

**Cost of Capital – Equity Risk
Premium and Size Premium**

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Introduction: Cost of Capital and CAPM

- ◆ **Weighted Average Cost of Capital (WACC)** requires estimation of cost of equity and cost of debt.
- ◆ **Capital Asset Pricing Model (CAPM)** estimates the required rate of return of an equity investor given a level of risk. It is the most widely used technique to estimate the cost of equity.
- ◆ **Cost of Equity is estimated by CAPM:**

$$k_e = R_f + \beta (R_m - R_f) + k_{scp} + k_{csp}$$

k_e = Cost of Equity

R_f = Risk-Free Rate

β = Beta

R_m = Expected return on the market

k_{scp} = Small capitalization premium

k_{csp} = Additional premium, if warranted, based on company specific risk profile.

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Equity Risk Premium (ERP)

- ◆ **It is the expected rate of return of diversified equity portfolio over the risk-free rate**

- ◆ **ERP = $E(R_m) - R_f$**

Where $E(R_m)$ = Expected Return on Stock Market

R_f = Risk-free Rate of Return

- ◆ **A forward looking concept.**
- ◆ **But unobservable in market and thus estimates are typically derived through use of historical data.**

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Equity Risk Premium –Through 2008 with Different Starting Dates

Table 5-5: Stock Market Return and Equity Risk Premium Over Time

Length (Yrs.)	Period Dates	Large Company Stock Arithmetic Mean Total Return (%)	Long-Horizon Equity Risk Premium (%)
83	1926–2008	11.7	6.5
70	1939–2008	11.9	6.3
60	1949–2008	12.4	6.3
50	1959–2008	10.6	3.8
40	1969–2008	10.6	3.2
30	1979–2008	12.5	5.0
20	1989–2008	10.4	4.2
15	1994–2008	8.7	3.1
10	1999–2008	0.7	-4.5
5	2004–2008	0.0	-4.7

Data from 1926–2008.

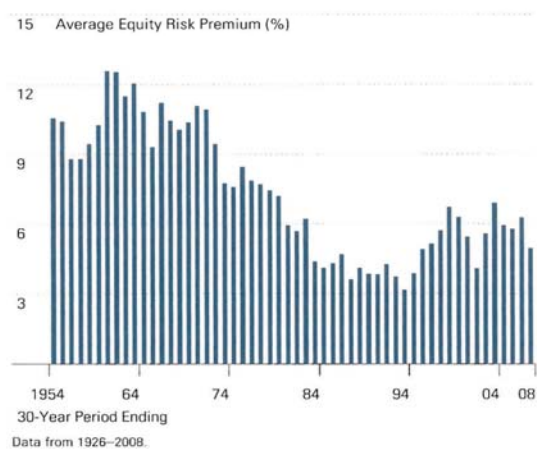
Source: Ibbotson S&P 500 Valuation Yearbook, Chapter 5, Page 62

- ◆ Longer historical periods provide more stable estimates of equity risk premium

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ERP : Impact of shorter horizon – 30 Year Periods

Graph 5-7: Equity Risk Premium Over 30-Year Periods



Source: Ibbotson S&P 500 Valuation Yearbook, Chapter 5, Page 63

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Equity Risk Premium – Supply Side

Table 5-6: Supply Side and Historical Equity Risk Premium Over Time

Period Length (Yrs.)	Period Dates	g(P/E)	Arithmetic Average	
			Supply Side Equity Risk Premium (%)	Historical Equity Risk Premium (%)
83	1926–2008	0.60	5.73	6.47
82	1926–2007	0.67	6.23	7.05
81	1926–2006	0.63	6.35	7.13
80	1926–2005	0.65	6.29	7.08
79	1926–2004	0.83	6.18	7.17
78	1926–2003	1.09	5.93	7.19
77	1926–2002	1.17	5.64	6.97
76	1926–2001	1.53	5.71	7.42
75	1926–2000	1.49	6.06	7.76
74	1926–1999	1.52	6.32	8.07
73	1926–1998	1.40	6.35	7.97
72	1926–1997	1.20	6.37	7.76
71	1926–1996	0.88	6.45	7.50
70	1926–1995	0.74	6.47	7.36
69	1926–1994	0.59	6.32	7.04
68	1926–1993	0.90	6.17	7.22
67	1926–1992	1.15	5.98	7.28
66	1926–1991	1.12	6.11	7.39
65	1926–1990	0.67	6.36	7.16
64	1926–1989	0.60	6.71	7.45
63	1926–1988	0.32	6.78	7.21
62	1926–1987	0.36	6.73	7.20
61	1926–1986	0.63	6.61	7.36

Data from 1926–2008.

Source: Ibbotson S&P 500 Valuation Yearbook, Chapter 5, Page 69

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Size Premium

- ◆ Empirically, small companies have earned a higher return than predicted by CAPM
- ◆ If your target company is smaller than the comparables, considering adding a size premium to the cost of equity
- ◆ The most popular source for size premium is Ibbotson Associates

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Size Premium

SBBI Size Premium Data

- ◆ **Ibbotson Size Premium** – difference between the arithmetic average return on the Ibbotson Small Company Stock Series and the CAPM return.
- ◆ **Size Premium** – Normally selected based on deciles of equity value

Size Premium by Deciles

Table 7-7: Long-Term Returns in Excess of CAPM Estimation for Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split

	Beta*	Arithmetic Mean Return (%)	Realized Return in Excess of Riskless Rate** (%)	Estimated Return in Excess of Riskless Rate ³ (%)	Size Premium (Return in Excess of CAPM) (%)
1-Largest	0.91	10.75	5.56	5.91	-0.36
2	1.03	12.51	7.31	6.69	0.62
3	1.10	13.06	7.87	7.13	0.74
4	1.12	13.45	8.25	7.28	0.97
5	1.16	14.23	9.03	7.49	1.54
6	1.18	14.48	9.28	7.65	1.63
7	1.24	14.94	9.65	8.03	1.62
8	1.30	15.95	10.76	8.41	2.35
9	1.35	16.62	11.42	8.71	2.71
10a	1.42	18.49	13.29	9.19	4.11
10b-Smallest	1.38	23.68	18.48	8.95	9.53
Mid-Cap, 3-5	1.12	13.37	8.18	7.24	0.94
Low-Cap, 6-8	1.22	14.86	9.66	7.92	1.74
Micro-Cap, 9-10	1.36	17.72	12.52	8.79	3.74

Data from 1926-2008. Source: Calculated (or Derived) based on data from CRSP US Stock Database and CRSP US Indices Database ©2009 Center for Research in Security Prices (CRSP), The University of Chicago Booth School of Business. Used with permission.

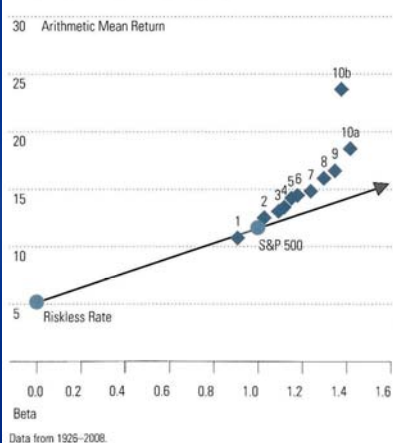
*Betas are estimated from monthly portfolio total returns in excess of the 30-day U.S. Treasury bill total return versus the S&P 500 total returns in excess of the 30-day U.S. Treasury bill, January 1926-December 2008.

**Historical riskless rate is measured by the 83-year arithmetic mean income return component of 20-year government bonds (5.20 percent).

³Calculated in the context of the CAPM by multiplying the equity risk premium by beta. The equity risk premium is estimated by the arithmetic mean total return of the S&P 500 (11.67 percent) minus the arithmetic mean income return component of 20-year government bonds (5.20 percent) from 1926-2008.

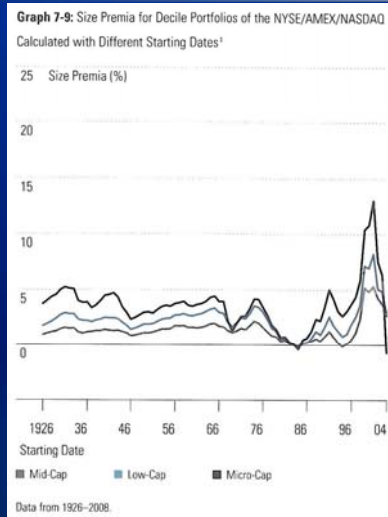
Source: Ibbotson SBBI 2009 Valuation Yearbook, Chapter 7, Page 96

Graph 7-3: Security Market Line versus Size-Decile Portfolios of the NYSE/AMEX/NASDAQ, with 10th Decile Split¹



Data from 1926-2008

Size Premium – Through 2008 with Different Starting Dates



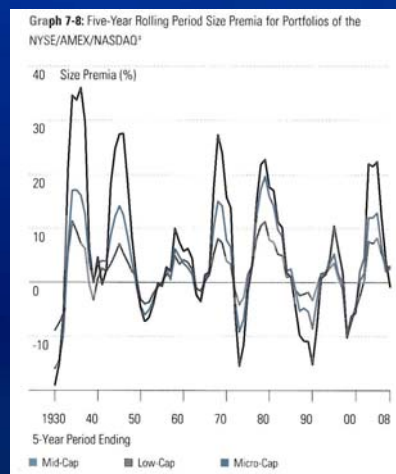
Source: Ibbotson S&P 2009 Valuation Yearbook, Chapter 7, Page 101

- ◆ Longer historical periods provide more stable estimates of size premium
- ◆ Size premium measured in more recent periods shows high volatility due to its cyclical nature

Mid-Cap, Decile 3-5 \$1.8 billion - \$7.4 billion
Low-Cap, Decile 6-8 \$453.4 million - \$1.8 billion
Micro-Cap, Decile 9-10 \$1.6 million - \$453.3 million

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Size Premium – Five Year Rolling Period



Source: Ibbotson S&P 2009 Valuation Yearbook, Chapter 7, Page 100

- ◆ Size premium over a five-year period is not stable and can be positive or negative

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Impact of discount rate on value

- ◆ Assume a business that throws of \$10 million per year in perpetuity.
- ◆ Further assume that the business has 9% cost of debt and 40% tax rate and a capital structure of 40% debt and 60% equity.
- ◆ Difference of 15% cost of equity and 17% cost of equity will result in WACC of 11.2% vs 12.4%
- ◆ Impact on value will be \$89.6 million vs \$80.9 million (or about 11%).