

# COST OF CAPITAL

## Trends, Tools, and Applications

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# Objectives and Outline

# Introduction

## Objectives

- Discuss key components and concepts used to determine cost of capital
- Discuss recent trends and issues related to cost of capital components
- Illustrate the application of each component of cost of capital
- Valuation focus

# Introduction

## Outline

- I. Introduction and Key Concepts
- II. Risk-free Rate
- III. Equity Risk Premium
- IV. Size Premium
- V. Industry Adjustments
- VI. Company Specific Risk Premium
- VII. The Big Picture
- VIII. Special Topics
- IX. Questions and Comments

# Introduction

# Introduction

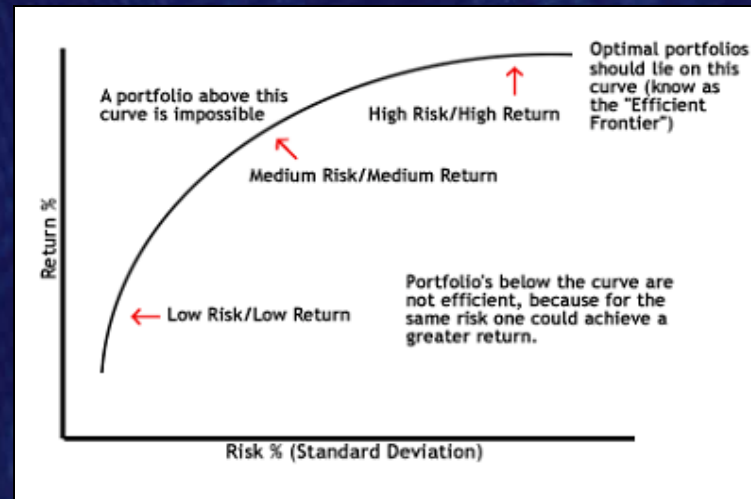
## Just Semantics?

- **Cost of capital** - is the expected rate of return that market participants require in order to attract funds to a particular investment
  - Sometimes referred to as expected or required rate of return, discount rate, or opportunity cost of capital
- Cost of equity
- Weighted average cost of capital
- Capitalization rate

# Introduction

## Core Components

- Risk-free Rate
- Equity Risk Premium
- Size Risk Premium
- Industry Adjustment
  - Industry Risk Premium
  - Beta
- Company Specific Risk Premium
- Capital Structure
  - Debt Capital
  - Preferred Equity
  - Common Equity



# Introduction

## Build-Up Method

$$\text{COE} = R_f + \text{ERP} + \text{SP} + \text{IRP} + \text{CSRP}$$

- Inputs
  - COE = Cost of equity
  - $R_f$  = Risk-free rate
  - ERP = Equity risk premium
  - SP = Size risk premium
  - IRP = Industry risk premium
  - CSRP = Company specific risk premium

# Introduction

## Modified Capital Asset Pricing Model

$$\text{COE} = R_f + (\text{ERP} \times \beta) + \text{SP} + \text{CSRP}$$

- Inputs
  - COE = Cost of equity
  - $R_f$  = Risk-free rate
  - ERP = Equity risk premium
  - $\beta$  = Beta coefficient
  - SP = Size risk premium
  - CSRP = Company specific risk premium

# Risk-free Rate


# Risk-free Rate

## Overview

- Most cost of capital models assume a single, riskless asset
- Theoretically, the rate of return expected from an investment with absolutely no default risk and no reinvestment risk
  - Represents the theoretical minimum for expected rates of return
- Components of the risk-free rate:
  - Rental rate – return for lending funds
  - Inflation – expected rate of inflation during the lending period
  - Maturity risk – risk of change in value during the lending period


# Risk-free Rate Rates and Sources

- In reality, no investment is truly risk-free
  - Even the least risky investments carry a very small amount of risk
- The most commonly accepted “risk-free” rates are derived from US treasury security yields
  - Federal Reserve Statistical Release
- Which type and term of US treasury security should be used in a valuation?
  - 20-year Treasury Bonds

Federal Reserve Statistical Release 

H.15  
**Selected Interest Rates**

[Release dates](#) | [Daily update](#) | [Historical data](#) | [Data Download Program \(DDP\)](#) | [About Announcements](#)  
[Current release](#) Other formats: [Screen reader](#) | [ASCII](#) | [PDF \(43 KB\)](#)

Historical Data (updated every business day, excluding holidays) 

Instruments	Frequency			
Treasury constant maturities				
Nominal <sup>11</sup>				
1-month	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
3-month	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
6-month	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
1-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
2-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
3-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
5-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
7-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
10-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
20-year (discontinued) <sup>26</sup>	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
20-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
30-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
Inflation indexed <sup>12</sup>				
5-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
7-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
10-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
20-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	<a href="#">Annual</a>
30-year	<a href="#">Business day</a>	<a href="#">Weekly (Friday)</a>	<a href="#">Monthly</a>	

<http://www.federalreserve.gov/releases/H15/data.htm>

# Risk-free Rate

## Application

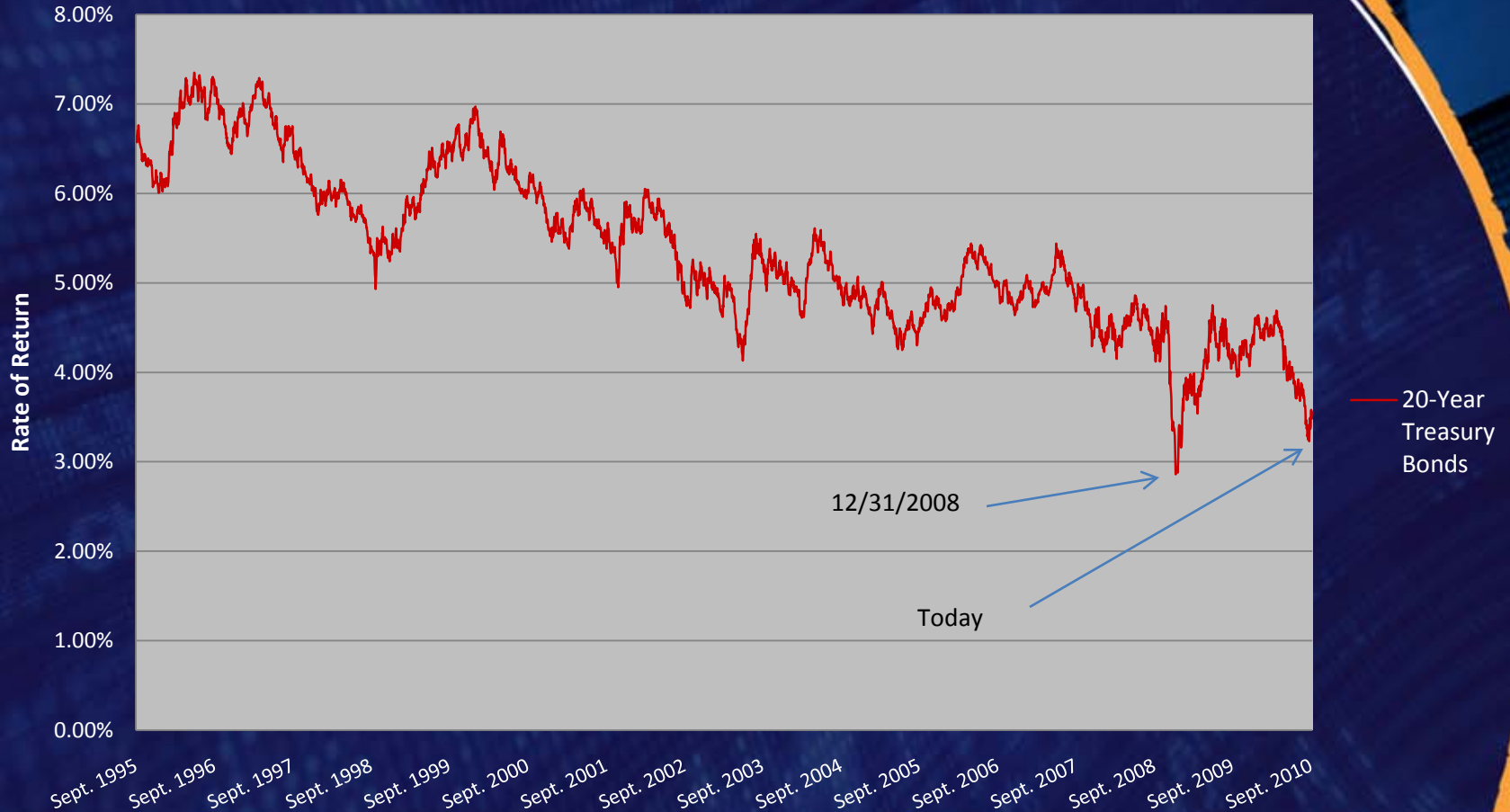
- What term? – Horizon of the Treasury bond should match the horizon of what is being valued. Horizon is a function of the *investment*, not the *investor* (i.e. indifferent to investor holding period expectation)
- Why 20 year maturity instead of 30? – It is ‘baked into’ SBBI numbers!
- Treasury bond or Treasury STRIP? – Bond is typically more appropriate if the asset spins off cash periodically; if the asset provides a single payoff at the end of its term, then a STRIP yield may be more appropriate
- Aren’t risk-free rates without controversy?

# Risk-free Rate

## Economic Considerations

- Treasury rates declined rapidly Q4 2008
- Was this decline a change in expectations regarding inflation? Real interest? Flight to quality? Panic?
- Should the decline be adjusted for?
  - Roger Grabowski (Duff & Phelps) suggested that one should 'ignore' the 12/31/08 spot yield on the 20-year treasury and use a longer term average (say, 4.5%-5.0%)
  - Jim Harrington (Morningstar) suggested that by "adding 1% or 2% to your risk free rate because you feel risk free rates are too low" assumed that:
    - Markets are not efficient
    - Present yields would regress to previous levels

# Historical Risk-free Rates of Return 1995 - 2010



# Risk-free Rate

## Alternatives?

- Are US treasury securities truly the least risky investment available?
  - Rarely called into question until catastrophic events (i.e. – war, recession, currency devaluation, etc.)
  - Backed by good-faith of US government
    - May raise taxes or issue currency to avoid default
- Moody's threatened to downgrade US rating of AAA in early 2010 due to growing budget deficit
- Are any alternatives available? Greek debt, anyone?

# Equity Risk Premium

# Equity Risk Premium

## The Basics

- Equity risk premium – the additional return an investor expects to receive as compensation for the risk associated with investing in equities as opposed to investing in riskless assets (Morningstar).
- Basic Elements
  - Stock market return ( $R_m$ )
  - Risk-free rate ( $R_f$ )
  - Time period
- Not observable, must be estimated
- Neutral to minority and control considerations

$$ERP = R_m - R_f$$

# Equity Risk Premium

## Estimation Sources

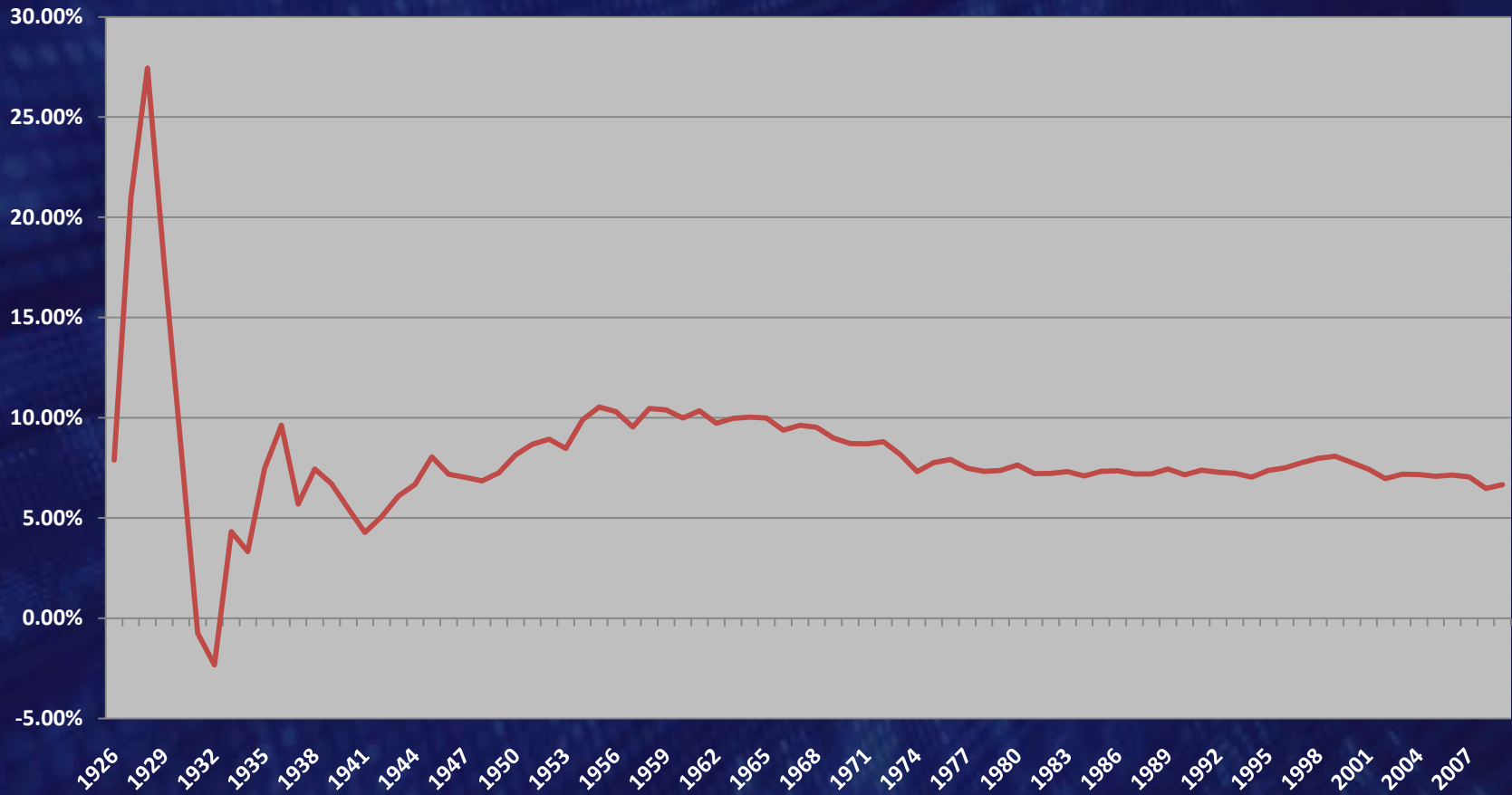
- Morningstar
  - Historical
  - Supply Side
- Duff & Phelps
- Investor surveys
- Implied from markets

# Equity Risk Premium

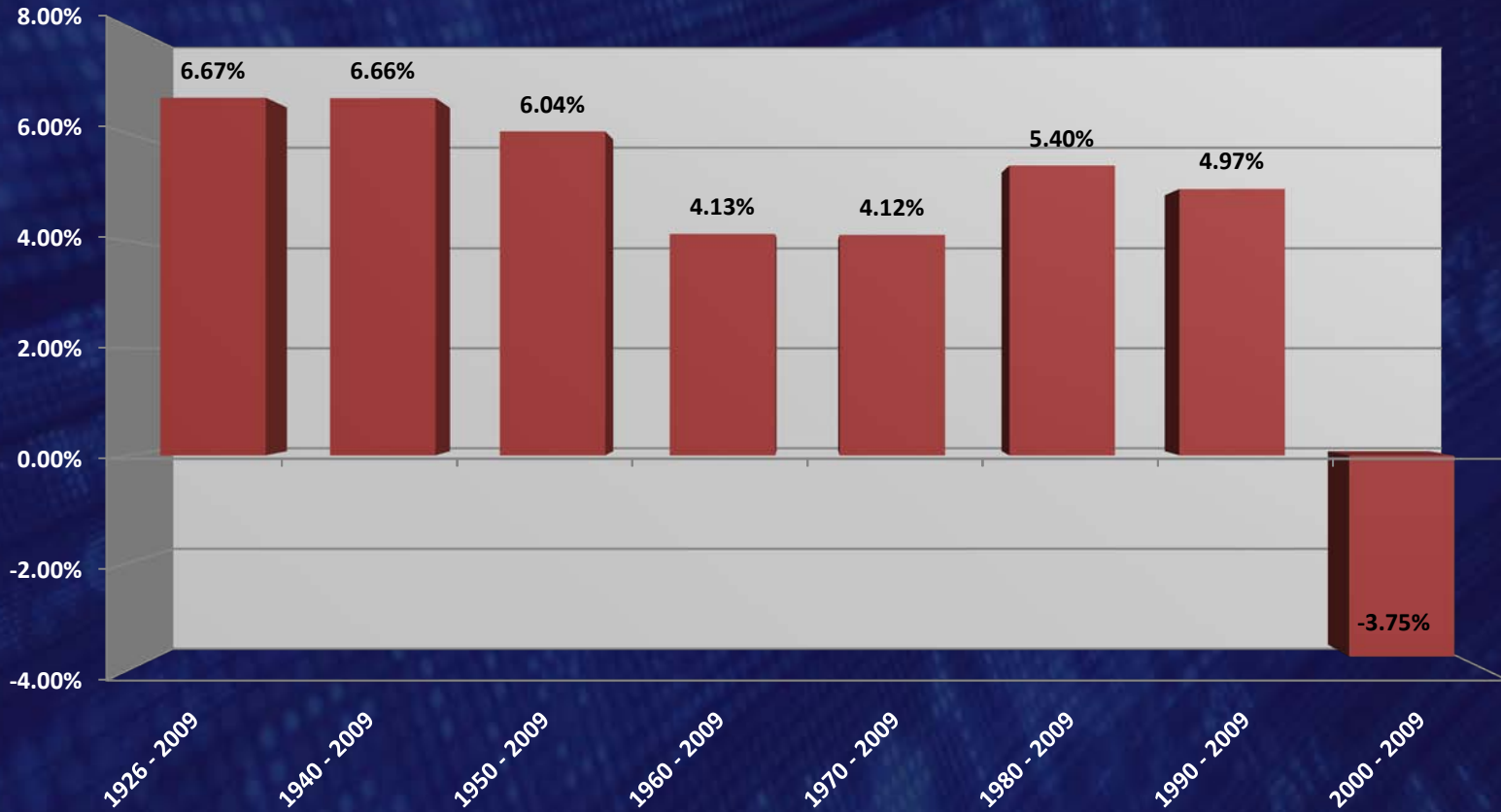
## Morningstar Historical Equity Risk Premium

- Commonly cited ERP
- 6.67% - December 2009
  - Based on:
    - Large company stocks, usually S&P 500
      - Can be calculated on other indices
    - Risk-free rate is 20 year Treasury income return
      - Income return *only* is used in calculating ERP, but *yield* is appropriate in developing forward looking cost of capital
  - Time-Period
    - 1926 – 2009

## Average Historical Equity Risk Premium, Morningstar 1926 - 2009



## Average Historical Equity Risk Premium, Morningstar Varying Starting Time Periods (1926 - 2009)



# Equity Risk Premium

## Morningstar Historical Equity Risk Premium

- Relies on a “future equals the past” assumption
- Why 1926?
  - Center for Research in Security Prices (CRSP) started keeping data in 1926.
  - Conscious effort to include extremely volatile 1920’s and 1930’s
- Analysis reveals sensitivity to ‘start’ date
- Historical ERP receiving more criticisms lately
  - Many articles on ‘downward adjustments’ over past few years
  - Delaware Court of Chancery decision in *Global GT v. Golden Telcom* (4/23/10) failed to adopt Morningstar historical ERP in favor of lower ERP

# Equity Risk Premium

## Morningstar Supply Side Equity Risk Premium

- Published first in 2005 Yearbook
- 5.2% - December 2009
  - Based on:
    - Large company stocks, usually S&P 500
      - Can be calculated on other indices
    - Risk-free rate is 20 year Treasury income return
      - Income return *only* is used in calculating ERP, but *yield* is appropriate in developing forward looking cost of capital
  - Time-Period
    - 1926 – 2009

# Equity Risk Premium

## Morningstar Supply Side Equity Risk Model

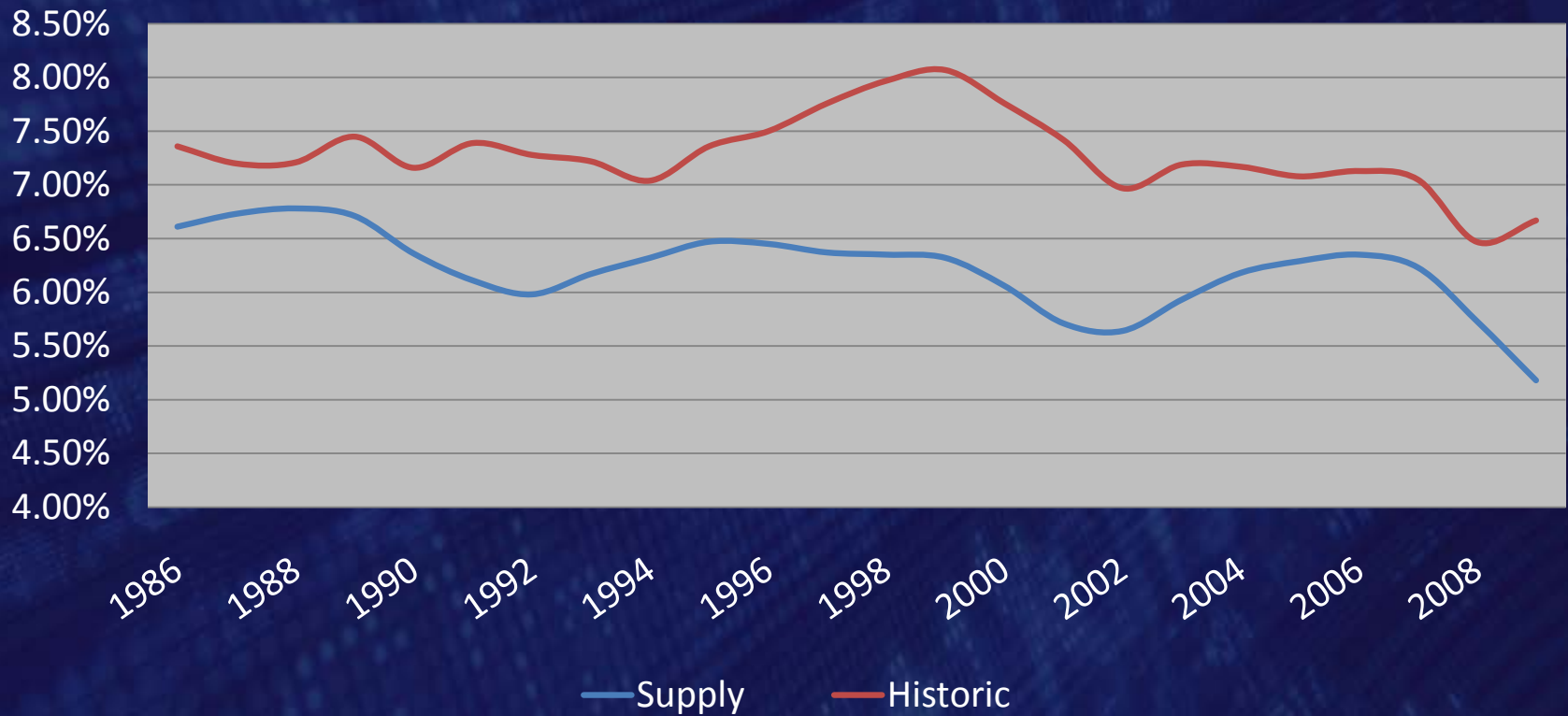
- Forward looking model, using historical data
- General concept
  - ‘Supply’ of market returns generated by productivity of corporations
  - Investors should not expect a return much different than that produced by corporations
  - Therefore, over the long-run, equity returns should approximate the ‘supply’ of market returns

# Equity Risk Premium

## Morningstar Supply Side Equity Risk Model

- ‘Historical’ returns measured by:
  - Inflation
  - Income return
  - Growth in real earnings per share (EPS)
  - Growth in Price / Earnings (P/E)
- Supply model eliminates growth in P/E
- “Growth in P/E is a reflection of investor’s changing predictions of future earnings growth. The past supply of corporate growth is expected to continue, however, a change in investor’s predictions is not.” Ibbotson.

## Comparison: Morningstar Historical vs. Supply Equity Risk Premium



Data Source: *SBBI Valuation Edition 2010 Yearbook*

# Equity Risk Premium

## Duff & Phelps

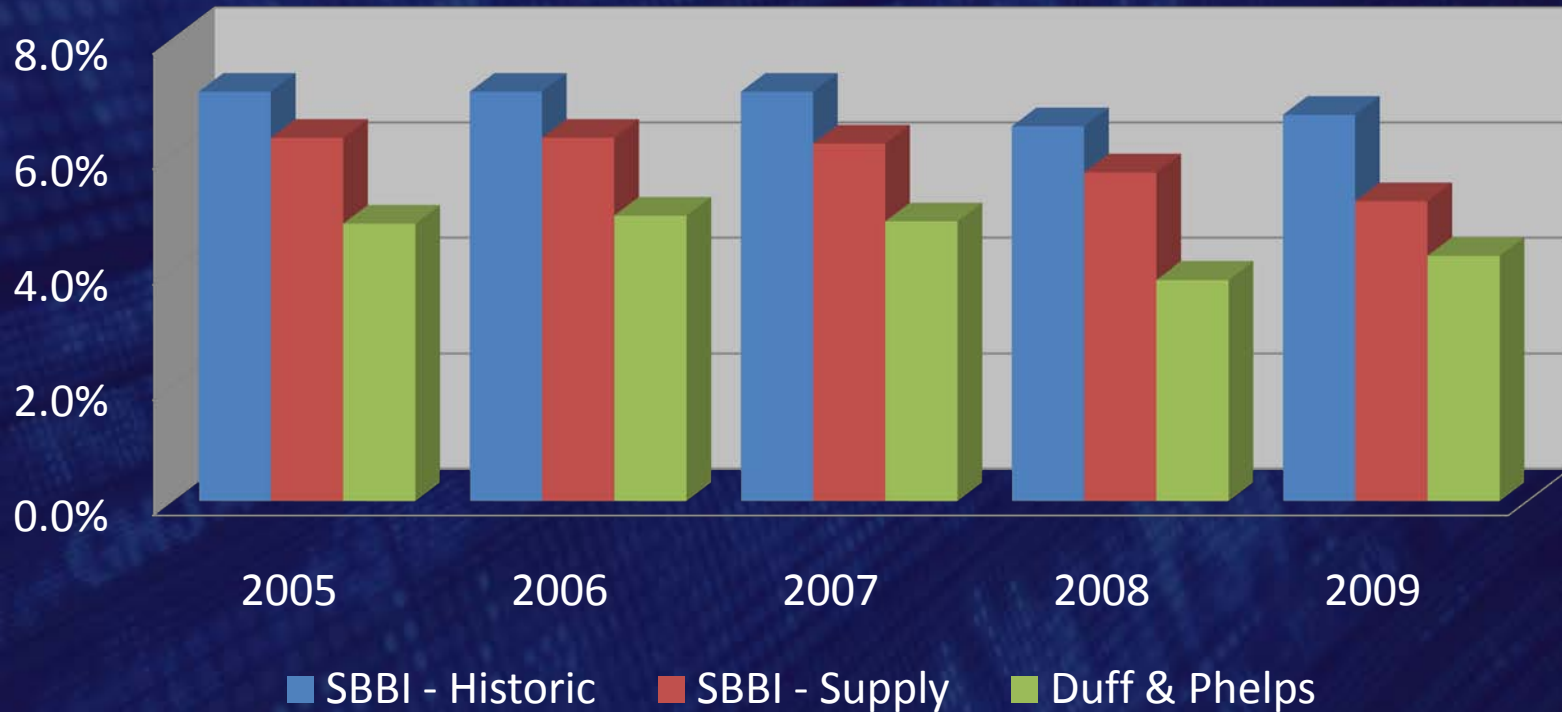
- Primarily a size premium study
- Large stock ERP 4.25% - December 2009
  - Based on:
    - Companies in NYSE, AMEX, and NASDAQ
    - Risk-free rate is 20 year Treasury income return
      - Income return *only* is used in calculating ERP, but *yield* is appropriate in developing forward looking cost of capital
  - Time-Period
    - 1963 – 2009

# Equity Risk Premium

## Duff & Phelps

- Based on CRSP and Compustat data
- Excludes financial services companies
- Excludes companies
  - Lacking five years of publicly traded price history
  - Sales below \$1M in any of the previous five years
  - Negative five-year average EBITDA
- Creates a separate 'high-financial risk' group
- Why 1963?
  - Compustat database established in 1963

## Comparison of Equity Risk Premiums Morningstar (SBBI) vs. Duff & Phelps



# Equity Risk Premium

## Survey Investors

- Survey Investors
  - Advantages:
    - Direct financial data from actual marketplace
  - Disadvantages:
    - No constraints on range of data responses
    - Impractical
    - Unpredictable
  - Source examples:
    - Ivo Welch
    - John Graham and Campbell Harvey
    - Greenwich Associates

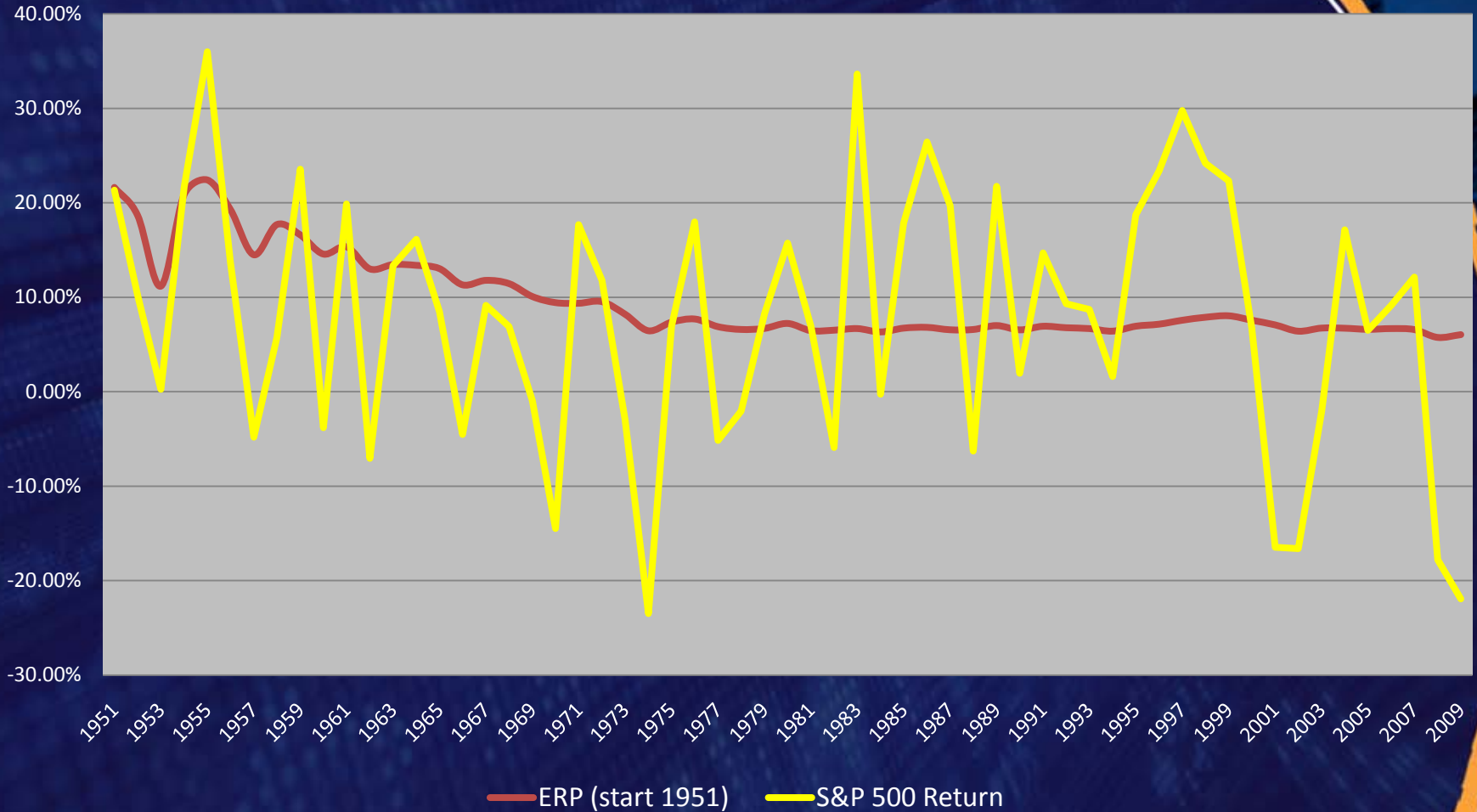
# Equity Risk Premium

## Is ERP Conditional?

- Unconditional vs. Conditional
  - Unconditional
    - Static estimate
    - Example: Long-term historic (Morningstar, 6.67%)
    - Represents average ERP over an entire business cycle
  - Conditional
    - ERP is cyclical during the business cycle
      - Higher ERP in bear markets
      - Lower ERP in bull markets
    - Conditional ERP assumed to reflect the current market conditions
    - ERP is within a reasonable range

# Comparison: Average Historical Equity Risk Premium (Morningstar) to Average S&P 500 Returns

Time Period (1951 - 2009)

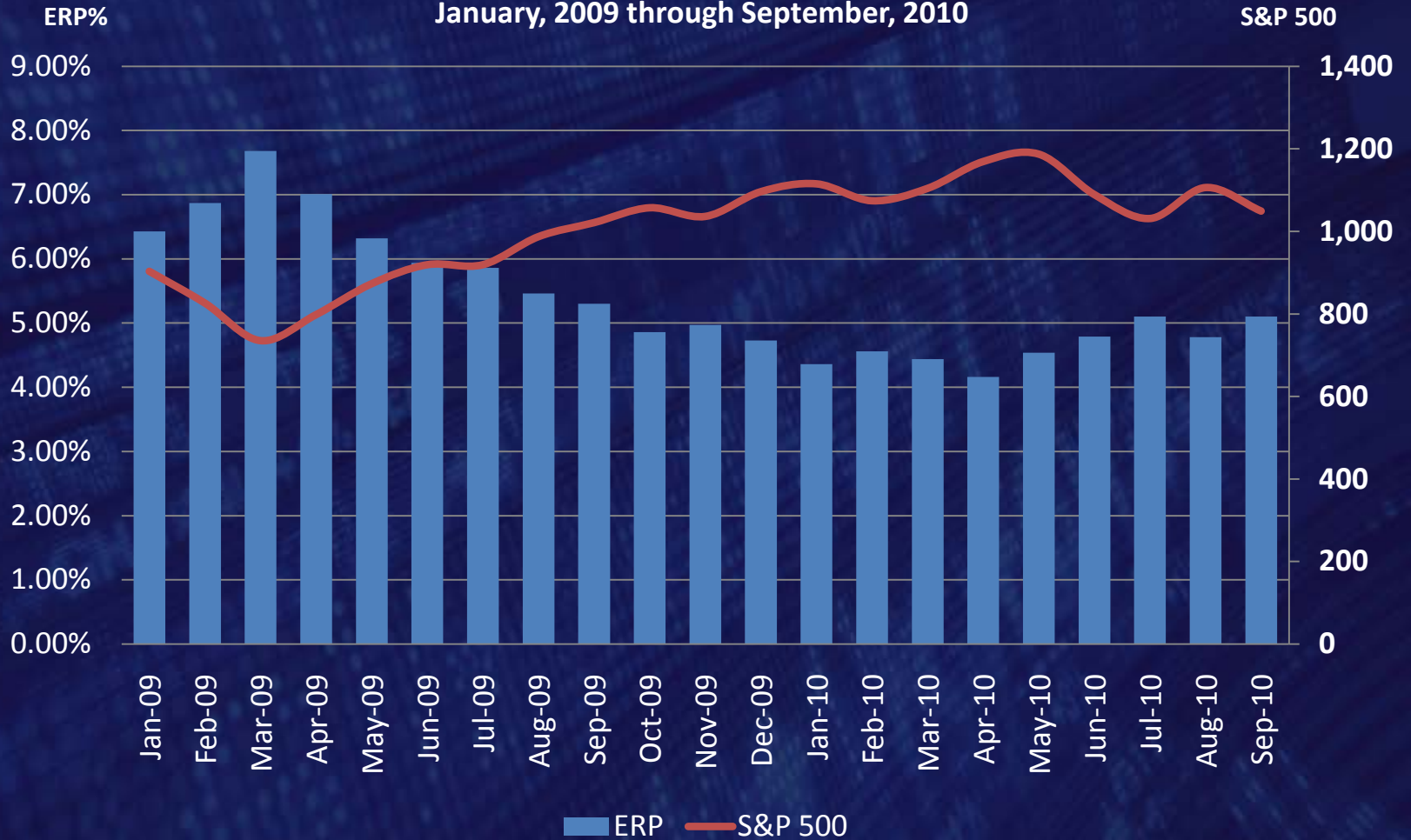


# Equity Risk Premium

## Implied Equity Risk Premium

- Calculated from market expectations (i.e. conditional)
- Aswath Damodaran, Stern School of Business (NYU) posts on his website
  - <http://pages.stern.nyu.edu/~adamodar/>
- Implied from S&P 500 4.73% - December 2009

### Comparison: Conditional Equity Risk Premium and S&P 500 January, 2009 through September, 2010



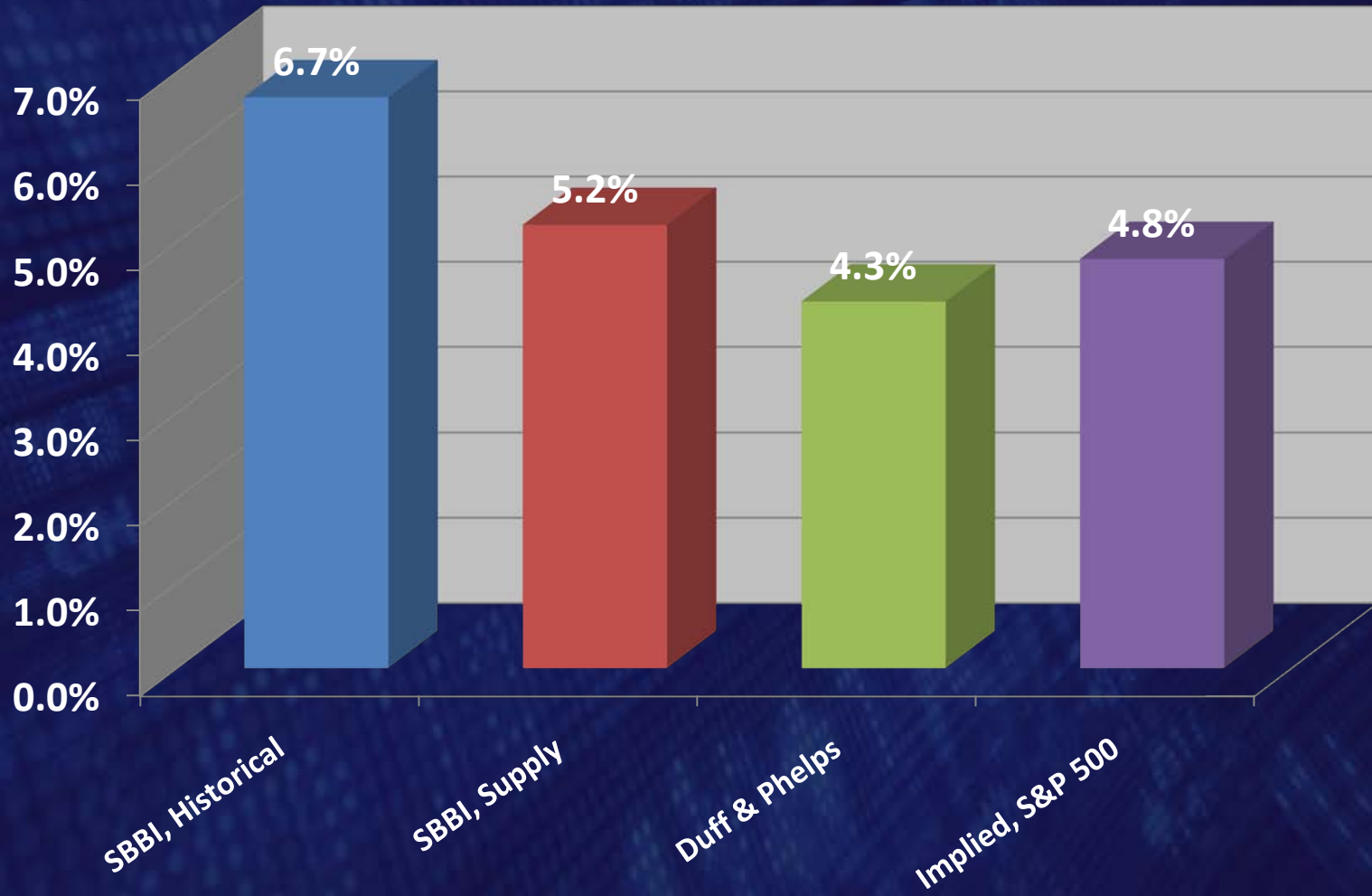
# Equity Risk Premium

## Summary and Application

- From the same data, different ERPs!
- Many articles and now cases are starting to embrace ERPs lower than Morningstar historical
- If you use Duff & Phelps for a build-up, you are starting with a 4.25% ERP
- On reducing ERPs: “While some of these theories are compelling in an academic framework, most do little to prove that the equity risk premium is too high.” Ibbotson
- And the data says...

# Comparison: Equity Risk Premiums

As of December 31, 2009



# Size Premium

# Size Premium

## Overview

- Compensates for the “size effect”, or empirical observations that smaller size is associated with greater risk and, therefore, higher cost of capital
- Size premiums are utilized because CAPM does not fully account for the higher returns of small company stocks
- Two primary studies for estimating the size premium
  - Morningstar
  - Duff & Phelps
- Not going to discuss general criticisms of the existence of the size premium (information asymmetries, liquidity, delisting bias, etc)

# Size Premium

## Morningstar Overview

- Calculates size premiums based on the market capitalization of publicly-traded companies
  - Stock returns of companies traded on the NYSE, AMEX, and NASDAQ
  - Uses CRSP database
  - Data back to 1926
- Segregates companies into 10 deciles based on each company's market capitalization

Decile	Market Cap of Largest Company (in thousands)	Largest Company
1 - Largest	\$ 329,725,255	Exxon Mobil Corp.
2	14,691,668	Sysco Corp.
3	5,936,147	American International Group Inc.
4	3,414,634	Resmed Inc.
5	2,384,026	Mirant Corp.
6	1,600,169	Cypress Semiconductor corp.
7	1,063,308	Energys
8	684,790	Live Nation Inc.
9	431,256	American Reprographics Co.
10 - Smallest	214,111	Quicksilver Gas Services LP

# Size Premium

## Morningstar Overview

- Morningstar calculates certain metrics for each decile
  - Beta
  - Arithmetic Mean Return
  - Actual Return in Excess of Riskless Rate
  - CAPM Return in Excess of Riskless Rate
  - Return in Excess of CAPM
- The appropriate size premium is the Return in Excess of CAPM (beta adjusted)

# Size Premium

## Morningstar Overview

- Morningstar size premia have been adjusted for beta
  - The portion of excess returns that can be explained by higher betas are not in the size premium
- Some analysts suggest using a ‘non-beta’ adjusted small stock premium in a build-up model
  - Calculated as arithmetic mean of small company stock return less arithmetic mean of large company stock return, or for decile 10: 20.85% (small) – 11.85% (large) = 9% (see Table 7.5 SBBI)
  - Morningstar recommends against this, as it assumes the subject company has the same beta as the portfolio of small stocks and typically overstates the cost of capital

# Size Premium

## Morningstar Data

Decile	Beta	Arithmetic Mean Return (%)	Actual Return in Excess of Riskless Rate (%)	CAPM Return in Excess of Riskless Rate (%)	Size Premium (Return in Excess of CAPM)(%)
1 - Largest	0.91	10.90	5.72	6.09	<b>-0.37</b>
2	1.03	12.81	7.64	6.90	<b>0.74</b>
3	1.10	13.36	8.18	7.33	<b>0.85</b>
4	1.12	13.82	8.65	7.50	<b>1.15</b>
5	1.16	14.59	9.41	7.72	<b>1.69</b>
6	1.18	14.81	9.63	7.90	<b>1.73</b>
7	1.24	15.19	10.01	8.28	<b>1.73</b>
8	1.30	16.33	11.15	8.67	<b>2.49</b>
9	1.35	17.01	11.84	8.99	<b>2.85</b>
10 - Smallest	1.41	20.85	15.68	9.39	<b>6.28</b>

# Size Premium

## Morningstar's 10<sup>th</sup> Decile

- Morningstar breaks down decile 10 for further analysis
- Split to 10a/10b in 2001
- Split to w,x,y,z in 2010
- Observations
  - Disproportionately high number of companies in 10z
  - 10z may represent small market cap, but not small size

Decile	Recent Number of Companies	Market Capitalization of Largest Company (in thousands)	Company Name
10a	395	\$ 214,111	Quicksilver Gas Services, LP
10w	163	214,111	Quicksilver Gas Services, LP
10x	232	169,497	Landry's Restaurants, Inc.
10b	1382	123,516	Lee Enterprises
10y	302	123,516	Lee Enterprises
10z	1080	76,052	Federal Agricultural Mortgage Corporation A

# Size Premium

## Morningstar Data (10<sup>th</sup> Decile Breakdown Included)

Decile	Beta	Arithmetic Mean Return (%)	Actual Return in Excess of Riskless Rate (%)	CAPM Return in Excess of Riskless Rate (%)	Size Premium (Return in Excess of CAPM)(%)
1 - Largest	0.91	10.90	5.72	6.09	-0.37
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8	1.30	16.33	11.15	8.67	2.49
9	1.35	17.01	11.84	8.99	2.85
10 - Smallest	1.41	20.85	15.68	9.39	6.28
10a	1.42	19.10	13.92	9.47	4.45
10w	1.39	18.33	13.15	9.30	3.85
10x	1.45	19.78	14.60	9.69	4.91
10b	1.38	24.39	19.21	9.20	10.01
10y	1.40	23.58	18.40	9.35	9.05
10z	1.35	26.23	21.05	8.99	12.06

# Size Premium

## Criticisms of Morningstar

- Market Value of Equity as only measure of size
  - ‘Large’ companies with small market capitalization (say, distressed companies) may dwell in 10<sup>th</sup> decile
- Does not exclude distressed companies
- Breaking down the smallest decile lowers the statistical significance of the results compared to the whole decile
- Number of companies in 10<sup>th</sup> decile (1,777 as of 2009)
  - 1926 – 52 companies
  - 1950 – 100 companies
  - 1980 – 685 companies
  - 1990 – 1,814 companies

# Size Premium

## Duff & Phelps Overview

- Duff & Phelps, LLC's *Risk Premium Report* has gained broader acceptance in recent years, particularly related to estimating size premiums
- Duff & Phelps estimates size premiums using eight measurements, not just market capitalization
  - Market capitalization is a function of the discount rate and, therefore, a circular calculation
  - Large, highly leveraged companies may have small market capitalizations

# Size Premium

## Duff & Phelps Overview

- Based on CRSP and Compustat data
- Excludes financial services companies
- Excludes companies
  - Lacking five years of publicly traded price history
  - Sales below \$1M in any of the previous five years
  - Negative five-year average EBITDA
- Creates a separate 'high-financial risk' group
- Why 1963?
  - Compustat database established in 1963

# Size Premium

## Duff & Phelps Overview

- Data is broken into 25 portfolios on eight measures of size:
  - Market value of equity
  - Book value of equity
  - Five-year average net income
  - Market value of invested capital
  - Total assets
  - Five-year average EBITDA
  - Net sales
  - Number of employees

# Size Premium

## Duff & Phelps Overview

- Report contains several exhibits, including
  - A-1 to A-8 – Premium Over Risk-free Rate; for use in build-up model
  - B-1 to B-8 – Premium Over CAPM; for use in MCAPM
- Each exhibit is data intensive, including
  - Portfolio ranks and average size value
  - Number of companies per portfolio
  - Multiple statistical measures
  - Average capital structure

# Size Premium

## Duff & Phelps Data

### Companies Ranked by Book Value of Equity

Historical Equity Risk Premium: Average Since 1963  
Data for Year Ending December 31, 2009

Portfolio Rank by Size	Average Book Val. (\$mls.)	Log of Average Book Val.	Number as of 2009	Beta (SumBeta) Since '63	Standard Deviation of Returns	Geometric Average Return	Arithmetic Average Return	Arithmetic Average Risk Premium	Smoothed Average Risk Premium	Average Debt/MVIC
1	42,549	4.63	35	0.82	16.78%	9.69%	12.21%	5.25%	4.56%	25.13%
2	14,057	4.15	34	0.85	17.51%	9.50%	12.09%	5.13%	5.66%	28.88%
3	9,158	3.96	34	0.91	17.50%	11.06%	13.89%	6.93%	6.09%	30.01%
4	6,435	3.81	34	0.92	17.56%	10.60%	13.31%	6.35%	6.44%	30.24%
5	4,734	3.68	35	1.02	20.12%	10.41%	13.62%	6.66%	6.75%	27.77%
6	3,566	3.55	33	1.00	18.17%	9.92%	12.65%	5.69%	7.03%	27.33%
7	2,862	3.46	36	1.06	22.42%	10.48%	14.06%	7.10%	7.25%	26.13%
8	2,352	3.37	35	1.09	20.44%	11.17%	14.50%	7.54%	7.45%	26.30%
9	1,973	3.30	34	1.08	20.70%	10.71%	14.01%	7.05%	7.62%	25.36%
10	1,748	3.24	36	1.05	20.34%	10.97%	14.17%	7.21%	7.74%	25.89%
11	1,513	3.18	40	1.10	21.22%	12.00%	15.56%	8.60%	7.89%	26.94%
12	1,313	3.12	36	1.10	22.41%	11.78%	15.39%	8.43%	8.03%	26.32%
13	1,155	3.06	38	1.06	20.62%	11.81%	15.24%	8.28%	8.16%	25.81%
14	1,045	3.02	40	1.11	20.38%	10.62%	13.94%	6.98%	8.26%	24.96%
15	952	2.98	41	1.12	20.43%	12.73%	16.26%	9.30%	8.35%	24.81%
16	850	2.93	45	1.22	23.26%	12.74%	16.83%	9.87%	8.46%	25.18%
17	736	2.87	51	1.15	20.34%	12.11%	15.56%	8.60%	8.61%	23.96%
18	635	2.80	48	1.20	22.69%	10.96%	14.64%	7.68%	8.75%	24.37%
19	554	2.74	52	1.24	21.64%	11.15%	14.70%	7.74%	8.89%	25.70%
20	483	2.68	49	1.22	23.27%	13.15%	17.54%	10.58%	9.03%	25.03%
21	411	2.61	86	1.20	21.70%	12.56%	16.31%	9.35%	9.19%	25.06%
22	316	2.50	79	1.22	23.52%	11.94%	16.07%	9.11%	9.45%	24.61%
23	235	2.37	96	1.23	23.87%	12.51%	16.62%	9.66%	9.74%	25.71%
24	166	2.22	117	1.27	26.28%	12.48%	17.21%	10.25%	10.09%	24.75%
25	62	1.79	363	1.26	26.81%	13.33%	18.20%	11.24%	11.08%	25.13%

Large Stocks (Ibbotson SBBI data)

9.73% 11.21% 4.25%

Small Stocks (Ibbotson SBBI data)

13.37% 16.22% 9.26%

Long-Term Treasury Income (Ibbotson SBBI data)

6.94% 6.96%

### Exhibit A-2

Equity Risk Premium Study: Data through December 31, 2009

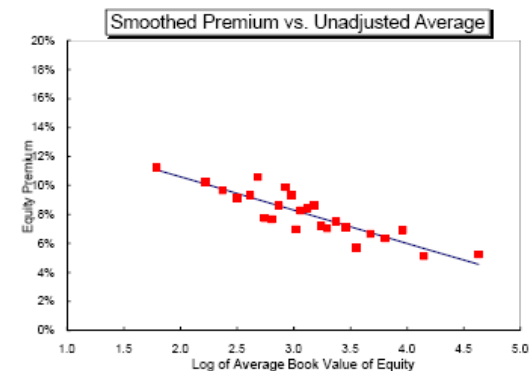
Data Smoothing with Regression Analysis

Dependent Variable: Average Premium

Independent Variable: Log of Average Book Value of Equity

Regression Output:	
Constant	15.190%
Std Err of Y Est	0.787%
R Squared	78%
No. of Observations	25
Degrees of Freedom	23
X Coefficient(s)	-2.296%
Std Err of Coef.	0.254%
t-Statistic	-9.04

$$\text{Smoothed Premium} = 15.190\% - 2.296\% * \text{Log(Book Value)}$$



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# Size Premium

## Application of Duff & Phelps

- Build-up Example - traditional

$$\text{COE} = R_f + \text{ERP} + \text{SP} + \text{IRP} + \text{CSRP}$$

- Build-up Example – Duff & Phelps

$$\text{COE} = R_f + R_{M+S} + \text{IRP} + \text{CSRP}$$

- $R_{M+S}$  = ERP plus risk premium for size, or premium over risk-free rate

# Size Premium

## Duff & Phelps – Build-up Example, book value

- Select your 'portfolio' by size
  - Assume book value is \$25M, therefore portfolio 25
- Find appropriate risk premium
  - Smoothed average risk premium for 25<sup>th</sup> portfolio = 11.08%
  - Arithmetic average risk premium for 25<sup>th</sup> portfolio = 11.24%
- Regression formula for smoothed premiums available to extrapolate risk premiums
  - Smoothed premium =  $15.190\% - 2.296\% \times \log(\text{book value})$
  - $15.190\% - 2.296\% \times \log(25) = 11.98\%$

# Size Premium

## Applying Duff & Phelps - Caveats

- Smoothed average risk premium is typically most appropriate
- However, at the smallest and largest ends of the data, average premiums may 'jump' off the smoothed line (see graph on next slide)
- Be careful using regression formula on companies significantly outside the range of Duff & Phelps data



# Size Premium

## Applying Duff & Phelps – Caveats

### Companies Ranked by Sorting Criteria

Exhibit E

Data for Year Ending December 31, 2009

Portfolio 25 Detail

	<u>Market Value of Equity</u>	<u>Book Value of Equity</u>	<u>5-Year Average Net Income</u>	<u>Market Value of Invested Capital</u>	<u>Total Assets</u>	<u>5-Year Average EBITDA</u>	<u>Sales</u>	<u>Number of Employees</u>
5th Percentile	\$ 6.667	\$ 10.382	\$ 0.559	\$ 10.867	\$ 17.183	\$ 1.590	\$ 18.852	18
25th Percentile	23.302	25.814	1.770	32.508	46.097	5.376	52.524	114
50th Percentile	56.653	60.368	3.497	81.697	111.078	11.332	110.536	239
75th Percentile	87.239	93.757	5.798	155.388	172.103	21.161	174.121	373
95th Percentile	141.043	119.938	8.169	214.325	241.654	29.813	241.852	500

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- Grabowski: “...be cautious about extrapolating a statistical relationship far beyond the range of the data used in the statistical analysis.”

# Size Premium

## Duff & Phelps – Consistency Adjustments

- As mentioned earlier, if you use Duff & Phelps unadjusted, you are accepting a 4.25% ERP; if you believe ERP is 5.00%, you make an adjustment to the cost of capital:

$$\text{Adjustment for ERP} = 5.00\% - 4.25\% = 0.75\%$$

- A similar adjustment is made for industry risk premiums; if your SBBI *IRP* is 2.00% (based on SBBI *ERP* of 6.7%), you make an adjustment for the new ERP:

$$\text{Adjusted IRP} = 2.00\% \times (5.0\%/6.7\%) = 1.49\%$$

# Size Premium

## Comparison of the Studies

Components	Morningstar	Duff & Phelps
Historical data	Starts in 1926	Starts in 1963
Underlying avg. historical ERP	6.67%	4.25%
Underlying avg. historical RFR	5.18%	6.96%
Number of size groupings	10 deciles	25 portfolios
Avg. market capitalization of smallest grouping	\$87 million (10 <sup>th</sup> decile)	\$95 million (25 <sup>th</sup> portfolio)
Distressed companies	Included	Included in separate database
Delisted companies	Excluded	Included at assumed 30% loss
Size measures	Market capitalization	8 measures
Breakdown of smallest grouping	Yes, into 2 or 4 groupings with premiums	Yes, into 5,25,50,75, & 90 <sup>th</sup> percentiles without premiums

# Industry Adjustments

# Industry Adjustments

## Overview

- Two primary 'adjustments'
  - Morningstar IRP for build-up
  - Beta in MCAPM
- Generally speaking, adjustment:
  - Greater than zero = riskier than the market
  - Equal to zero = same risk as the market
  - Less than zero = less risky than the market

# Industry Adjustments

## Morningstar IRP

- Listed by 2, 3, and 4 digit SIC codes (see Table 3-5 of current Yearbook)
- Based on full information beta estimates (basically a 'peer group' average beta)
- Screening criteria:
  - At least 36 months of return data
  - Sales greater than \$1M
  - Market capitalization of at least \$10,000
  - Five or more 'participants' per SIC code

# Industry Adjustments

## Morningstar IRP

$$IRP_i = (R_i \times ERP) - ERP$$

- $IRP_i$  = the expected risk premium for industry  $i$ , or the amount by which investors expect the future return of the industry to exceed the overall market return.
- $R_i$  = the risk index for industry  $i$
- $ERP$  = the expected equity risk premium
- Morningstar IRP's are based on historical ERP (6.7%); if you use a different ERP, consider adjusting IRP

# Industry Adjustments

## Morningstar IRP Application

- Define industry and SIC code; example, grocery store
  - Two digit SIC – 54, Food Stores, IRP = -3.46% (20 observations)
  - Three digit SIC – 541, Grocery Stores, IRP = -3.43% (18)
  - Four digit SIC – 5411, Grocery Stores, IRP = -3.47% (17)
- Add to build-up model
- Generally speaking:
  - More observations are better (remember, 5 is minimum)
  - Granularity of SIC code is better (four digit better than two digit all things being equal)

# Industry Adjustments

## Morningstar IRP Criticisms

- Some industries really don't have enough observations
- Some data doesn't make sense on face value
  - Restaurants (SIC 5812) have IRP of -0.65%; less risky than the market?
  - Who are these companies?
- Companies in a particular SIC code may be less like the subject company than you think

# Industry Adjustments

## Morningstar IRP Company List

*Industry Premia Company List Report*  
available at  
<http://corporate.morningstar.com/IRP>

### SIC CODE 5812

AERO PERFORMANCE PRODUCTS  
AFC ENTERPRISES INC  
ARK RESTAURANTS CORP  
BENIHANA INC -CL A  
BJS RESTAURANTS INC  
BOB EVANS FARMS  
BRAZIL FAST FOOD CORP  
BRINCKER INTL INC  
BUFFALO WILD WINGS INC  
BURGER KING HOLDINGS INC  
CALIFORNIA PIZZA KITCHEN INC  
CARIBOU COFFEE CO  
CARROLS RESTAURANT GROUP INC  
CEC ENTERTAINMENT INC  
CHEESECAKE FACTORY INC  
CHIPOTLE MEXICAN GRILL INC  
CKE RESTAURANTS INC  
COSI INC  
CRACKER BARREL OLD CTRY STOR  
DARDEN RESTAURANTS INC

DENNY'S CORP  
DIEDRICH COFFEE INC  
DINEQUITY INC  
DOMINO'S PIZZA INC  
EAT AT JOES LTD  
EINSTEIN/NOAH RESTAURANT GRP  
FAMOUS DAVES OF AMERICA INC  
FLANIGAN'S ENTERPRISES INC  
FRISCH'S RESTAURANTS INC  
GLOBAL ENTERTAINMENT CORP  
GOOD TIMES RESTAURANTS INC  
GRANITE CITY FOOD & BREWERY  
HEALTHCARE SERVICES GROUP  
J. ALEXANDER'S CORP  
JACK IN THE BOX INC  
JAMBA INC  
KONA GRILL INC  
LANDRY'S RESTAURANTS INC  
LITTLEFIELD CORP  
LUBYS INC  
MCCORMICK & SCHMICKS SEAFOOD  
MCDONALD'S CORP  
MERITAGE HOSPITALITY GROUP  
MEXICAN RESTAURANTS INC  
MORGAN'S FOODS INC  
MORTON'S RESTAURANT GROUP INC  
NATHAN'S FAMOUS INC  
NUTRITION MGMT SVCS -CL A  
O'CHARLEY'S INC  
P F CHANG'S CHINA BISTRO INC  
PANERA BREAD CO  
PAPA JOHN'S INTERNATIONAL INC  
RED ROBIN GOURMET BURGERS  
RUBIO'S RESTAURANTS INC  
RUBY TUESDAY INC  
RUTH'S HOSPITALITY GROUP INC  
SONIC CORP  
STAR BUFFET INC  
STARBUCKS CORP  
STEAK N SHAKE CO  
TEXAS ROADHOUSE INC  
WENDY'S/ARBY'S GROUP INC  
WESTERN SIZZLIN CORP  
YUM BRANDS INC

# Industry Adjustments

## Beta Overview

- Beta is a measure of the systematic risk of a security, i.e. beta measures a security's sensitivity to the market as a whole
- It is estimated by regressing the excess returns of a security against the market's excess returns.
- Beta estimation is a complex subject; we'll discuss major points of contention
  - Sources and market proxies
  - Time period and frequency
  - Adjustment factors
  - Levered or unlevered

# Industry Adjustments

## Beta Sources

- Common sources
  - Bloomberg
  - Compustat
  - Capital IQ
  - *ValueLine*
  - Morningstar (*Beta Book* and *Cost of Capital Book*)
  - Barra
  - Independent calculations from stock prices
    - Covariance of stock and market returns / variance of market returns
- Google, Reuters, Yahoo, etc. may reference the above sources

# Industry Adjustments

## Beta Market Proxies

- CAPM says appropriate market proxy is the *entire market of all risky assets*; however, not a very *practical* market
- Theoretically, the broader the index, the better the beta estimation; however, studies have shown market proxy to have a minor impact
- Major sources
  - Bloomberg – select from over 20 series, S&P 500 default
  - Compustat and Morningstar – S&P 500
  - Capital IQ – select from over 8 series, S&P 500 default
  - *ValueLine* – NYSE

# Industry Adjustments

## Beta Time Period

- Ideally, beta should be measured over a long time period (i.e. more data points) to increase precision
- However, changes in industry (i.e. airlines after 9/11; banks in 2008/2009) may merit different time period
- Five years has become an 'accepted' time period
- Major sources
  - Bloomberg and Capital IQ – adjustable, default is two years
  - Compustat, Morningstar, and *ValueLine* – five years

# Industry Adjustments

## Beta Time Interval/Frequency

- What frequency? Daily, weekly, monthly, quarterly, annually?
- Goal is more data points, so over five years, quarterly and annually will not be enough, but daily adds noise
- Major sources
  - Bloomberg and Capital IQ – adjustable, default is weekly
  - Compustat and Morningstar – monthly
  - *ValueLine* – weekly

# Industry Adjustments

## Beta Normalization Adjustments

- Beta estimation should be forward-looking, but calculations are all historical
- Studies (Blume, Vasicek) have suggested that betas revert to the mean (market beta of one or industry beta) over time
- Major sources
  - Bloomberg –  $(0.67 \times \text{beta}) + (0.33 \times 1.0)$ ; Blume method
  - Compustat and Capital IQ – unadjusted
  - Morningstar – Vasicek adjustment (reverts to industry)
  - *ValueLine* –  $0.35 + (0.67 \times \text{beta})$

# Industry Adjustments

## Why do we care?

- Which beta is 'right' for Exxon (10/15/10)?
  - Google Finance / Reuters = 0.48
  - Yahoo Finance = 0.38
  - ValueLine = 0.75
- All are 'right', but they are calculated in different ways
- So, which one? It may be a matter of analyst preference or matching specific facts to calculation approaches

# Industry Adjustments

## Beta – Levered or Unlevered

- Observed beta from stock prices inherently include the business *and* financing risks for a company, and are called levered or equity betas
- An 'unlevered' beta (or asset beta) removes the financing risk, and reflects only business risk
- Basic steps
  - 'Guideline' betas are unlevered
  - Unlevered betas are 'relevered' based on the assumed capital structure for the subject entity
- Several formulas for unlevering beta, presented Hamada model for simplicity

# Industry Adjustments

## Unlevering Beta

$$\beta_u = \beta_l / [1 + (1 - t)(W_d / W_e)]$$

- Inputs
  - $\beta_u$  = Unlevered beta
  - $\beta_l$  = Levered beta
  - $t$  = Tax rate for the company
  - $W_d$  = % Debt in capital structure (market)
  - $W_e$  = % Equity in capital structure (market)

# Industry Adjustments

## Relevering Beta

$$\beta_l = \beta_u / [1 + (1 - t)(W_d / W_e)]$$

- Inputs
  - $\beta_l$  = Levered beta
  - $\beta_u$  = Unlevered beta
  - $t$  = Tax rate for the company
  - $W_d$  = % Debt in capital structure (market)
  - $W_e$  = % Equity in capital structure (market)

# Industry Adjustments

## Beta Application

- Define industry and SIC code
  - Use 'industry' beta from Morningstar
  - Look-up betas from guideline companies
  - Calculate betas from guideline companies
- Consider impact of data sources, calculation methodologies, and adjustments
- Relever to subject capital structure
- Insert into MCAPM

# Company Specific Risk Premium

# Company Specific Risk Premium

## Overview

- Accounts for risk which is unique to the company
- One of the most subjective areas of business valuation
- Can be estimated through
  - Professional judgment
  - Quantitative methods

# Company Specific Risk Premium

## Professional Judgment

- What factors should be considered (to the extent not considered elsewhere)?
  - External factors
    - General economic outlook
    - Industry outlook
  - Internal factors
    - Nature and history of the business
    - Financial condition and earning capacity of the business
    - Customer or supplier concentrations
    - Quality of management
    - Dependence on key employees
    - Pending regulation or litigation
    - Competition

# Company Specific Risk Premium

## Professional Judgment

- What factors should be considered (to the extent not considered elsewhere)?
  - SWOT analysis
  - Michael Porter's Five Forces
    - Rivalry
    - Threat of substitutes
    - Buyer power
    - Supplier power
    - Barriers to entry

# Company Specific Risk Premium

## Professional Judgment

- How do factors translate into an actual risk premium?
  - Trugman - “there is no objective source of data to properly reflect or quantify the specific company risk premium. It is a matter of judgment and experience.”
- Component methods
  - Detail
  - Observation
  - Summary

# Company Specific Risk Premium

## Professional Judgment

### Component Methods:

Company Specific Risk Component	Detail	Observation	Summary
Quality of management	(1.0)%	-	
Dependence on key employee	0.0%	neutral	
Financial condition	2.0%	+	
Pending litigation	2.0%	+	
Total Company-Specific Risk Premium	3.0%	3.0%	3.0%

- Which one?
  - How did you determine quality of management to be -1.0%? Relative to what?
  - Summary component method may be easier to defend

# Company Specific Risk Premium

## Quantitative Methods

- Are quantitative estimates the answer?
  - Butler Pinkerton / Total Beta
  - Method proposed by Peter Butler and Keith Pinkerton in early 2007
    - Beta is adjusted for the total risk of the subject company
      - Total Beta = Beta of guideline public company / correlation of regression used to estimate Beta of guideline public company
      - Substituting Total Beta into the CAPM model provides a new cost of equity with all non-systematic risk included
      - The company-specific risk premium can be isolated by removing the risk-free rate, Beta x ERP, and size premium
- BPM Calculator available on BVR's website
- Does not eliminate professional judgment

# Company Specific Risk Premium

## Quantitative Methods

### Total Cost of Equity Calculator™

More Empirical: Less Subjective Benchmarks for Private Company Valuations  
Total Risk Premium Allocator



Butler Pinkerton Calculator™  
Total Cost of Equity Calculator

Risk Free Rate:	4.58%
Equity Risk Premium:	4.73%
Effective Date:	12/31/2009 (261 weeks)

Ticker	AGX	EME	IESC	PWR
Company Name	Argan, Inc.	EMCOR Group, Inc.	Integrated Electrical Services, Inc.	Quanta Services Inc.
Size Premium	5.26%	3.37%	5.27%	3.17%
Weekly Standard Deviation	5.94%	6.17%	10.58%	6.89%
Levered Beta	0.26	1.62	1.60	1.62
Correlation Coefficient (R)	0.18	0.78	0.51	0.69
Total Beta	1.47	2.09	3.13	2.33
<b>Total Cost of Equity</b>	<b>11.52%</b>	<b>14.45%</b>	<b>19.38%</b>	<b>15.60%</b>
<b>Company Specific Risk Premium</b>	<b>0.45%</b>	<b>-1.18%</b>	<b>1.97%</b>	<b>0.21%</b>

# Company Specific Risk Premium

## Quantitative Methods

- Recent criticism of BPM / Total Beta
  - Larry Kasper vs. Butler and Pinkerton
  - Sarah von Helfenstein<sup>1</sup> claims that the authors of Total Beta either:
    - “Misinterpret capital market theory,”
    - “Misunderstand statistical fundamentals,”
    - “Manipulate statistical equations in a manner that distorts the intended relationships,”
    - “Misinterpret the use of the regression equation,”
    - or “Misunderstand the effect of investor diversification on the risk of the investment.”
- So does it pass the ‘peer reviewed’ test?

# Company Specific Risk Premium

## Quantitative Methods

- Duff & Phelps *Risk Study*
  - Three alternative measures of company risk
    - Operating margin
    - Coefficient of variation in operating margin
    - Coefficient of variation in return on equity
  - Similar application to information in Duff & Phelps size analysis

# Company Specific Risk Premium

## Quantitative Methods

Companies Ranked by Operating Margin											Exhibit D-1	
Historical Equity Risk Premium: Average Since 1983											Equity Risk Premium Study: Data through December 31, 2009	
Data for Year Ending December 31, 2009											Data Smoothing with Regression Analysis	
											Dependent Variable: Average Premium	
											Independent Variable: Log of Median Operating Margin	
Portfolio Rank	Median Operating Margin	Log of Median Op Margin	Number as of 2009	Beta (SumBeta) Since '63	Standard Deviation of Returns	Geometric Average Return	Arithmetic Average Return	Arithmetic Average Risk Premium	Smoothed Average Risk Premium	Average Debt/MVIC	Regression Output:	
1	39.9%	-0.40	55	0.87	18.15%	11.35%	14.26%	7.30%	5.38%	25.69%	Constant	2.908%
2	30.5%	-0.52	58	0.80	18.28%	9.49%	12.22%	5.26%	6.11%	28.59%	Std Err of Y Est	1.030%
3	25.5%	-0.59	56	0.86	18.74%	10.76%	13.71%	6.75%	6.50%	26.49%	R Squared	77%
4	21.6%	-0.67	66	0.92	17.46%	11.37%	14.36%	7.40%	7.03%	23.34%	No. of Observations	25
5	18.8%	-0.73	53	1.00	19.15%	10.69%	13.72%	6.76%	7.41%	20.76%	Degrees of Freedom	23
6	17.5%	-0.76	55	1.06	18.39%	11.24%	14.16%	7.20%	7.60%	18.03%	X Coefficient(s)	-6.196%
7	16.2%	-0.79	58	1.10	20.89%	11.28%	14.69%	7.73%	7.80%	18.72%	Std Err of Coef.	0.700%
8	15.0%	-0.82	54	1.09	20.31%	11.30%	14.58%	7.62%	8.01%	20.03%	t-Statistic	-8.85
9	13.7%	-0.86	58	1.14	20.84%	12.02%	15.47%	8.51%	8.20%	20.40%	Smoothed Premium = 2.908% - 6.196% * Log(Operating Margin)	
10	12.8%	-0.89	55	1.13	21.34%	11.93%	15.43%	8.47%	8.44%	21.46%		
11	12.0%	-0.92	55	1.20	22.26%	10.81%	14.32%	7.36%	8.02%	21.51%		
12	11.1%	-0.96	49	1.17	20.81%	10.32%	13.58%	6.62%	8.83%	22.94%		
13	10.6%	-0.98	51	1.19	22.18%	11.14%	14.76%	7.80%	8.90%	22.57%		
14	10.0%	-1.00	58	1.20	23.80%	11.59%	15.65%	8.69%	9.10%	23.18%		
15	9.3%	-1.03	52	1.21	23.04%	12.46%	16.39%	9.43%	9.20%	24.32%		
16	8.8%	-1.05	54	1.17	23.46%	13.13%	17.21%	10.25%	9.44%	25.27%		
17	8.3%	-1.08	53	1.24	25.20%	13.63%	18.38%	11.42%	9.60%	26.22%		
18	7.8%	-1.11	56	1.24	25.01%	12.35%	16.68%	9.72%	9.77%	25.74%		
19	7.2%	-1.14	66	1.28	25.10%	12.72%	17.18%	10.22%	9.90%	26.17%		
20	6.5%	-1.18	63	1.23	24.98%	13.12%	17.55%	10.59%	10.24%	29.11%		
21	5.8%	-1.23	72	1.24	25.02%	15.26%	20.04%	13.08%	10.50%	29.40%		
22	5.1%	-1.29	63	1.21	25.01%	12.95%	17.37%	10.41%	10.92%	30.32%		
23	4.3%	-1.37	77	1.29	27.11%	13.41%	18.40%	11.44%	11.40%	31.61%		
24	3.4%	-1.47	84	1.29	26.47%	13.45%	18.47%	11.51%	12.02%	31.92%		
25	2.0%	-1.69	106	1.28	29.68%	14.41%	20.17%	13.21%	13.38%	31.00%		
Large Stocks (Ibbotson SBBI data)						9.73%	11.21%	4.25%				
Small Stocks (Ibbotson SBBI data)						13.37%	16.22%	9.26%				
Long-Term Treasury Income (Ibbotson SBBI data)						6.94%	6.96%					

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Data Source: Duff & Phelps Risk Premiums Report

# Company Specific Risk Premium

## Application

- The *existence* of CSRPs are debated, and the quantification thereof is controversial at best
  - Textbook CAPM suggests that unanticipated events manifest in cash flows; only systematic risk impacts cost of capital
- Quantitative models are being proposed, but some are met with stern criticism
- Informed judgment still essential

# The Big Picture

# Cost of Equity

## Putting the Pieces Together

Cost of Capital - Build-up Method Comparison 12/31/09			
Duff & Phelps		Morningstar - Historical	
Risk-free rate	4.58%	Risk-free rate	4.58%
Premium over risk-free rate	11.98%		
Equity risk premium adjustment		Equity risk premium	6.67%
Estimate of equity risk premium	5.00%		
Implied from Duff & Phelps	4.25%	<b>Size risk premium, 10</b>	<b>6.28%</b>
Adjustment	0.75%		
Industry risk premium		Industry risk premium	2.00%
Per Morninstar	2.00%		
Duff & Phelps 'Consistency' Adjustment (ERP Estimate / SBBI ERP)	0.75	Estimate of company specific risk premium	2.00%
Adjusted industry risk premium	1.50%		
Estimate of company specific risk premium	2.00%		
<b>Cost of Equity</b>	<b>20.81%</b>	<b>Cost of Equity</b>	<b>21.53%</b>

# Cost of Equity

## Putting the Pieces Together

Cost of Capital - Build-up Method Comparison 12/31/09			
Duff & Phelps		Morningstar - Historical	
Risk-free rate	4.58%	Risk-free rate	4.58%
Premium over risk-free rate	11.98%		
Equity risk premium adjustment		Equity risk premium	6.67%
Estimate of equity risk premium	5.00%		
Implied from Duff & Phelps	4.25%	<b>Size risk premium, 10b</b>	<b>10.01%</b>
Adjustment	0.75%		
Industry risk premium		Industry risk premium	2.00%
Per Morninstar	2.00%		
Duff & Phelps 'Consistency' Adjustment (ERP Estimate / SBBI ERP)	0.75	Estimate of company specific risk premium	2.00%
Adjusted industry risk premium	1.50%		
Estimate of company specific risk premium	2.00%		
<b>Cost of Equity</b>	<b>20.81%</b>	<b>Cost of Equity</b>	<b>25.26%</b>

# WACC

## Overview

- The WACC is the rate a company can expect to pay to all of its security holders in financing its assets

$$\text{WACC} = [MV_e / (MV_d + MV_e) \times R_e] + [MV_d / (MV_d + MV_e) \times R_d \times (1 - t)]$$

- Inputs
  - $MV_e$  = Market value of equity
  - $MV_d$  = Market value of debt
  - $R_e$  = Cost of equity
  - $R_d$  = Cost of debt
  - $t$  = Tax rate

# WACC

## Capital Structure

- The WACC is determined by the mix of debt and equity (i.e. capital structure) and their respective costs
- How is capital structure determined?
  - Target from industry / guideline companies
  - Actual from subject company (use iterative calculation feature of Excel)
- Minority versus control?
  - Minority often based on actual capital structure, as minority owners can't compel change
  - Control can be based on 'target'

# WACC

## Cost of Debt

- In a forward-looking cost of capital, should be cost of new debt
- Practically, cost of debt can be estimated as the weighted average of existing debt at respective rates
- Since interest is tax deductible, the cost of debt should be computed in after-tax terms

# Discounting vs. Capitalizing

## Overview

Discounting (DCF)	Capitalizing (CCF)
Used to determine the present value of a series of future economic income streams	Used to convert a static period income amount into a current estimate of value
Use: When future income is expected to grow at varying rates in future periods	Use: When future income is expected to grow at a constant rate
Future increment of return is estimated specifically and included in the numerator	Estimates of changes in future returns are lumped into one annually compounded growth rate, which is subtracted from the growth rate in the denominator
Discount rate = Cost of capital (k)	Capitalization rate = Discount rate – long-term growth rate (k – g)
Apply to: Projected period cash flows	Apply to: Base period grown by growth period ( $CF_0 * (1 + g)$ ), or $CF_1$

# Discounting vs. Capitalizing

## Growth Rates

- Sources of Growth Rates
  - Inflation estimates
  - Gross Domestic Product (GDP) estimates
  - Industry reports
  - Industry association reports
  - Management estimates (reasonableness)

# Discounting vs. Capitalizing

## Growth Rates

**EXHIBIT 2: Historical Economic Data 2004-2009 and Forecasts 2010-2019**

	HISTORICAL DATA						CONSENSUS FORECASTS**					
	2004	2005	2006	2007	2008	2009	2010	2011	2112	2013	2014	2015-2019
Real GDP*	3.6	3.1	2.7	2.1	0.4	-2.5	2.6	3.2	2.6	3.2	3.0	2.6
Industrial Production*	2.5	3.3	2.3	1.5	-2.2	-10.3	3.5	3.9	2.9	3.7	3.4	2.9
Personal Consumption*	3.5	3.4	2.9	2.6	-0.2	-0.7	1.5	2.6	2.5	2.6	2.6	2.5
Nonresidential Investment*	6.0	6.7	7.9	6.2	1.6	-18.2	-0.3	5.8	3.4	5.3	4.5	3.4
Government Spending*	1.4	0.3	1.4	1.7	3.1	2.0	2.2	NA	NA	NA	NA	NA
Consumer Price Index*	2.7	3.4	3.2	2.9	3.8	-0.4	1.9	2.1	2.4	2.1	2.2	2.4
Unemployment Rate	5.6	5.1	4.6	4.6	5.8	9.2	9.9	NA	NA	NA	NA	NA
Housing Starts (millions)	1.96	2.07	1.80	1.36	0.91	0.58	0.81	NA	NA	NA	NA	NA

Source of historical data: [www.bea.gov](http://www.bea.gov), [www.bls.gov](http://www.bls.gov), [www.census.gov](http://www.census.gov), [www.federalreserve.com](http://www.federalreserve.com), Consensus Forecasts - USA  
 Source of forecasts: Consensus Forecasts-USA, October 12, 2009 and January 11, 2010, [www.consensuseconomics.com](http://www.consensuseconomics.com)

**Notes:**

\*Numbers are based on percent change from preceding period, seasonally adjusted rates.

\*\*Forecast numbers are based on average percent change on previous calendar year.

Personal Consumption includes spending on services, durable, and nondurable goods.

Government Spending includes federal, state, and local government spending.

Every month, Consensus Economics surveys a panel of prominent United States economic and financial forecasters for their predictions on a range of variables including future growth, inflation, current account and budget balances, and interest rates.

# Discounting vs. Capitalizing

## Growth Rates

### 44711 - Gas Stations with Convenience Stores in the US - Industry Report

Outlook

Published Date Aug 28 2009

Revenue (constant prices)

EXPORT TO EXCEL

	Revenue \$ Million	Growth %
2010	364,922.0	21.2
2011	363,971.0	-0.3
2012	342,445.0	-5.9
2013	348,780.0	1.8
2014	361,932.0	3.8
2015	356,352.0	-1.5

### 44111 - New Car Dealers in the US - Industry Report

Outlook

Published Date Dec 11 2009

Revenue (constant prices)

EXPORT TO EXCEL

	Revenue \$ Million	Growth %
2010	438,853.0	7.3
2011	486,881.0	10.9
2012	521,443.0	7.1
2013	553,431.0	6.1
2014	584,163.0	5.6
2015	581,243.0	-0.5

# Cost of Capital

## Application

- Free cash flows to equity with cost of equity = Market Value of Equity
- Free cash flows to invested capital with WACC = Market Value of Invested Capital
  - Don't forget to subtract debt for  $MV_e$ !
- When cash flows grow at varying rates in the future - DCF
- When cash flows grow at a constant rate - CCF

# Special Topics

# Special Topics

- Mid-Period Adjustments
- Private Company Cost of Capital Survey

# Special Topics

## Mid-period Adjustments

- Mid-Period Adjustments
  - Traditional DCF and CCF models assume all cash is earned at the end of a period
  - In reality, cash is usually earned at different times throughout a given period

	Traditional	Mid-Year
Capitalization	$PV = \frac{NCF_1}{k - g}$	$PV = \frac{NCF_1 * (1 + k)^{0.5}}{(k - g)}$
Discounting	$PV = \frac{NCF_1}{(1 + k)} + \frac{NCF_2}{(1 + k)^2} + \frac{NCF_n}{(1 + k)^n}$	$PV = \frac{NCF_1}{(1 + k)^{0.5}} + \frac{NCF_2}{(1 + k)^{1.5}} + \frac{NCF_n}{(1 + k)^{n-0.5}}$

# Special Topics

## Private Company Cost of Capital Survey

- Pepperdine University's Private Capital Markets Project
- Survey of major market participant segments on required returns
- Segments (required return from 2009 survey)
  - Senior lenders (6.5%)
  - Asset-based lenders (11%)
  - Mezzanine funds (18%)
  - Private equity groups (25%)
  - Venture capital funds (42%)
- [www.bschool.pepperdine.edu/privatecapital](http://www.bschool.pepperdine.edu/privatecapital)

# Questions and Comments

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