments and principal repayments will not be made when owed which infers tax deductions on the interest expense will be realized in the period in which the interest is paid (i.e., beta of debt capital equals zero).
- Value of the tax shield is proportionate to the value of the market value of debt capital (i.e., value of tax shield $= t \times W_d$).
- *But the Hamada formulas are based upon Modigliani and Miller's formulation of the tax shield values for constant debt.* ***The formula is not correct if the assumption is that debt capital remains at a constant percentage of equity capital (equivalent to debt increasing in proportion to net cash flow to the firm in every period).****[1] The formulas are often wrongly assumed to hold in general.*

[1] Arzac, Enrique R., and Lawrence R. Glosten. "A Reconsideration of Tax Shield Valuation." European Financial Management (2005): 453-461.

Beta Measurement - Levered/Unlevered/Relevered Formulae (cont'd)

Miles and Ezzell, "The Weighted Average Cost of Capital, Perfect Capital Markets, and Project Life: a Clarification," *Journal of Financial and Quantitative Analysis* (Sept 1980) pp 719-730.

Introduces beta for debt capital

$$B_U = \frac{M_e \times B_L + M_d \times B_d \left[1 - (t \times k_{d(pt)})/(1 + k_{d(pt)})\right]}{M_e + M_d \left[1 - (t \times k_{d(pt)})/(1 + k_{d(pt)})\right]}$$

$$B_L = B_U + \frac{W_d}{W_e}(B_U - B_d)\left[1 - \frac{(t \times k_{d(pt)})}{(1 + k_{d(pt)})}\right]$$

Beta Measurement - Levered/Unlevered/Relevered Formulae (cont'd)

The Miles Ezzell formulas are consistent with the theory that:

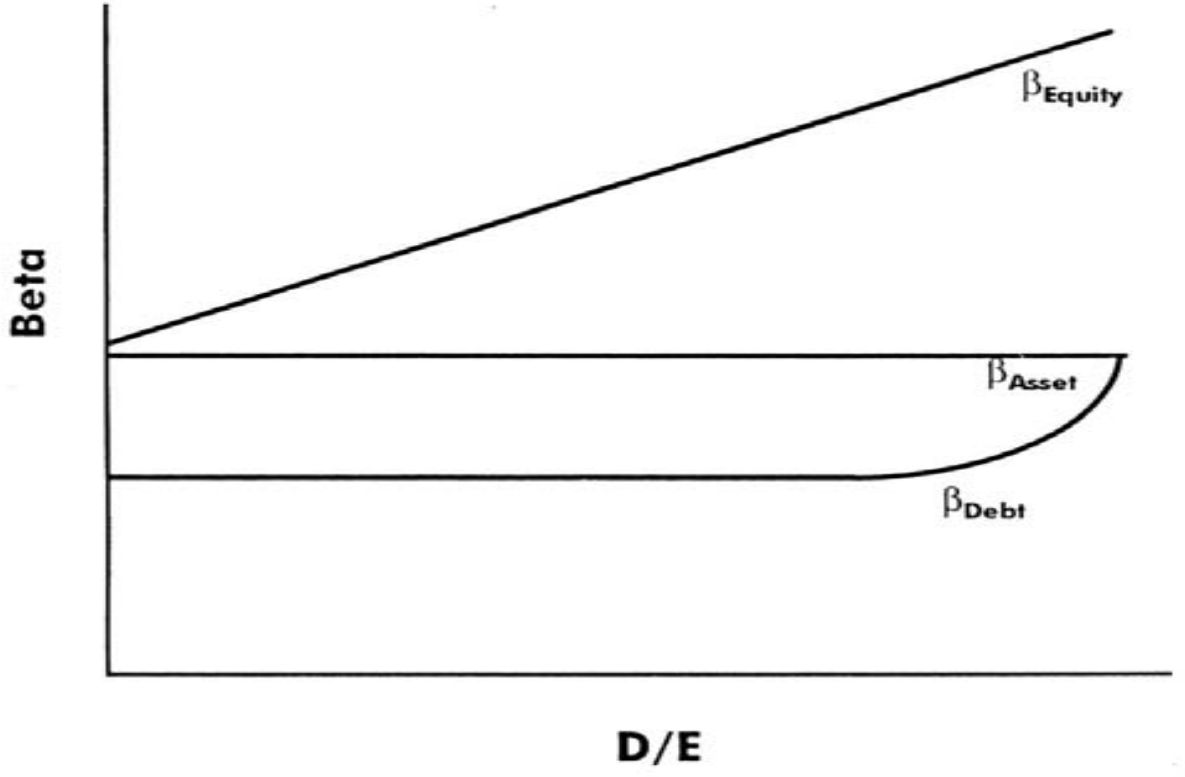
- Discount rate used to calculate the tax shield equals the cost of debt capital (i.e., the tax shield has same risk as debt) during the first year and the discount rate used to calculate the tax shield thereafter equals the cost of equity calculated using the asset beta of the firm (i.e., the risk of the tax shield after the first year is comparable to the risk of the operating cash flows). That is, the risk of realizing the tax deductions is greater than assumed in the Hamada formulas.
- Debt capital is bearing risk of variability of operating net cash flow in that interest payments and principal repayments may not be made when owed which infers tax deductions on the interest expense may not be realized in the period in which the interest is paid (i.e., beta of debt capital may be greater than zero).
- Market value of debt capital remains at a constant percentage of equity capital which is equivalent that debt increases in proportion to the net cash flow of the firm (net cash flow to invested capital) in every period.

Source: Shannon Pratt and Roger Grabowski, Cost of Capital: Applications and Examples, 3rd ed. (John Wiley & Sons, March 2008). Used with permission. All Rights Reserved.

Beta Measurement - Levered/Unlevered/Relevered Formulae (cont'd)

- Textbook formulas assume linear relationship between increases in leverage and cost of equity capital
- Reasonable for lower levels of debt
- Relationship breaks down with high levels of debt (financial distress)

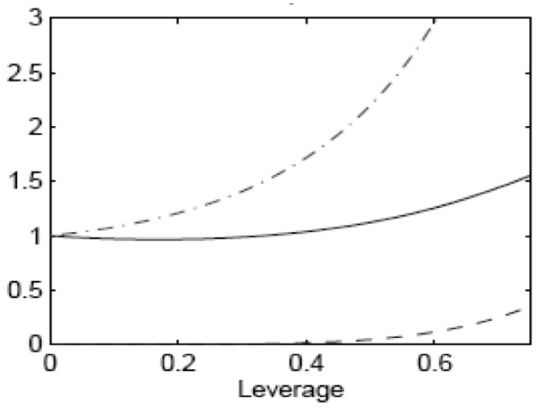
Textbook Relationship Between Levered Equity Beta and Unlevered Asset Beta



Beta as a Function of Leverage

(Exhibit 14.5 Cost of Capital 3rd ed)

The real world is more complicated than the textbook models. This figure depicts the relationship between leverage and the beta of a firm's debt, equity, and the weighted average beta with tax benefits and costs of financial distress. Leverage is defined as the market value of debt divided by the total market value of the firm. B_d is the beta of the company's debt and B_e is the beta of the firm's equity. The unlevered asset beta is assumed equal to 1.



Weighted average beta of equity and debt ——

B_d — —

B_e · — ·

Source: Arthur G. Korteweg, "The Costs of Financial Distress across Industries," Working paper Stanford University (January 15, 2007): 65. Used with permission. All rights reserved. 06 From Shannon Pratt and Roger Grabowski, *Cost of Capital: Applications and Examples, 3rd ed.* (John Wiley & Sons, March 2008). Used with permission. All Rights Reserved.

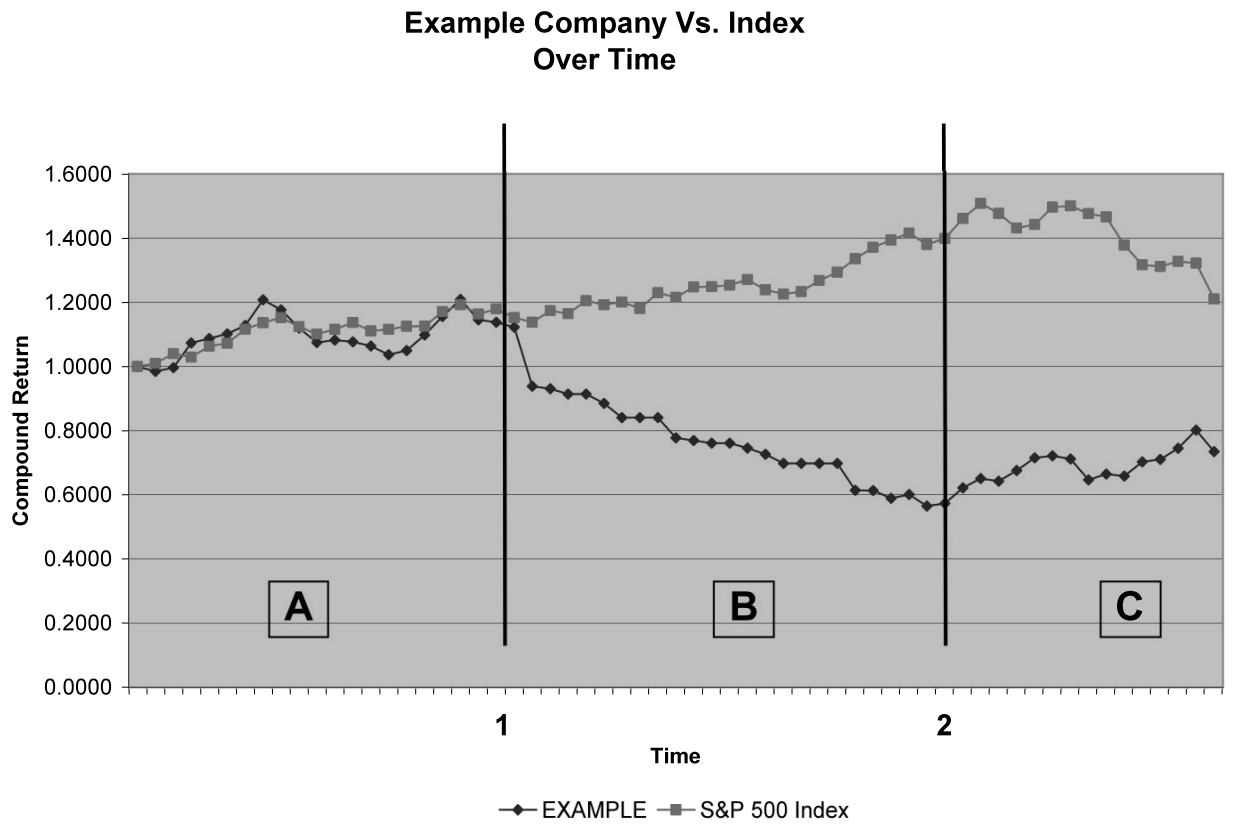
Debt Betas by Bond Rating

	December 2008	August 2009
Aaa	0.12	0.22
Aa	0.17	0.24
A	0.35	0.36
Baa	0.42	0.41
Ba	0.68	0.58
B	0.77	0.69
Caa	1.11	1.03
Ca-D	1.50	1.49

Issues with estimating β: using returns during look-back period when relationship to market is changing

- While such adjustments in pricing occur for some stocks during all time periods, over these past few months we have seen the stock market (as represented by the *S&P 500* for example) experience a major re-pricing led by financial sector stocks and highly leveraged non-financial stocks. Stocks of companies with traditionally high operating leverage (operating income and prices moving up faster than the overall market during upward market price movements, and moving down faster than the market when the market declines) appear to indicate that operating leverage has decreased when in fact their underlying operating leverage has not changed.
- Looking at example on next slide. In period A, the sample company essentially moves with the market. In period B, the sample company is experiencing a downward re-pricing, and during this period the sample company's returns are not as strongly correlated with the movement of the overall market. In Period C, the re-pricing of the sample company is complete, and the sample company's returns are once again moving in tandem with market returns.

Pricing Adjustment for a Hypothetical Company



Issues with estimating β: using returns during look-back period when relationship to market is changing

- If one were to compute beta at Time 1, which includes period "A" as the "look-back" period, the beta estimate would reflect the normal relationship between the sample company's returns in the market's returns. In contrast, computing a beta estimate at Time 2, which includes period "B" (the sample company's re-pricing by the market) as the "look-back" period, would not yield a reliable forward-looking beta estimate. In fact, it would yield a beta estimate lower than expected since the sample company's return was negative in a period when the market was generally rising. This result is counter-intuitive given the sample company's downward re-pricing, i.e., the operating risk of the sample company has not declined over period "B" and will resume its "normal" relationship to the market in period "C."

Company-Specific Risk Adjustment

- Adjusting build-up method for Industry Risk Premia
- Judgment
- Estimate “cost-to-cure” risk and adjust expected cash flows
- Total Beta
- Directly measure risk using *D&P Risk Premium Report*-Risk study:
  - Operating margin
  - CV (operating margin)
  - CV (return on equity)

Industry Risk Premia

- *SBBI* reports ***Industry Risk Premia*** (***IRP***) for almost 300 industries at the 2 and 3 digit SIC Code level.
- ***Risk index for industry*** = ***Full Information Beta*** (***FI-beta***)

  IRP = (***FI-beta*** x ***ERP***) – ***ERP***
- Uses *SBBI*'s historical realized risk premium for ***ERP***

  Example: Food Stores Industry, SIC 54

  IRP= (.84 x 7.1) – 7.1 = -1.17%
- *SBBI Valuation Edition* has instructions on how to download the current Industry Premia Company List Report.
- You can make adjustments either directly or to the industry premium:
  - Change ***ERP*** estimate based on history to expected ***ERP,*** or
  - Change ***beta*** to account for any differences in industry between the subject company and the published premium.

Industry Risk Premia (cont'd)

Industry Adjustments for Use in the Build-up Model

Through Year-End 2005

SIC Code	Short Descriptions	Number of Companies	Industry Premia
Manufacturing			
20	Food and Kindred Products	116	-4.78%
201	Meat Products	11	-2.06%
203	Canned, Frozen, and Preserved Fruits, Vegetables, and Food Specialties	15	-4.41%
204	Grain Mill Products	13	-6.23%
205	Bakery Products	11	-1.42%
206	Sugar and Confectionary Products	17	-6.90%
208	Beverages	31	-4.26%
209	Miscellaneous Food Preparations and Kindred Products	21	-5.06%
21	Tobacco Products	7	-2.71%
22	Textile Mill Products	22	-5.04%
221	Broadwoven Fabric Mills, Cotton	6	3.24%
225	Knitting Mills	5	-6.80%
227	Carpets and Rugs	5	-2.16%
23	Apparel and Other Finished Products Made from Fabrics	49	-0.33%
230	Apparel and Other Finished Products	11	-0.09%
232	Men's and Boys' Furnishings, Work Clothing, and Allied Garments	14	0.38%
233	Women's, Misses', and Juniors' Blouses	15	-0.17%
24	Lumber and Wood Products, Except Furniture	31	2.86%
241	Logging	7	-5.50%
242	Sawmills and Planning Mills	12	3.76%
243	Millwork, Veneer, Plywood, and Structural Wood Members	5	0.32%

Source: Stocks, Bonds, Bills and Inf lation, Valuation Edition, 2006 Yearbook (Chicago: Ibbotson Associates, 2006), p. 45

Using Industry Risk Premia in Conjunction with your estimate of ERP

For example, assume that the subject *SBBI IRP* equaled -2.19%.[1] This is consistent with the 7.05% historical risk premium used to calculate the *SBBI IRP* as of 2007. We can then determine an industry risk premium for that SIC code consistent with your ERP estimate as follows:

New *IRP* =

SBBI IRP x (New ERP estimate / *SBBI* historical ERP estimate)

[1] SIC code 591, Drug Stores and Proprietary stores, *SBBI Valuation Edition 2008 Yearbook*, p. 51.

Criticisms of Company-Specific Risk Adjustment

- Company-specific risk adjustment intended to account for company specific factors affecting company's competitive position in the industry
- According to CAPM – unanticipated events arising from company-specific risk factors will affect price of stock through expected future cash flows
- According to CAPM – only systematic risk will affect equity discount rates
- Discount rates should be applied to expected cash flows
- Brealey and Myers, *Principles of Corporate Finance,* critique:

"Managers [appraisers] often add fudge factors to discount rates… This sort of adjustment makes us nervous. …the need for a discount rate adjustment usually arises because managers [appraisers] fail to give bad outcomes their due weight in cash flow forecasts. The managers [appraisers] then try to offset that mistake by adding a fudge factor to the discount rate." (brackets added)

Criticisms of Company-Specific Risk Adjustment (cont'd)

Delaware Open MRI Radiology Associates, P.A.

v. Howard B. Kessler et al. (Court of Chancery of State of Delaware, Cons C.A. No. 275-N)

- "Much more heretical to CAPM, however, the build-up method typically incorporates heavy dollops of what is called "company-specific risk," the very sort of unsystematic risk that the CAPM believes is not rewarded by the capital markets and should not be considered in calculating a cost of capital. The calculation of a company specific risk is highly subjective and often is justified as a way of taking into account competitive and other factors that endanger the subject company's ability to achieve its projected cash flows. In other words, it is often a back-door method of reducing estimated cash flows rather than adjusting them directly."

Criticisms of Company-Specific Risk Adjustment (cont'd)

Delaware Open MRI Radiology Associates (cont'd)

- "To judges, the company specific risk premium often seems like the device experts employ to bring their final results into line with their clients' objectives, when other valuation inputs fail to do the trick…

  (petitioners' expert's) own analysis also contains a subjective specific risk premium of 2%, the quantification of which cannot be explained by reference to objective factors. I will not quibble with including that factor, which reinforces the conservatism of (petitioners' expert's) final cost of capital."

i.e., the increase in the cost of capital reduced the Fair Value claimed by petitioner.

Criticisms of Company-Specific Risk Adjustment (cont'd)

- To be consistent with CAPM and other asset pricing models, specific risks (e.g., lack of management depth) should be addressed in arriving at expected cash flows – different cash flow scenarios weighted by probability of realizing that cash flow. But this fails to account for the possible increased variance in possible cash flow outcomes – that is, are the expected cash flows (mean of the distribution) of the larger, public comparable companies subject to less variance than are the expected cash flows of a subject smaller private company?
- Alternative to adjusting discount rate: quantify "cost to cure"
- Some cite venture capital returns is evidence of high rates of return – but those returns are expected over short time frames (not long-term)

Does Beta Alone Measure Risk or Does Unsystematic Risk Count

- Economic theory predicts that the relation between idiosyncratic risk and expected returns depends on the extent to which investors hold diversified portfolios
- The less diversified the portfolio, the higher the proportion of idiosyncratic risk reflected in expected returns
- In some models (e.g., textbook CAPM) investors are assumed to hold fully-diversified portfolios in frictionless markets
- But market frictions (information and transaction costs) and investor characteristics (income levels, risk preferences, behavioral biases) can cause investors to under-diversify
- Research has shown that idiosyncratic risk is priced by the market whether investors are fully diversified or not.

Studies of Market Pricing of Company-Specific Risk

Empirical studies of company specific risk, RP_u, based their analyses on relationship:

$$TCOE = R_f + \beta_1 \times RP_m + \beta_2 \times RP_s + \beta_3 \times RP_{B\text{-}to\text{-}M} + RP_u$$

That is, RP_u is independent of $\beta_1 \times RP_m$. Authors define residuals of regression equation as idiosyncratic risk. For example:

- Malkiel and Xu, "Idiosyncratic Risk and Security Returns," working paper (May 2004)
- Spiegel and Wang, "Cross-sectional Variation in Stock Returns: Liquidity and Idiosyncratic Risk," working paper (Sept 2005)
- Fu, "Idiosyncratic Risk and the Cross-Section of Expected Returns," working paper (May 2008)
- Brockman, Schutte, and Yu, "Is Idiosyncratic Risk Priced? The International Evidence," working paper (July 2009)

Studies of Market Pricing of Company Specific Risk

Why does the market price company-specific (idiosyncratic risk)?

- Investors are not fully diversified (brief comment)
  - Malkiel and Xu, "Idiosyncratic Risk and Security Returns," working paper (May 2004)
  - Fu, "Idiosyncratic Risk and the Cross-Section of Expected Returns," working paper (May 2008)
  - Brockman, Schutte, and Yu, "Is Idiosyncratic Risk Priced? The International Evidence," working paper (July 2009)

Studies of Market Pricing of Company Specific Risk (cont'd)

Why does the market price company-specific (idiosyncratic risk)?

- Information risk or firm specific uncertainty (not many analysts, dispersion of analyst estimates, poor record of meeting analyst forecasts)
  - Rajgopal and Venkatachalam, "Information Risk and Idiosyncratic Return Volatility over the Last Four Decades," working paper (January 2005)
  - Barinov, "Turnover: Liquidity or Uncertainty?" working paper (March 2009)
  - Berrada and Hugonnier, "Incomplete Information, Idiosyncratic Volatility and Stock Returns," working paper (January 2009)
  - Teoh and Yang, "R-Square: Noise or Firm-Specific Information?" (July 2008)

Studies of Market Pricing of Company Specific Risk (cont'd)

Why does the market price company-specific (idiosyncratic risk)?

- Idiosyncratic risk and size effect are interrelated – portfolios of companies with high idiosyncratic risk generally are small companies
  - Fu, "Idiosyncratic Risk and the Cross-Section of Expected Returns," working paper (May 2008)
  - Angelidis and Tessaromatis, "Equity Returns and Idiosyncratic Volatility: UK Evidence," working paper (June 2005)

Company-Specific Risk Adjustment – Example of Using Judgment

Mercer "An Adjusted Cyclical Asset/Pricing Model (ACAPM)," *Business Valuation Review* (Dec. 1989).

SELECTED SPECIFIC COMPANY RISKS	
Specific Risk	Premium Range
Key Man, Management	0% - 5%
Absolute Size	0% - 5%
Financial Structure	0% - 5%
Product/Geographical Diversification	0% - 5%
Customer Diversification	0% - 5%
Earnings: Margins and Historical Predictability	0% - 5%
Other Specific Risks	0% - 5%

Estimating Total Cost of Equity Capital and Company-Specific Risk using Total Beta

Butler and Pinkerton:

"Company-Specific Risk- A Different Paradigm: A New Benchmark," *Business Valuation Review* (Summer 2006).

"Quantifying Company-Specific Risk: A New, Empirical Framework with Practical Applications," *Business Valuation Update* (February 2007).

Derivation of Total Beta

- $\beta = \sigma_{s,m}/\sigma^2_m$
- $\beta = \sigma_{s,m}/(\sigma_m * \sigma_m)$
- $\beta = (\sigma_{s,m}/\sigma_s * \sigma_m) * (\sigma_s/\sigma_m)$

  Note: we have merely multiplied the right hand side of the equation by 1 or σ_s/σ_s
- $R = \sigma_{s,m}/(\sigma_s * \sigma_m)$
- $\beta = R * (\sigma_s/\sigma_m)$
- $\beta/R = \sigma_s/\sigma_m$
- Total Beta = $T\beta = \beta/R = \sigma_s/\sigma_m$

Total Beta

- ***Tβ*** measures the total risk or volatility of an individual stock (σ_s) relative to the total risk or volatility of the market (σ_m).
  - $\boldsymbol{\sigma_s}$ is the correct total risk measure if one owns a single stock.
  - $\boldsymbol{\sigma_m}$ is the correct total risk measure for the S&P 500 if the S&P index is the only security in one's portfolio.
- ***Tβ*** (total risk) will always be greater than ***β*** (systematic risk only).
  - All observations will never fall on the best-fit linear regression line (is this beta estimation with error or company-specific risk or both?).

The BP Model: Quantification of Company -Specific Risk using Total Beta

Assuming that

$$TCOE = R_f + T\beta \times RP_m$$

Equating it to the modified CAPM and solving for the only unknown in the equations:

$$TCOE = R_f + T\beta \times RP_m = \underbrace{R_f + \beta \times RP_m}_{\text{Modified CAPM}} + RP_s + RP_u$$

we get:

Company-Specific Risk Premium = $(T\beta - \beta) \times RP_m - RP_s$

BP Model Issues?

- *Is TCOE derived from Total Beta consistent with FMV?*
- *Can one use TCOE estimated using Total Beta to derive reliable estimates of Company-Specific – Risk Premiums*

Do TCOE estimates derived from Total Beta lead to estimated FMV?

- BP Model is based on the premise that most owners of private businesses are undiversified, therefore the cost of capital of the private business should include that extra amount due to the owner being undiversified.
- This leads to the unreasonable position that there are at least two costs of capital for a business- the cost of capital for investors that comprise the pool of likely buyers and the current owner.

Do TCOE estimates derived from Total Beta lead to estimated FMV?

- Businesses and interests in businesses (any asset) sell in various markets made up of pools of likely buyers. The pool of likely buyers set the market price.
- Some markets are comprised of more diversified investors than others. But no market- other than possibly the pool of buyers for the smallest businesses- are fully undiversified.
- Risk of an investment and its FMV must be developed based on the risks (and pricing) perceived by investors that comprise the pool of likely buyers for the subject asset - not based on the diversification or non-diversification of the current owner.
- If one is valuing the smallest businesses, one should likely be using pricing from the IBA or Pratt Stat's data bases, not from public comparable companies.

Do TCOE estimates derived from Total Beta match the risk of the investment?

"The cost of capital is a function of the investment, not the investor."

Roger Ibbotson, *Cost of Capital Workshop*, 1999

(Pratt and Grabowski, *Cost of Capital 3rd ed.*, page 5)

The cost of capital should reflect the risk of the investment, not the cost of funds to the investor.

Studies on pricing of Idiosyncratic Risk

- Researchers do find that public stock returns reflect company-specific (idiosyncratic risk) as well as systematic risks.
- Empirical studies of company specific risk, RP_u, based their analyses on relationship:

$$TCOE = R_f + \beta_1 \times RP_m + \beta_2 \times RP_s + \beta_3 \times RP_{B\text{-}to\text{-}M} + RP_u$$

That is, RP_u is independent of [$\beta_1 \times RP_m$]

Researchers define residuals of regression equation as idiosyncratic risk. No one uses: $TCOE = R_f + T\beta \times RP_m$.

- The idiosyncratic risk is independent of the systematic risk.

Is CSRP derived from BP Model Reliable?

Company-Specific Risk Premium = ($T\beta$–β) x RP_m – RP_s

- Beta estimates using "look-back" methods are subject to estimation error
- Company-Specific Risk Premium estimates derived from beta estimates also subject to estimation error
- Ascribing beta estimation error to CSRP makes CSRP unreliable
- If levered (observed) betas are used, then mixes operating risk and financial risk. Is CSRP due to financial risk? Operating risk? How do you separate? Matching to guideline companies must then be on both operating and financial risk characteristics.

Calculating Total Beta - Example

Fleetwood Enterprises
Ticker: FLE
Industry: Motor Homes
Market Cap: $ 506,065,980
Data: 60 Months through December 2006

OLS Beta	
	β
Coefficient	**1.89**
s.e.	0.62
t-stat	3.07
R^2	14.0%

Sum Beta			
	β_t	β_{t-1}	$\beta_t + \beta_{t-1}$
Coefficient	**1.89**	**1.975**	**3.87**
s.e.	0.62	0.61	
t-stat	3.07	3.23	
R^2	14.0%		

Calculating CSRP using BP Model - Example

- Company-Specific Risk Premium = ($T\beta - \beta$) x RP_m – RP_s
- Estimate of CSRP (using RP_m or ***ERP*** estimate of 5% and size premium of 4.76% based on market value of $505 million from portfolio 21, Exhibit B-1 of Duff & Phelps *Risk Premium Report*) :
  - Using OLS beta estimate, BP model implies CSRP:

    Total beta = 1.89 / .374 = 5.05 *if* 1.89 is "true" beta

    CSRP = [5.05 – 1.89] x 5% - 4.76% = 11.04%
  - Using Sum Beta estimate the BP model implies CSRP:

    Total beta = 3.87 / .374 = 10.35 *if* 3.87 is "true" beta

    CSRP = [10.35 – 3.87] x 5% - 4.76% = 27.74%

    [Note: beta is levered and D/E = 56%]

Calculating CSRP using BP Model – Example (cont'd)

- Using OLS beta estimate: Total Beta = 1.89 / .374 = 5.05 *if* 1.89 is "true" beta

  But std error = .62 meaning "true" beta lies between

  1.89 +- [2 x .62] or between .65 to 3.13 with 95% probability or "true"

  Assume the Total Beta = 5.05 is "true" total beta but beta estimate is subject to estimation error.

- Company-Specific Risk Premium = $(T\beta - \beta) \times RP_m - RP_s$

  Estimate of CSRP (using ERP estimate of 5% and size premium of 4.76% based on market value of $505 million from portfolio 21, Exhibit B-1 of Duff & Phelps *Risk Premium Report*) then CSRP could be between

  {[5.05 - .65] x 5% - 4.76%} = 17.24% and

  {[5.05 - 3.13] x 5% - 4.76%} = 4.84%

Conclusions on BP Model

- ***Is TCOE derived from Total Beta consistent with FMV?***

  NOT LIKELY EXCEPT FOR SMALLEST BUSINESSES

- ***Can one use TCOE estimated using Total Beta to derive reliable estimates of Company-Specific – Risk Premiums***

  NO - MIXES COMPANY-SPECIFIC RISK WITH LACK OF DIVERSIFICATION RISK

Duff & Phelps Risk Premium Report – Risk Study

- Research the relationship between company "risk" and return on equity risk premiums
- Applications to cost of capital estimation using build-up method
- Measures **historical** realized risk premiums: **market risk premium plus company-specific risk**
- Articles: September 1999 and March 2000, *Business Valuation Review*
- Formerly Standard & Poor's CVC *Risk Premium Study*

Duff & Phelps Measures of "Risk"

- ***Profitability (operating profit margin)***
  - Operating profit / revenue
- ***Volatility of Earnings***
  - Volatility of operating profit margin
  - Volatility of ROE (NI/book value of equity)

Measuring Volatility: Coefficient of Variation

- ***Coefficient of Variation*** = Standard Deviation / Mean
- Example: Coefficient of Variation in Operating Income Margin

  Average Margin = 15%

  Standard Deviation of Margin = 5%

  → CV (Op.Inc. Margin) = 5/15 = 33%

Sample Calculation: Operating Margin and CV (Operating Margin)

Coefficient of Variation of Operating Margin:

(Standard of Deviation of Operating Margin)/(Average Operating Margin

	2005	2004	2003	2002	2001
Net Sales	$900	$800	$850	$750	$900
Operating Income	$150	$120	$130	$80	$140
Operating Margin	16.7%	15.0%	15.3%	10.7%	15.6%

Standard Deviation of Op. Margin	2.3%
Average Operating Margin	14.6%
Coefficient of Variation	15.8%

Sample Calculation: CV (ROE)

Coefficient of Variation of Return on Book Value of Equity:

(Standard Deviation of ROE)/(Average of ROE)

		2005	2004	2003	2002	2001
Book Value		$820	$710	$630	$540	$500
Net Income b4 extraordinary items		$110	$80	$90	$40	$100
Return on Book Equity (ROE)		13.4%	11.3%	14.3%	7.4%	20.0%
Standard Deviation of ROE	4.6%					
Average ROE	13.3%					
Coefficient of Variation	34.7%					

How Do These Risk Measures Relate to Rates of Return?

- Sort companies into 25 portfolios, ranked by risk measures:
  - Operating income margin (Exhibit D-1)
  - CV (operating income margin) (Exhibit D-2)
  - CV (ROE) (Exhibit D-3)
- Same procedure as used when ranking by size
- Results:
  - Lower profitability gives higher equity returns
  - Higher earnings volatility gives higher equity returns

Duff & Phelps Risk-Based Portfolio Details (Exhibits D-1 through D-3)

Companies Ranked by Operating Margin

Exhibit D-1

Historical Equity Risk Premium: Average Since 1963
Data for Year Ending December 31, 2005

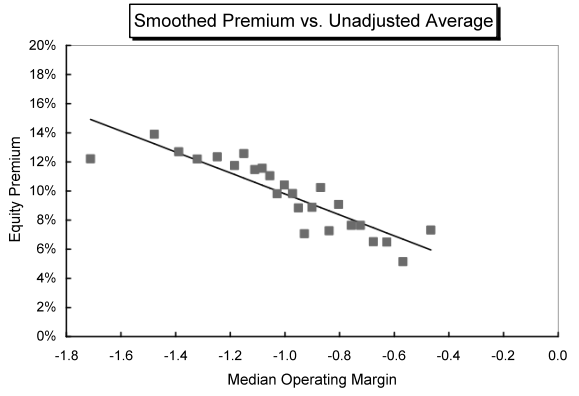
Portfolio Rank by Size	Median Operating Margin	Log of Median Op Margin	Number as of 2005	Beta (SumBeta) Since '63	Standard Deviation of Returns	Geometric Average Return	Arithmetic Average Return	Arithmetic Equity Risk Premium	*Smoothed Average Equity Risk Premium*	Average Debt/ MVIC
1	34.2%	-0.47	79	0.81	16.91%	13.30%	14.51%	7.31%	*5.96%*	30.58%
2	27.1%	-0.57	45	0.77	16.43%	11.15%	12.34%	5.14%	*6.69%*	34.49%
3	23.6%	-0.63	57	0.80	15.88%	12.53%	13.69%	6.49%	*7.12%*	32.56%
4	21.1%	-0.68	54	0.95	16.86%	12.44%	13.71%	6.51%	*7.48%*	26.87%
5	18.9%	-0.72	47	0.99	17.39%	13.52%	14.84%	7.64%	*7.81%*	22.70%
6	17.5%	-0.76	68	1.11	18.82%	13.31%	14.84%	7.64%	*8.05%*	19.17%
7	15.7%	-0.80	63	1.15	19.96%	14.63%	16.28%	9.08%	*8.39%*	18.38%
8	14.5%	-0.84	62	1.12	19.17%	12.84%	14.47%	7.27%	*8.64%*	20.20%
9	13.5%	-0.87	58	1.20	19.86%	15.74%	17.44%	10.24%	*8.86%*	20.89%
10	12.6%	-0.90	58	1.20	21.39%	14.11%	16.07%	8.87%	*9.09%*	21.57%
11	11.8%	-0.93	54	1.21	20.99%	12.33%	14.26%	7.06%	*9.29%*	22.66%
12	11.2%	-0.95	66	1.19	21.27%	14.13%	16.03%	8.83%	*9.45%*	22.83%
13	10.7%	-0.97	73	1.21	22.20%	14.94%	17.02%	9.82%	*9.60%*	22.77%
14	10.0%	-1.00	57	1.19	22.73%	15.35%	17.61%	10.41%	*9.82%*	23.86%
15	9.4%	-1.03	68	1.23	24.10%	14.63%	17.01%	9.81%	*10.01%*	24.78%
16	8.8%	-1.06	70	1.18	22.46%	16.05%	18.25%	11.05%	*10.20%*	26.52%
17	8.3%	-1.08	56	1.27	24.30%	16.23%	18.76%	11.56%	*10.40%*	26.88%
18	7.8%	-1.11	62	1.27	24.69%	16.07%	18.68%	11.48%	*10.60%*	27.84%
19	7.1%	-1.15	67	1.29	24.95%	17.15%	19.77%	12.57%	*10.88%*	29.31%
20	6.5%	-1.18	73	1.27	26.28%	16.09%	18.95%	11.75%	*11.13%*	31.12%
21	5.7%	-1.25	113	1.26	25.97%	16.85%	19.55%	12.35%	*11.58%*	31.37%
22	4.8%	-1.32	68	1.29	28.22%	16.11%	19.40%	12.20%	*12.11%*	32.07%
23	4.1%	-1.39	92	1.30	26.08%	17.12%	19.90%	12.70%	*12.60%*	33.74%
24	3.3%	-1.48	91	1.32	28.22%	17.91%	21.09%	13.89%	*13.24%*	33.66%
25	1.9%	-1.71	91	1.29	27.55%	16.25%	19.41%	12.21%	*14.92%*	32.92%
High financial risk			680	1.62	38.05%	16.49%	21.73%	14.53%		47.51%
Large Stocks (Ibbotson SBBI data)						10.75%	12.01%	4.81%		
Small Stocks (Ibbotson SBBI data)						15.01%	17.67%	10.47%		
Long-Term Treasury Income (Ibbotson SBBI data)						7.18%	7.20%			

Equity Risk Premium Study: Data through December 31, 2005
Data Smoothing with Regression Analysis
Dependent Variable: Average Premium
Independent Variable: Log of Median Operating Margin

Regression Output:

Constant	2.607%
Std Err of Y Est	1.148%
R Squared	78%
No. of Observations	25
Degrees of Freedom	23
X Coefficient(s)	-7.195%
Std Err of Coef.	0.796%
t-Statistic	-9.04

*Smoothed Premium = 2.607% - 7.195% * Log(Operating Marg*



Relationship Between Size and Risk

- Small companies are believed to have higher rates of return than large companies because small companies are "inherently" more risky.

- Is this true?
  - Yes, as measured by the stock-market based indicators of beta and price volatility.
  - D&P data also demonstrates that as company size decreases, fundamental measures of accounting risk increase – showing that small companies are inherently more risky (see, for example, Exhibit C-1).

Duff & Phelps Risk Premium Report - Exhibit C-1

Exhibit 12.12: Duff & Phelps Study: Comparative Risk Statistics

Companies Ranked by Market Value of Equity: Comparative Risk Characteristics
Data for Year Ending December 31, 2005

Portfolio Rank by Size	Portfolio Statistics for 2005: Average Mkt Value ($mils.)	Log of Size	Number of Firms	Portfolio Statistics for 1963-2005: Average Equity Risk Premium	Average Debt to MVIC	Average Debt to Market Value of Equity	Average Unlevered Risk Premium	Beta (SumBeta) Since '63	Average Unlevered Beta	Average Operating Margin	Average CV(Operating Margin)	Average CV(ROE)
1	96,796	4.99	46	4.7%	16.24%	19.4%	4.2%	0.90	0.81	15.4%	9.6%	14.4%
2	26,818	4.43	36	4.9%	22.74%	29.4%	4.3%	0.93	0.80	13.1%	10.6%	17.9%
3	14,912	4.17	40	3.6%	24.97%	33.3%	3.1%	0.97	0.82	13.3%	11.3%	18.1%
4	10,930	4.04	39	5.6%	25.96%	35.1%	4.7%	0.98	0.82	12.7%	12.2%	19.0%
5	8,014	3.90	45	6.1%	26.92%	36.8%	5.1%	0.96	0.80	12.7%	13.1%	20.1%
6	5,996	3.78	41	7.0%	26.86%	36.7%	5.8%	1.03	0.86	13.3%	12.7%	18.9%
7	4,872	3.69	44	7.7%	27.51%	38.0%	6.4%	1.02	0.85	12.6%	13.9%	21.2%
8	3,745	3.57	45	7.1%	26.00%	35.1%	6.0%	1.09	0.91	12.3%	13.5%	20.4%
9	3,185	3.50	48	8.1%	25.31%	33.9%	6.8%	1.09	0.92	12.2%	14.1%	21.6%
10	2,758	3.44	41	7.3%	24.96%	33.3%	6.2%	1.10	0.93	12.0%	13.8%	21.6%
11	2,441	3.39	42	8.1%	24.98%	33.3%	6.9%	1.09	0.93	11.8%	14.8%	21.0%
12	2,121	3.33	41	7.9%	25.48%	34.2%	6.6%	1.11	0.94	11.6%	14.8%	20.2%
13	1,845	3.27	47	6.6%	26.50%	36.1%	5.6%	1.09	0.91	11.0%	14.7%	20.7%
14	1,588	3.20	51	8.8%	26.98%	36.9%	7.4%	1.14	0.95	11.2%	15.2%	21.9%
15	1,382	3.14	58	8.5%	26.56%	36.2%	7.1%	1.14	0.96	10.9%	17.1%	23.2%
16	1,117	3.05	52	10.4%	25.82%	34.8%	8.7%	1.14	0.96	10.3%	17.8%	24.5%
17	1,025	3.01	53	10.3%	26.46%	36.0%	8.6%	1.21	1.01	10.0%	18.2%	25.8%
18	870	2.94	61	9.7%	26.97%	36.9%	8.1%	1.20	1.00	9.7%	20.6%	28.2%
19	736	2.87	57	9.6%	26.36%	35.8%	8.1%	1.24	1.04	9.4%	20.8%	27.1%
20	626	2.80	77	10.6%	27.19%	37.3%	8.8%	1.27	1.06	9.0%	23.7%	30.8%
21	541	2.73	64	10.8%	27.29%	37.5%	9.0%	1.26	1.05	8.5%	23.1%	30.9%
22	436	2.64	80	10.4%	27.67%	38.3%	8.7%	1.27	1.05	8.2%	25.2%	35.0%
23	326	2.51	90	10.8%	28.04%	39.0%	9.0%	1.24	1.03	7.9%	27.0%	34.8%
24	225	2.35	162	12.2%	28.74%	40.3%	10.0%	1.28	1.05	7.6%	28.7%	38.8%
25	76	1.88	332	16.1%	30.99%	44.9%	13.0%	1.30	1.05	6.2%	42.2%	56.0%

Note: CV(X) = Standard deviation of X divided by mean of X, calculated over 5 fiscal years. For Portfolios 1-25, calculation uses statutory federal tax rates plus weighted average effective state tax rates. The average blended income tax rate used is 45.9 %.

Duff & Phelps Report Summary
Exhibit: Premiums Over Risk-Free Rate

Portfolio Rank by Size	Operating Income Margin			CV(Operating Income Margin)			CV(ROE)		
	Average	Arithmetic Average Premium	Smoothed Average Premium	Average	Arithmetic Average Premium	Smoothed Average Premium	Average	Arithmetic Average Premium	Smoothed Average Premium
1	34.2%	7.3%	6.0%	183.3%	12.4%	13.7%	792.3%	11.6%	12.3%
2	27.1%	5.1%	6.7%	86.3%	13.1%	12.4%	308.3%	12.0%	11.3%
3	23.6%	6.5%	7.1%	62.8%	11.0%	11.8%	190.2%	10.6%	10.7%
4	21.1%	6.5%	7.5%	54.2%	11.2%	11.5%	140.2%	10.1%	10.3%
5	18.9%	7.6%	7.8%	44.7%	11.3%	11.2%	109.8%	11.1%	10.1%
6	17.5%	7.6%	8.1%	39.2%	11.6%	10.9%	94.1%	9.9%	9.9%
7	15.7%	9.1%	8.4%	35.2%	10.4%	10.7%	81.9%	8.4%	9.7%
8	14.5%	7.3%	8.6%	31.8%	11.4%	10.6%	71.3%	9.2%	9.5%
9	13.5%	10.2%	8.9%	29.3%	10.8%	10.4%	62.8%	10.0%	9.4%
10	12.6%	8.9%	9.1%	27.1%	11.6%	10.3%	55.9%	10.3%	9.3%
11	11.8%	7.1%	9.3%	25.0%	9.7%	10.1%	50.3%	10.5%	9.1%
12	11.2%	8.8%	9.4%	23.2%	10.8%	10.0%	46.0%	7.8%	9.0%
13	10.7%	9.8%	9.6%	21.5%	9.2%	9.9%	42.4%	9.0%	8.9%
14	10.0%	10.4%	9.8%	19.4%	9.5%	9.7%	38.5%	9.5%	8.8%
15	9.4%	9.8%	10.0%	17.5%	10.4%	9.5%	35.4%	8.0%	8.7%
16	8.8%	11.1%	10.2%	15.2%	7.8%	9.3%	31.4%	8.4%	8.6%
17	8.3%	11.6%	10.4%	13.6%	10.0%	9.1%	28.8%	8.4%	8.5%
18	7.8%	11.5%	10.6%	12.5%	9.9%	8.9%	25.7%	8.2%	8.4%
19	7.1%	12.6%	10.9%	11.1%	8.7%	8.7%	22.7%	7.8%	8.2%
20	6.5%	11.7%	11.1%	9.8%	8.4%	8.5%	20.5%	7.8%	8.1%
21	5.7%	12.4%	11.6%	8.6%	7.9%	8.2%	18.0%	8.2%	7.9%
22	4.8%	12.2%	12.1%	7.4%	7.3%	8.0%	15.4%	7.4%	7.8%
23	4.1%	12.7%	12.6%	6.3%	6.8%	7.7%	13.0%	7.8%	7.6%
24	3.3%	13.9%	13.2%	4.8%	6.7%	7.2%	9.7%	7.8%	7.2%
25	1.9%	12.2%	14.9%	3.0%	6.6%	6.4%	6.0%	6.4%	6.7%

Using the Duff & Phelps – Risk Study in Build-Up Method - Example 5

Exhibit D-	Duff & Phelps Size Characteristic		
	1	2	3
	Operating Margin	CV of Operating Margin	CV of Return on Equity
Subject Company	15.0%	14.0%	34.0%
		Equates to	
Portfolio Rank	8th	17th	15th
Portfolio Characteristic	14.5%	13.6%	35.4%
R^2 of Regression Model	0.78	0.83	0.78
Smoothed Average ERP	8.64%	9.05%	8.74%
Used (1 = Yes, 0 = No)	1	1	1
	8.64%	9.05%	8.74%
Median D&P ERP	8.74%		
Average D&P ERP	8.81%		

Why Is This Data Useful?

- Discount rate gauges the risk of the company achieving the projected cash flows.
- MVe (*SBBI*) may be an imperfect measure of risk of a company's operations.
- Small companies may be less risky when measured against fundamental accounting measures of risk.
  - How risky is a small company that has a near economic monopoly as a result of a geographic or market niche?

Comparing D&P Exhibits A – Size Study vs. Exhibits D – Risk Study

- Combine exhibits with knowledge about the subject company, its industry, and the general economy.
- Wholesaler has thin operating margins compared to the average company from a portfolio in Exhibit A.
- But those margins might have unusually low variation due to a strong position in a stable market niche.
- Can be used to get a better handle on Company -Specific Risk Premium.

Cost of Debt impacted by Company Size too

The cost of debt may be affected if company is small and less diversified:

- Increased likelihood of default in business downturn
- Less likely that optimum capital structure can be achieved (e.g., cannot borrow against value of environmentally impaired real estate) – more equity investment required
- Measure cost of debt without shareholder guarantees to separate value of business from value of shareholders' other assets

Valuing Firms in Distress

There are at least three widely used methods in valuing firms in distress:

- Value the business enterprise (BE) with a changing capital structure over time;
- The adjusted present value (APV) method;
- Value equity as an option on the BE.

Valuing Firms in Distress

Changing Capital Structure: During the transition period from current distressed operations to normalized operations (a period that varies depending on the level of current distress and economic industry conditions), you project detailed cash flows. The cost of capital components change over time as does the weighted average of the overall cost of capital.

- The cost of debt capital is reduced as debt is paid down and the credit rating improves;
- The cost of equity capital is reduced as financial distress is reduced.

APV: The general formulation is:

PV = Present Value of Unlevered Firm

+ Present Value of Tax Shield + Other Adjustments

Valuing Firms in Distress

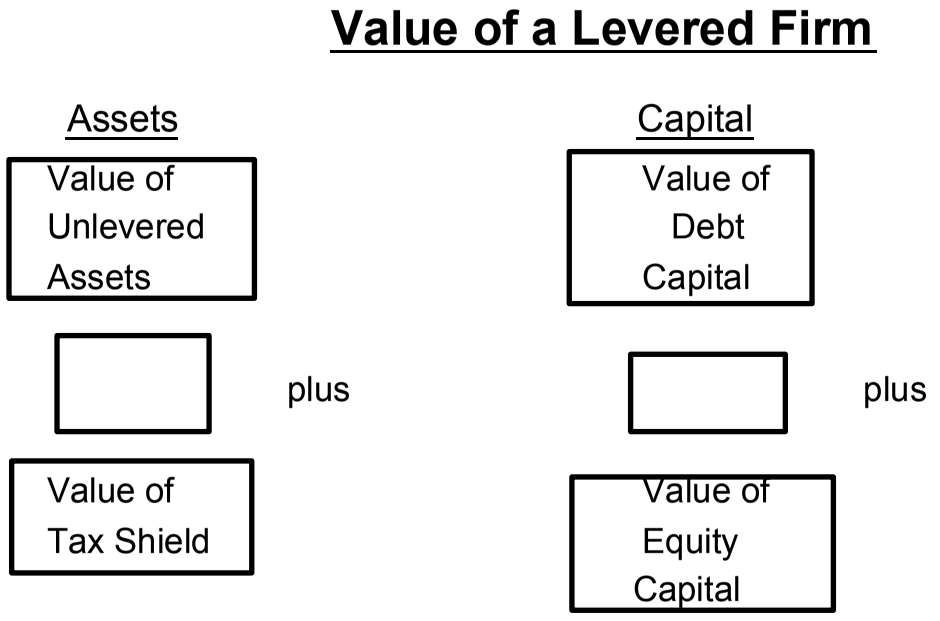
Value of equity as a call option on BE:

Inputs needed:

- If the subject company is public, the equity volatility can be estimated either from the observed volatility of the subject company stock over a look-back period or implied volatility from traded options.
- If the subject company is not public, then the equity volatility can be estimated either from the observed volatilities of guideline public (i.e., comparable) companies over a look-back period or implied volatilities from traded options.
- The option method indicates the fair market value of equity at time 0 based on the **asset volatility** of the business enterprise.

Discount Rate for Distressed Business

The discussion of the relationship between the face value of debt and market value of debt should be structured around the following diagram:



Market vs Face Value of Debt

- For example, during prosperous times before recession we have the following relationship (using the diagram):

180 = unlevered value of assets	100 = debt at market
+	+
20 = tax shield	100 = equity at market
200	200

- Where the market value of debt = book value of debt (contract interest rate on debt = market interest rate on debt + likelihood of collecting interest and principal when due is certain) and the tax shield = present value of tax savings due to interest deductions calculated at , the pre-tax cost of debt (about 20% of the value of debt).

  Assume that the debt capacity indicated the debt is rated Baa and the interest rate reflects that rating.

Market vs Face Value of Debt

- Assume that “distress” – recession - occurs and the market value of debt and equity decline as follows:

140 = unlevered value of assets	80 = debt at market
+	+
10 = tax shield	70 = equity at market
150	150

- What happened?

Impact of Recession

- A recession is causing the decline in expected cash flows. The value of the business **without consideration of debt** declined in the hands of the current owner (that is the underlying basis that drives market values of debt and equity).
- Cash flows in the near term are expected to decline and, in fact, result in losses. The tax shield is reduced because tax savings due to interest expenses are not going to be realized while the company is losing money (net of the impact of tax loss carry-backs).
- The equity declined because the unlevered value of the assets has declined [the expected cash flows have declined, the variability of the cash flows has increased resulting in a higher discount rate and a lower present value of the cash flows without regards to debt] and the present value of the tax shield (a benefit to the equity) has declined.

Distressed Companies

Financial Distress: A company whose equity and debt values reflect the potential or probability of default or liquidation scenarios is considered to be operating under Financial Distress. Financial Distress is typically a result of a high debt burden, coupled with difficulties is accessing capital markets. Investment decisions become distorted due to debt overhang including distressed asset fire-sales. The equity and debt market values should reflect analyst's views and weighting of going concern and default scenarios. Default scenarios could include, for example, the inability to pay current interest expense obligations, or inability to refinance current debt obligations resulting in the need to sell a portion of operating assets. Rating downgrades, non-investment grade debt or high market yields on debt are all indicators that the market is weighing the potential impact of distress scenarios. Management spends much of its time talking to creditors and legal/financial advisors about reorganization and refinancing plans instead of running the business. A company does not need to be in or near bankruptcy to be considered under financial distress. Financial Distress can also lead to Operational Distress.

Distressed Companies

Operational Distress: Operational Distress will typically occur in periods of significant economic downturn. Financial Distress can also lead to Operational Distress. Other non- recurring events may also lead to Operational Distress, such as the loss of a major lawsuit, or a regulatory injunction, for example. While this is not an exhaustive list, the following situations may be indicators of Operational Distress:

- The company is unable to pay its suppliers on a timely basis, leading potentially to supply shortages or disruptions;
- The refusal by certain suppliers to service the company, again causing supply disruptions;
- Manufacturing facilities operating at a significantly low level of capacity utilization;
- High employee turnover, leading to operational disruptions;
- Impaired ability to do business due to customers' concerns for parts, service and warranty interruptions or cancellations if the firm files for bankruptcy; or
- The loss of key customers due to concerns of supply reliability, both in terms of quality and delivery times.

Market vs Face Value of Debt

- Bondholders are assuming that there is now risk in realizing interest payments when they are due. They may still expect to ultimately receive their $100 principal repayment sometime but not necessarily when contractually due. In addition there will be costs if bankruptcy were to occur even if they ultimately believe they will receive their $100 principal. We can depict that scenario in present value terms as follows:
  - Market value of debt = $80 = <20> + 100

  where the <20> is the present value of the possible delay in receiving interest payments when due were bankruptcy to occur plus the costs of possible bankruptcy (even though ultimately $100 principal is ultimately expected to be paid). The "risk adjusted discount rate" equates the probability weighted outcomes with the market value of $80:
  - Outcome #1 Interest continues to be paid as contracted and principal is repaid when due
  - Outcome #2 Interest is delayed and repaid with principal at a date after contractually due because of bankruptcy.
- Assuming that the debt now is rated B- or lower, the interest rate has increased and the market value of debt has decreased to an amount below face.

Discount Rate for Distressed Business

- Now assume that we are valuing the BE without regards to the existing capital structure. The price is equal to the unlevered value of the business plus the tax shield that the buyer will realize from interest that can be supported by the current debt capacity of the firm. Assume that the current debt capacity is equal to only ½ of the original debt capacity (i.e., 28.5% of the current unlevered value of the assets), an amount to obtain a debt rating of Baa. That means that approximately $40 of the purchase will be debt ("buyer's debt"), resulting in a tax shield of approximately $6 (about 15% of the value of the buyer's debt).
- We now have the following values based on the buyer's analysis:

140 = unlevered value of assets		40 = buyer's debt at market
+		+	
6 = tax shield		106 = buyer's equity at market
146		146

Discount Rate for Distressed Business

How does one reconcile the values?

- The value of the BE = $146 to the buyer, the seller's debt has a face value of $100 and a market value of $80. If we are valuing the BE without regards to the existing owner's capital structure, then the implied equity value to the current equity owner is:
  - $146 minus $100 (face value of debt to be repaid in change of control transaction) = $46.
- If the assumption is an implied value assuming continued part of the firm the result would be:
  - $146 minus $80 (market value of debt) = $66.

General Formula for WACC

- $WACC_t = k_{eut} - \{TS_t / [\ M_{dt-1} + M_{et-1}\ ]\} - \{(k_{eut} - k_{TS})\ (PV_{TSt-1} / [\ M_{dt-1} + M_{et-1}\ ]\}$
- where:
- k_{eut} = cost of equity capital, un-levered (assuming firm financed with all equity) at time = *t*
- TS_t = Tax shield realized at time = *t*
- M_{dt-1} = Market value of debt capital at time = *t –1*
- M_{et-1} = Market value of equity capital at time = *t –1*
- k_{TS} = Discount rate on tax shield based on the risk of realizing the tax shield (typically either $k_{d(pt)}$, the pre-tax cost of debt, or k_{eu}, the unlevered cost of equity)
- PV_{TSt-1}= Present value of the tax shield as of time = *t-1*

General Formula for WACC (cont'd)

- If we assume that $k_{TS} = k_{eut}$ (the variability of one realizing the tax shield is approximately equal to the variability of cash flows of the business before interest expense) then the above formula simplifies to:

$$WACC_t = k_{eut} - \{TS_t / [\, M_{dt-1} + M_{et-1} \,]\}$$

Discount Rate for Distressed Business

What discount rates to use?

- If we are valuing the BE truly as an "exit price" without regards to the existing owner and existing capital structure and the buyer finances the hypothetical purchase assuming an appropriate debt level, the general form of the WACC will set $k_{TS} = k_{d(pt)}$ (the pre-tax cost of debt) and the market value of debt (i.e., $40) and equity (i.e., $106) will reflect the buyer's debt and equity.
- If we are valuing the equity in the hands of the existing owners and as part of the existing capital structure the general form of the WACC will set $k_{TS} = k_{eu}$ (the cost of unlevered equity) and the market value of debt (i.e., $80) and the equity (i.e., $70) will reflect the existing owner's debt and equity.

Duff & Phelps' Risk Premium Report

- Provides data on realized equity returns in excess of the returns predicted by CAPM for "High Financial Risk" companies. This premium can be added to the standard CAPM estimate of the increase in the cost of equity capital for the market's estimate of the cost of distress (economic and financial distress).
- Criteria for assignment to the high financial risk portfolio are:

  (1) companies in bankruptcy or liquidation;
  (2) companies with the 5-year average net income or operating income in the prior 5-years less than zero;

  (3) companies with negative book value of equity at any of the prior 5 fiscal year ends; or

  (4) companies with book value of debt to market value of equity greater than 80%.

Duff & Phelps' Risk Premium Report

Categorizing risk of High Financial Risk portfolio companies by Altman "z" score:

T_1 = Working Capital / Total Assets

T_2 = Retained Earnings / Total Assets

T_3= Earnings Before Interest and Taxes / Total Assets

T_4 = Market Value of Equity / Total Book Value of Liabilities

T_5 = Sales / Total Assets

$Z = 1.2 \times T_1 + 1.4 \times T_2 + 3.3 \times T_3 + .6 \times T_4 + .999 \times T_5$

Categorize companies and returns: $1.8 < z < 2.99$ = "grey zone"

$z < 1.8$ = Distress Zone

Companies Ranked by Z Score Equity Premiums for Use in the Build-up Method

Realized Equity Risk Premium: Average Since 1963						
High Financial Risk Company Data for Year Ending December 31, 2008						
Portfolio Rank by Z Score	**Beta (Sum Beta) Since '63**	**Standard Deviation of Returns**	**Geometric Average Return**	**Arithmetic Average Return**	**Arithmetic Average Risk Premium**	**Average Debt/MVIC**
1.8 to 2.99	1.57	34.46%	13.15%	18.22%	11.18%	44.16%
< 1.8	1.70	43.29%	14.44%	21.41%	14.37%	58.07%
Large Stocks (*SBBI data)*			9.39%	10.88%	3.84%	
Small Stocks (*SBBI data)*			13.07%	15.96%	8.92%	
Long-Term Treasury Income (*SBBI* data)			7.01%	7.04%		

Source: Calculations by © Duff and Phelps, LLC © 200902 CRSP®, Center for Research in Security Prices. Graduate School of Business, The University of Chicago used with permission. All rights reserved. www.crsp.chicagogsb.edu

Companies Ranked by Z Score Equity Premiums over CAPM for use in the CAPM

Realized Equity Risk Premium: Average Since 1963					
High Financial Risk Company Data for Year Ending December 31,					
Portfolio Rank by Z Score	**Beta (Sum Beta) Since '63**	**Arithmetic Average Return**	**Arithmetic Average Risk Premium**	**Indicated CAPM Premium**	Premium over CAPM
1.8 to 2.99	1.57	18.22%	11.18%	6.04%	5.14%
< 1.8	1.7	21.41%	14.37%	6.52%	7.84%
Large Stocks (*SBBI data)*		10.88%	3.84%		
Small Stocks (*SBBI data)*		15.96%	8.92%		
Long-Term Treasury Income (*SBBI* data)		7.04%			