

Business Valuation: Advanced Topics

Cost of Capital – Update on the Size Effects

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Roger J. Grabowski, FASA, is a Managing Director with Duff & Phelps LLC and an Accredited Senior Appraiser and Fellow (FASA) of the American Society of Appraisers (ASA) (their highest designation), Business Valuation.

He was formerly Managing Director of the Standard & Poor's Corporate Value Consulting practice, a partner of PricewaterhouseCoopers LLP and one of its predecessor firms, Price Waterhouse (where he founded its U.S. Valuation Services practice and managed the real estate appraisal practice).

He has directed valuations of businesses, interests in businesses, intellectual property, intangible assets, real property and machinery and equipment. Roger has been recognized in various courts as an expert on matters of solvency, the value of closely held businesses and business interests, valuation and amortization of intangible assets and other valuation issues. His testimony in U.S. District Court was referenced in the U.S. Supreme Court opinion decided in his client's favor in the landmark Newark Morning Ledger case.

Roger is the co-author of *Cost of Capital: Applications and Examples* 5th ed., with Shannon P. Pratt (John Wiley & Sons, 2014); co-author of the on-line Duff & Phelps Cost of Capital Navigator (provides access to data on risk-free rate, equity risk premiums, size premiums, other risk measures); and co-author of the annual *Valuation Handbooks: U.S. Industry Cost of Capital; International Guide to Cost of Capital; and International Industry Cost of Capital* (Duff & Phelps, 2018).

Roger teaches courses for the American Society of Appraisers..

Size Effect

Empirically observed: average returns on small firms greater than for large firms after adjusting for differences in beta (market risk)

Two U.S. studies:

- CRSP Decile Size Premia – measures size by market value of equity
- Risk Premium Report – measures size by two market value based measures of size (equity and Market Value of Invested Capital) plus six “fundamental” measures of company size

European study:

- Firm Size and Cost of Equity Capital in Europe- measures size by two market value based measures of size (equity and Market Value of Invested Capital) plus four “fundamental” measures of company size plus overall “size factor”

Issues:

- Has size effect disappeared?
- Is size effect a proxy for other risks (e.g., variability of cash flows, lack of liquidity) ?

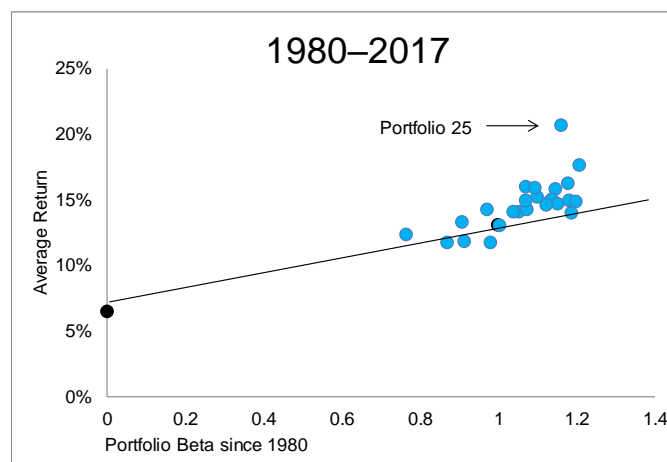
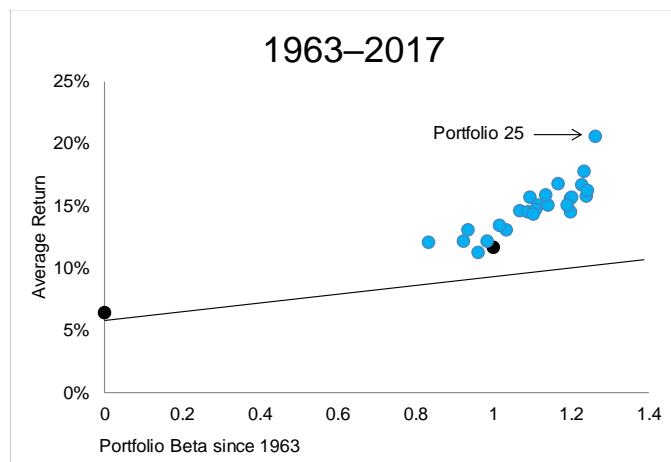
- Measures of Equity Size
 1. Market value of common equity
 2. Book value of common equity
 3. Five-year average net income before extraordinary items for previous five fiscal years

- Measures of Company Size
 1. Market value of invested capital (MVIC)
 2. Total assets (as reported on the balance sheet)
 3. Five-year average EBITDA for the previous five fiscal years
 4. Sales
 5. Number of employees

Size Effect Over Recent Time Periods

Alternative Measures of Size – U.S. Companies - Market Capitalization

Risk Premium Report – Size Study: 1963 – 2017, 1980 – 2017

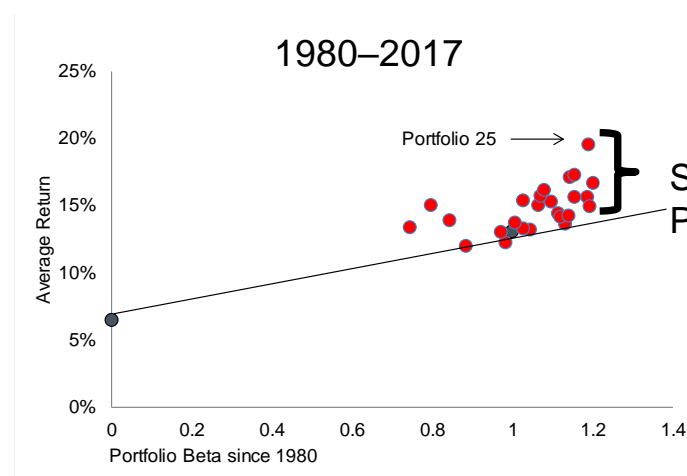
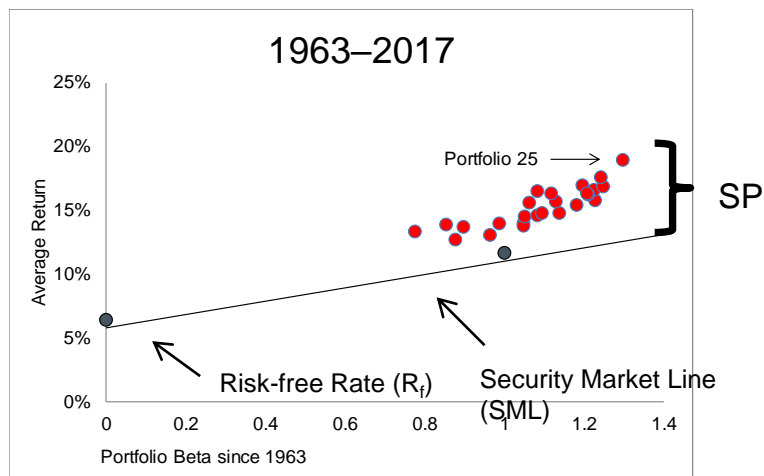


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Size Effect Over Recent Time Periods

Alternative Measures of Size – U.S. Companies - 5 Year Avg Net Income

Risk Premium Report – Size Study: 1963 – 2017, 1980 – 2017



Sources of underlying data: 1.) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2018 Center for Research in Security Prices (CRSP®), University of Chicago Booth School of Business. 2.) Morningstar *Direct* database. Used with permission. All rights reserved. Calculations performed by Duff & Phelps LLC.

Size Effect – Updated Evidence for U.S. Companies

The following is taken from these two papers:

- Roger J. Grabowski, “The Size Effect Continues To Be Relevant When Estimating the Cost of Capital” forthcoming in *Business Valuation Review*
- Roger J. Grabowski, “The Size Effect—It is Still Relevant,” *Business Valuation Review* 35(2) (2016): 62–71

Exhibit 1: U.S. Companies ranked by size measured by Market Value of Equity

**Size Premia for Companies Ranked by
Market Value of Equity**

Portfolio Ranking by Size	Average MVE (in \$millions) ¹	Premiums of CAPM	
		1981-2016	1990-2016
21	1023	2.82%	4.27%
22	731	3.38%	4.83%
23	532	2.36%	3.81%
24	370	5.61%	7.06%
25	121	7.99%	9.43%

¹ Average total market value of equity (MVE) in 2015 for companies comprising each portfolio

Exhibit 2: U.S. Companies ranked by size measured by 5-year Average Net Income

**Size Premia for Companies Ranked by
5-Year Average Net Income**

Portfolio Ranking by Size	Net Income (in \$millions) ¹	Premiums of CAPM	
		1981-2016	1990-2016
21	42	1.68%	3.13%
22	34	3.01%	4.45%
23	24	4.17%	5.62%
24	15	4.41%	5.86%
25	5	6.60%	8.05%

¹ Five-year average prior to 2016 for companies comprising each portfolio

Exhibit 3: U.S. Companies ranked by size measured by Total Assets

**Size Premia for Companies Ranked by
Total Assets**

Portfolio Ranking by Size	Average Total Assets (in \$millions) ¹	Premiums of CAPM	
		1981-2016	1990-2016
21	1069	2.15%	3.59%
22	801	3.15%	4.60%
23	600	3.44%	4.89%
24	429	3.86%	5.31%
25	161	6.43%	7.87%

¹ Average total assets in 2015 for companies comprising each portfolio

Exhibit 4: U.S. Companies ranked by size measured by 5-year average EBITDA

Size Premia for Companies Ranked by 5-Year Average EBITDA

Portfolio Ranking by Size	5-year Average EBITDA ¹ (in \$millions)	Premiums of CAPM	
		1981-2016	1990-2016
21	125	3.41%	4.85%
22	94	3.12%	4.57%
23	74	4.68%	6.13%
24	51	3.30%	4.74%
25	17	5.99%	7.43%

¹. Five-year average prior to 2016 for companies comprising each portfolio

Exhibit 5: U.S. Companies ranked by size measured by Market Value of Equity

Fundamental Risk Data for Companies Ranked by Market Value of Equity

		Fundamental Risk Data				
Portfolio Ranking	MVE	Avg Debt/	Unlevered	Avg Operating	Avg CV (Operating	
by Size	(in Millions) ¹	MVIC	Beta	Margin	Margin)	
1	\$238,299	13.13%	0.68	19.09%		9.35%
2	\$60,613	16.50%	0.83	14.74%		12.01%
3	\$35,630	18.49%	0.72	14.72%		11.96%
21	\$1,023	18.97%	0.98	8.84%		24.96%
22	\$731	19.29%	0.98	8.73%		26.73%
23	\$532	18.81%	1.00	8.00%		29.52%
24	\$370	19.02%	1.01	7.99%		33.00%
25	\$121	21.94%	0.94	6.27%		47.18%

¹ Average in 2015 for companies comprising each portfolio

MVIC = Debt plus Market Value of Equity

CV = Coefficient of variation

Exhibit 6: U.S. Companies ranked by size measured by 5-year Average Net Income

**Fundamental Risk Data for Companies Ranked by
5-Year Average Net Income**

Portfolio Ranking by Size	Net Income (in Millions) ¹	Fundamental Risk Data			Avg CV (Operating Margin)
		Avg Debt/ MVIC	Unlevered Beta	Avg Operating Margin	
1	\$10,101	17.38%	0.63	18.74%	9.51%
2	\$2,747	21.58%	0.71	15.36%	11.08%
3	1735	23.54%	0.63	14.89%	11.44%
21	42	20.13%	0.98	9.41%	24.63%
22	34	19.82%	0.95	8.83%	25.26%
23	24	17.32%	1.02	8.75%	28.81%
24	15	18.01%	0.98	7.97%	33.87%
25	5	19.47%	0.99	5.97%	54.51%

¹ Five-year average prior to 2016 for companies comprising each portfolio

MVIC = Debt plus Market Value of Equity

CV = Coefficient of variation

Exhibit 7: U.S. Companies ranked by size measured by Total Assets

Fundamental Risk Data for Companies Ranked by Total Assets

Portfolio Ranking by Size	Fundamental Risk Data				
	Total Assets (in Millions) ¹	Avg Debt/ MVIC	Unlevered Beta	Avg Operating Margin	Avg CV (Operating Margin)
1	\$161,117	26.16%	0.63	15.32%	13.77%
2	\$51,936	30.22%	0.57	15.66%	13.43%
3	\$35,110	26.02%	0.69	13.09%	12.95%
21	\$1,069	18.60%	0.97	9.04%	23.18%
22	\$801	17.55%	1.01	9.03%	25.69%
23	\$600	16.53%	0.99	8.44%	28.53%
24	\$429	16.23%	1.02	8.21%	30.74%
25	\$161	14.97%	0.99	7.33%	43.99%

¹ Average total assets in 2015 for companies comprising each portfolio

MVIC = Debt plus Market Value of Equity

CV = Coefficient of variation

Exhibit 8: U.S. Companies ranked by size measured by 5-year average EBITDA

Fundamental Risk Data for Companies Ranked by 5-Year Average EBITDA

Portfolio Ranking by Size	Fundamental Risk Data				
	EBITDA (in Millions) ¹	Avg Debt/ MVIC	Unlevered Beta	Avg Operating Margin	Avg CV (Operating Margin)
1	\$22,452	20.52%	0.62	17.43%	10.90%
2	\$6,905	26.38%	0.64	15.14%	13.81%
3	\$4,343	26.51%	0.66	14.83%	11.29%
21	\$125	19.08%	0.95	9.71%	22.79%
22	\$94	18.58%	1	9.23%	24.42%
23	\$74	18.06%	0.98	8.41%	28.49%
24	\$51	17.30%	0.99	8.19%	32.27%
25	\$17	16.22%	1.01	6.80%	47.80%

¹ Five-year average prior to 2016 for companies comprising each portfolio

MVIC = Debt plus Market Value of Equity

CV = Coefficient of variation

Exhibit 9: Breakdown of Subdecile 10z U.S. Companies: Market Value of Equity between \$2.516 And \$73.504 million (appear as Exhibit 4.10 in the Duff & Phelps 2017 *Valuation Handbook - U.S. Guide to Cost of Capital*) as of September 30, 2016

Subdecile 10z	Market Value of Equity (in \$millions)	Book Value of Equity (in \$millions)	5-Year Average Net Income (in \$millions)	Market Value of Invested Capital (in \$millions)
95th Percentile	\$70.114	\$85.864	\$4.600	\$176.784
75th Percentile	53.104	42.925	0.709	72.135
50th Percentile	34.343	18.007	(3.958)	46.750
25th Percentile	18.846	5.866	(13.929)	25.493
5th Percentile	6.657	(5.338)	(25.146)	9.759

Subdecile 10z	Total Assets (in \$millions)	5-Year Average EBITDA (in \$millions)	Sales (in \$millions)	Return on Book Equity (%)
95th Percentile	\$660.828	\$22.767	\$248.603	15.5
75th Percentile	106.517	3.179	67.029	2.5
50th Percentile	40.658	(1.547)	25.303	(23.0)
25th Percentile	17.456	(9.474)	8.086	(94.5)
5th Percentile	6.319	(18.669)	1.329	(222.4)

Subdecile 10z	OLS Beta	Sum Beta
95th Percentile	2.71	3.45
75th Percentile	1.35	1.79
50th Percentile	0.70	1.01
25th Percentile	0.28	0.43
5th Percentile	0.09	0.13

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Exhibit 10: Size Measure of U.S. Companies That Comprise Portfolio 25 of the *Risk Premium Report* December 31, 2016 (appeared as Exhibit 4.11 in the Duff & Phelps 2017 *Valuation Handbook - U.S. Guide to Cost of Capital*)

Portfolio 25	Market Value of Equity (in \$millions)	Book Value of Equity (in \$millions)	5-Year Average Net Income (in \$millions)	Market Value of Invested Capital (in \$millions)
Largest Company	\$291.526	\$159.204	\$11.274	\$387.281
95th Percentile	260.490	151.276	10.302	355.585
75th Percentile	189.941	116.879	7.292	257.179
50th Percentile	99.386	74.349	4.148	141.789
25th Percentile	48.289	33.630	1.976	67.336
5th Percentile	16.848	13.868	0.669	20.342
Smallest Company	4.784	4.756	0.054	8.190

Portfolio 25	Total Assets (in \$millions)	5-Year Average EBITDA (in \$millions)	Sales (in \$millions)	Number of Employees
Largest Company	\$346.465	\$39.386	\$307.857	686
95th Percentile	318.170	36.761	276.458	641
75th Percentile	249.862	26.608	200.273	485
50th Percentile	163.579	15.120	118.960	272
25th Percentile	62.163	6.991	55.810	131
5th Percentile	24.577	2.109	18.314	10
Smallest Company	9.283	1.130	2.619	1

Sources of underlying data: (i) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2017 Center for Research in Security Prices (CRSP®), University of Chicago Booth School of Business, (ii) S&P Research Insight. Used with permission. All rights reserved Calculations performed by Duff & Phelps, LLC.

Effect of Volatility on Expected Returns

Fama and French, “Volatility Lessons” (November 2017)

- Examine the distribution of monthly equity premiums (monthly return on portfolio of U.S. stocks minus one-month U.S. T-bills for July 1963 - December 2016)
- Average premium is 0.51% per month (equivalent to 6% per year), but std. dev of monthly equity premium = 4.42%
- Returns are skewed: skewed to left for monthly premiums, but skewed to the right for annual premiums and increasingly skewed to right for longer-term horizons
- Monthly equity premiums are leptokurtic (more extreme returns than would be expected with a normal distribution) – probability of extreme returns increase as return horizon increases
- Probability that “small” stocks (small market value) will have a lesser premium than the market is substantial over short horizons.
- But for longer return horizons, small stock returns can be expected to exceed the market premium

Beyond MCAPM – more factors

Fama and French, “A Five-Factor Asset Pricing Model,” *Journal of Financial Economics* 116 (1) April 2015:1-22

F-F (1993) three-factor model:

- $R_{it} - R_{f_t} = a_i + b_i(RM_t - R_{f_t}) + s_iSMB_t + h_iHML_t + e_{it}$.
- R_{it} = return on security or portfolio i for period t , R_{f_t} = risk-free return, RM_t = return on the value-weight market portfolio, SMB_t = return on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks, HML_t = difference between the returns on diversified portfolios of high and low B/M stocks, and e_{it} = zero-mean residual.

Fama and French, “A Five-Factor Asset Pricing Model,” *Journal of Financial Economics* 116 (1) April 2015:1-2

F-F (2015) add profitability and investment factors:

- $R_{it} - R_{f_t} = a_i + b_i(RM_t - R_{f_t}) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it}$.
 RMW_t = difference between the returns on diversified portfolios of stocks with robust and weak profitability;
- CMA_t = difference between the returns on diversified portfolios of the stocks of low (conservative) and high (aggressive) investment firms.
- If the exposures to the five factors, b_i , s_i , h_i , r_i , and c_i , capture all variation in expected returns, the intercept a_i is zero for all securities and portfolios i .

Data exhibits in Professor Peek's Research Note summarize the relationships between firm size and the cost of equity capital in European equity markets.

These exhibits present different types of size-related risk premia data, including:

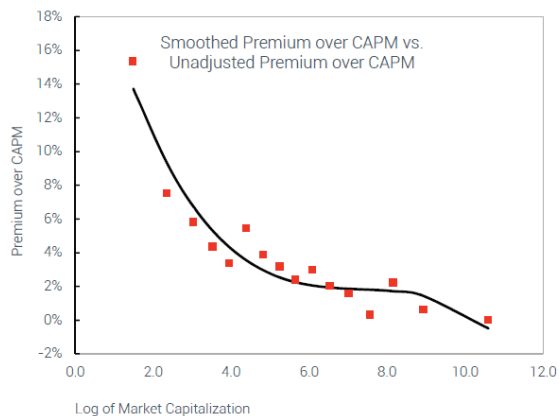
- Premia Over the Risk-Free Rate (Data Exhibit 5A)
- Premia Over CAPM, or Size Premia (Data Exhibit 5B)
- Comparative Risk Characteristics (Data Exhibit 5C)

Analyzing Size – European Companies Analyzed Using Seven Measures of Size

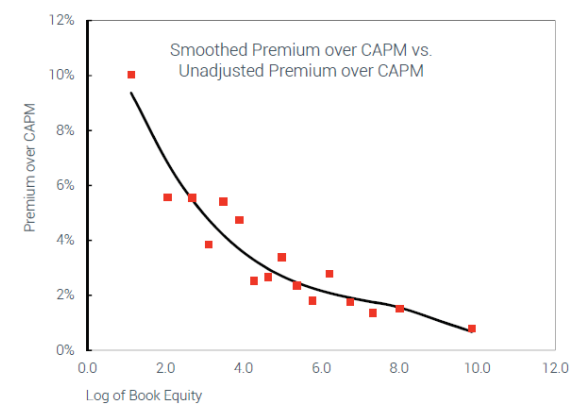
- Measure of Equity Size
 1. Market value of common equity
 2. Book value of common equity
- Measure of Company Size
 1. Market value of invested capital (MVIC)
 2. Total assets (as reported on the balance sheet)
 3. Sales
 4. Number of employees
- Measure of Overall Size Factor

Premia Over CAPM

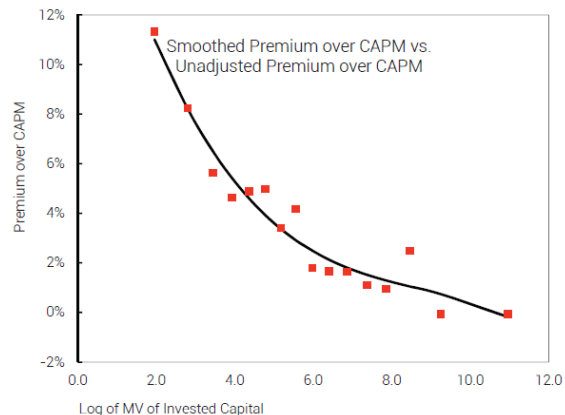
European Companies Ranked by
Market Capitalization



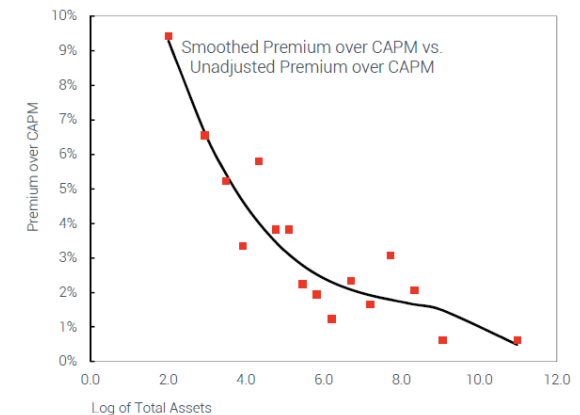
European Companies Ranked by
Book Equity



European Companies Ranked by
MV of Invested Capital

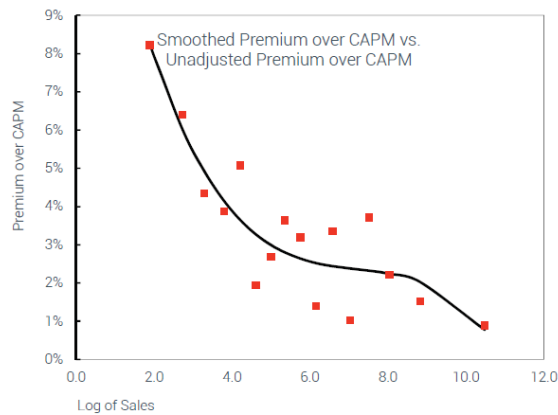


European Companies Ranked by
Total Assets

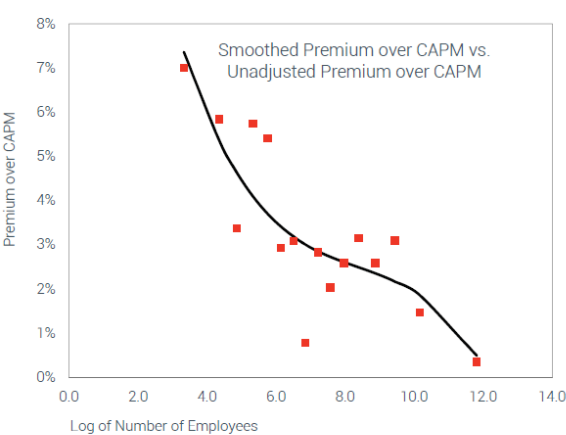


Premia Over CAPM

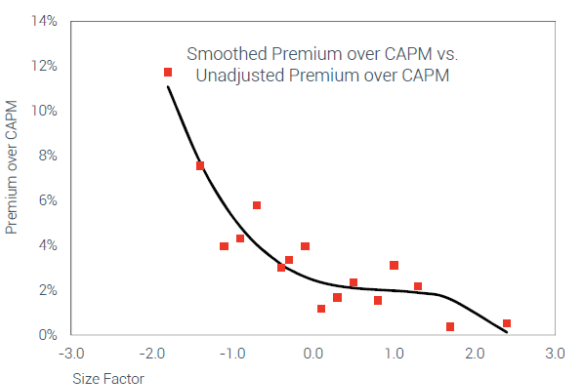
European Companies Ranked by
Total Sales



European Companies Ranked by
Number of Employees



European Companies Ranked by
Size Factor



Analyzing Size – European Companies Analyzed Using Overall Size Factor

$$\begin{aligned}\text{Size Factor} &= (-2.5177) + .0809 \times LN(\text{Market Capitalization}) \\ &\quad + .0844 \times LN(\text{Market Value of Investment Capital}) \\ &\quad + .0854 \times LN(\text{Book Equity}) \\ &\quad + .0855 \times LN(\text{Total Assets}) \\ &\quad + .0732 \times LN(\text{Total Sales}) \\ &\quad + .0785 \times LN(\text{Employees})\end{aligned}$$

Footnote 7.7, Chapter 7, “Firm Size and The Cost of Capital in Europe,” *2018 Valuation Handbook – International Guide to Cost of Capital*

European Companies Ranked by Size Measured by Market Capitalization

Portfolio Rank by Size	Avg. Mkt Cap (in € millions)	Premium over CAPM 1990 - 2017
12	52	3.36%
13	34	4.35%
14	21	5.80%
15	11	7.52%
16 (small)	4	15.35%

European Companies Ranked by Size Measured by Book Equity

<u>Portfolio Rank by Size</u>	<u>Avg. Book Equity (in € millions)</u>	<u>Premium over CAPM 1990 - 2017</u>
12	33	5.40%
13	23	3.84%
14	15	5.54%
15	8	5.56%
16 (small)	3	10.02%

European Companies Ranked by Size Measured by Total Assets

Portfolio Rank by Size	Avg. Total Assets (in € millions)	Premium over CAPM 1990 - 2017
12	77	5.79%
13	51	3.34%
14	33	5.22%
15	19	6.54%
16 (small)	7	9.41%

European Companies Ranked by Size Measured by Size Factor

Portfolio Rank by Size	Avg. Size Factor	Premium over CAPM 1990 - 2017
12	(0.7)	5.76%
13	(0.9)	4.29%
14	(1.1)	3.96%
15	(1.4)	7.55%
16 (small)	(1.8)	11.72%

European Companies Ranked by Size Measured by Market Capitalization

Portfolio Statistics for 2017			Portfolio Statistics for 1990 - 2017		
Portfolio Rank by Size	Avg. Mkt Cap (in € millions)	Unlevered Beta (Sum Beta) Since '90	Avg. Debt to MVIC	Avg. Operating Margin	StdDev Operating Margin
1 (big)	40,194	0.74	23.49%	14.97%	1.99%
2	7,557	0.82	21.21%	13.09%	2.06%
3	3,506	0.87	19.39%	11.45%	2.40%
12	52	0.84	19.16%	6.20%	3.87%
13	34	0.79	23.98%	5.28%	3.95%
14	21	0.83	24.25%	4.32%	3.77%
15	11	0.88	17.74%	3.88%	4.12%
16 (small)	4	1.01	34.21%	3.88%	3.88%

European Companies Ranked by Size Measured by Book Equity

Portfolio Statistics for 2017			Portfolio Statistic for 1990 - 2017		
Portfolio Rank by Size	Average Book Equity (in € millions)	Unlevered Beta (Sum Beta) Since '90	Average Debt to MVIC	Average Operating Margin	StdDev Operating Margin
1 (big)	19,406	0.73	29.66%	13.18%	2.22%
2	3,038	0.82	25.42%	12.30%	2.47%
3	1,506	0.83	24.37%	11.50%	2.23%
12	33	0.84	17.02%	7.13%	3.62%
13	23	0.82	17.84%	6.96%	3.58%
14	15	0.90	17.03%	5.86%	3.98%
15	8	0.90	16.27%	5.72%	4.91%
16 (small)	3	1.23	9.34%	4.45%	5.49%

European Companies Ranked by Size Measured by Total Assets

Portfolio Statistics for 2017			Portfolio Statistics for 1990 - 2017		
Portfolio Rank by Size	Average Total Assets (in € millions)	Unlevered Beta (Sum Beta) Since '90	Average Debt to MVIC	Average Operating Margin	StdDev Operating Margin
1 (big)	58,981	0.72	33.96%	12.61%	1.95%
2	8,696	0.81	26.56%	12.48%	2.41%
3	4,169	0.81	28.29%	10.46%	2.30%
12	77	0.84	17.64%	8.38%	3.37%
13	51	0.86	14.77%	8.31%	3.39%
14	33	0.89	13.44%	6.34%	4.34%
15	19	0.93	11.18%	6.60%	5.51%
16 (small)	7	1.21	4.69%	5.60%	6.04%

European Companies Ranked by Size Measured by Size Factor

Portfolio Statistics for 2017			Portfolio Statistics for 1990-2017		
Portfolio Rank by Size	Average Size Factor	Unlevered Beta (Sum Beta) Since '90	Average Debt to MVIC	Average Operating Margin	StdDev Operating Margin
1 (big)	2.4	0.72	30.42%	12.35%	1.87%
2	1.7	0.84	23.46%	11.99%	2.15%
3	1.3	0.84	23.43%	11.44%	2.26%
4	1.0	0.87	21.82%	9.99%	1.94%
12	-0.7	0.76	18.57%	7.00%	3.90%
13	-0.9	0.85	13.35%	8.62%	4.17%
14	-1.1	0.86	19.00%	6.35%	5.55%
15	-1.4	0.89	17.08%	5.41%	5.21%
16 (small)	-1.8	1.20	9.51%	4.83%	5.42%

Analyzing Size – European Companies Analyzed Using Seven Measures of Size

Notes:

- Countries included:

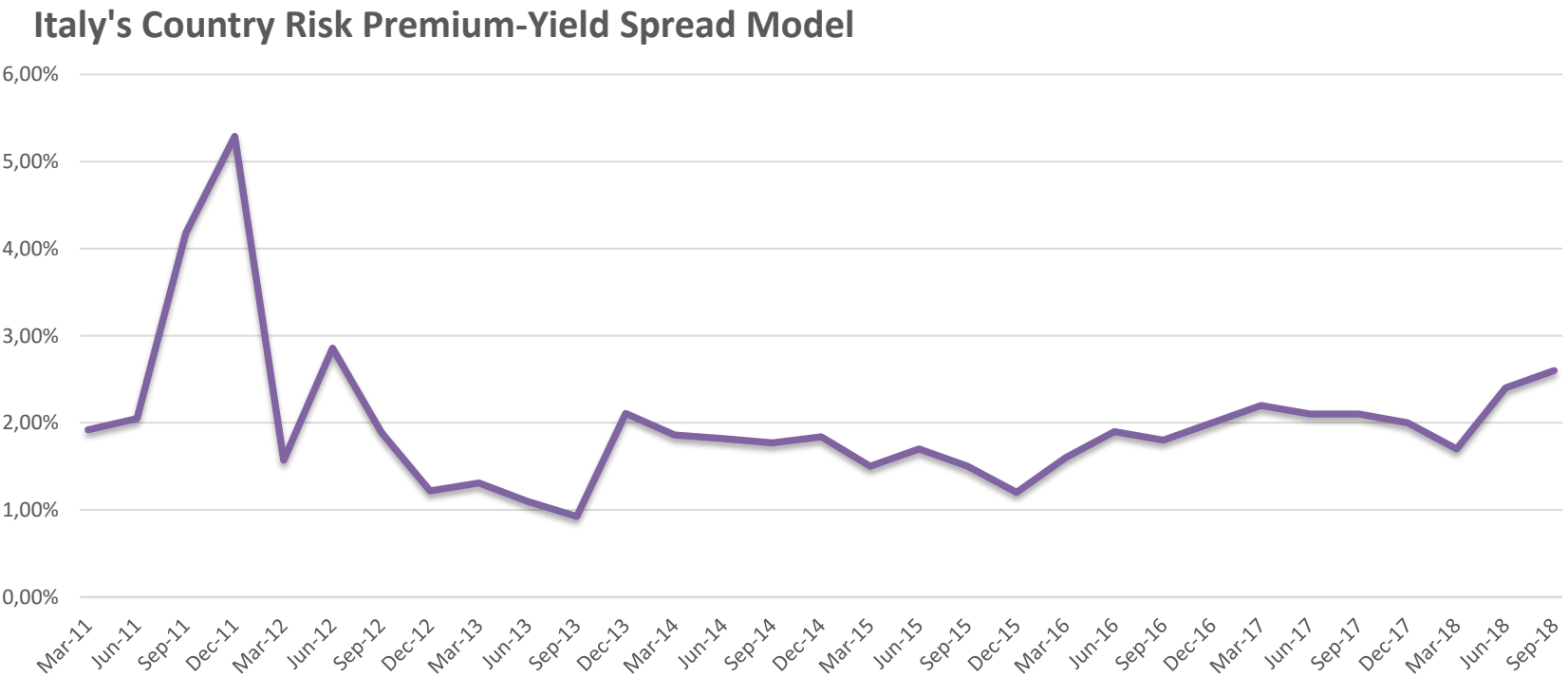
Austria	Germany	Luxembourg	Spain
Belgium	Greece	The Netherlands	Sweden
Denmark	Ireland	Norway	Switzerland
Finland	Italy	Portugal	United Kingdom
France			

- Data Sources: Thomson Reuters *Datastream* and *Worldscope* databases
- While there are regional differences, the return spreads, measured as the probability that the size premium is positive, suggest that the size premium is positive in every economic region considered. But the size effect varies across countries and regions within Europe.

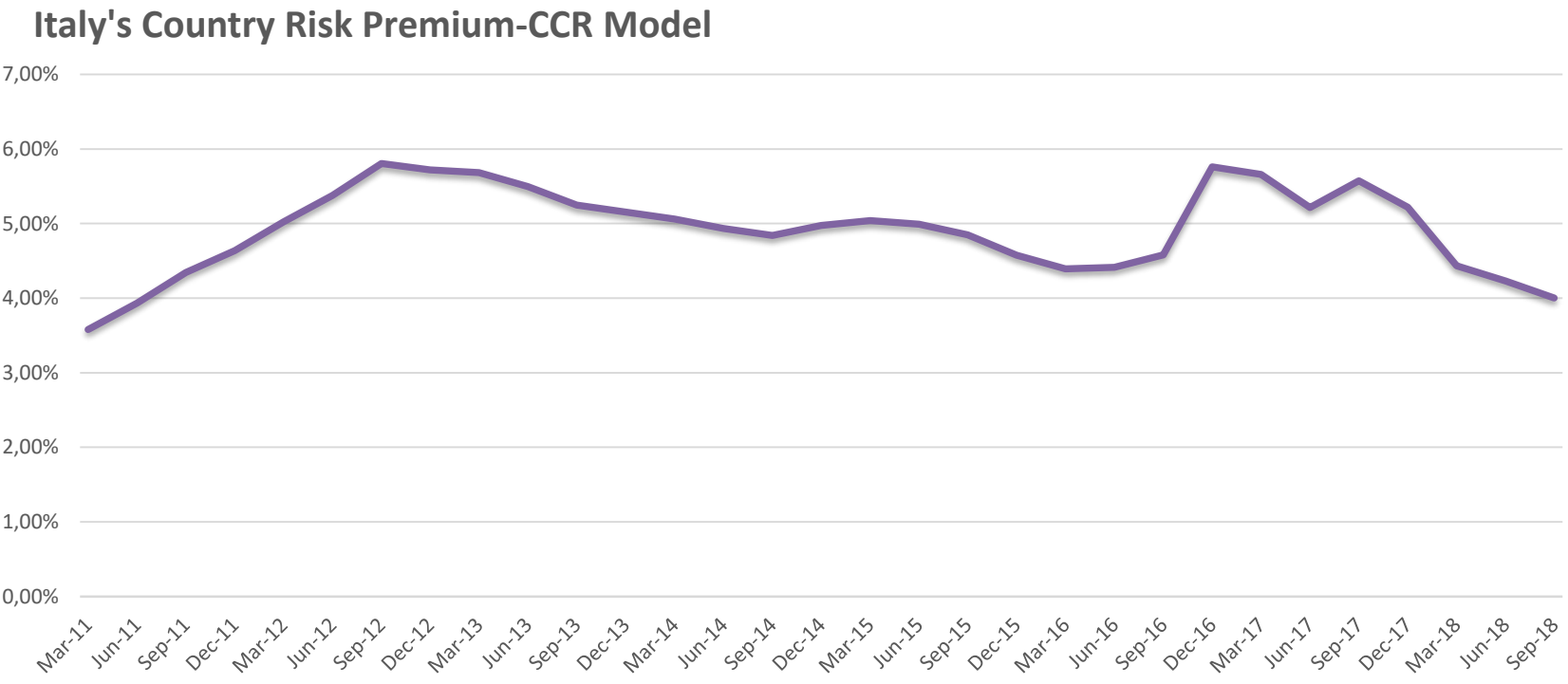
Current Country Risk Premiums for Italy

- Source: Duff & Phelps *2018 Valuation Handbook – International Guide to Cost of Capital* semi-annual update through September 2018
- Country risk rating from perspective of a Euro investor
 - Yield spread model
 - Country Credit Rating (CCR) Model

Italy's Country Risk Premium (Yield Spread Model)



Italy's Country Risk Premium (CCR Model)



Questions?

Contact Information

*Roger Grabowski
Managing Director
Valuation Advisory*

+1 312 697 4720

Roger.Grabowski@duffandphelps.com

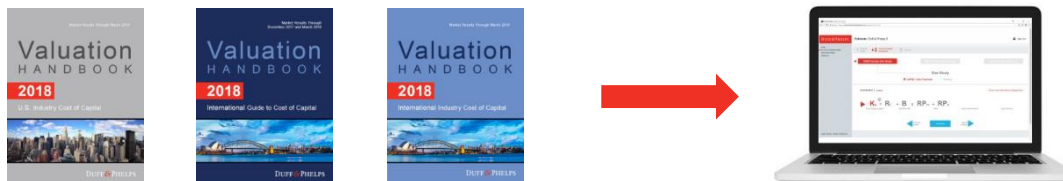
Sources of Cost of Capital Data

What is going on with the books?

The Cost of Capital Navigator replaced the *Valuation Handbook – U.S. Guide to Cost of Capital* for 2018.



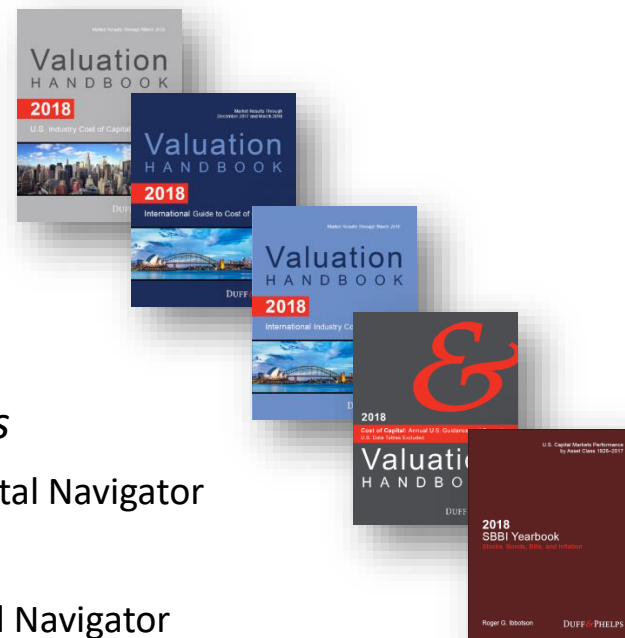
In 2019, the remaining Valuation Handbooks including: *U.S. Industry Cost of Capital*, *International Guide to Cost of Capital*, and *International Industry Cost of Capital* will be migrated to the Cost of Capital Navigator.



Which books are still available?

➤ Duff & Phelps is selling 5 books this year.

- *The Valuation Handbooks:*
 - *U.S. Industry Cost of Capital*
 - *International Guide to Cost of Capital*
 - *International Industry Cost of Capital*
- *Cost of Capital: Annual U.S. Guidance and Examples*
 - Provides background for data provided in Cost of Capital Navigator
 - Teaching tool for young staff
 - No data tables – data available through Cost of Capital Navigator
- *2018 SBBI® Yearbook*



To purchase the books or learn more, please visit: dpcostofcapital.com

Cost of Capital Resources

Duff & Phelps has authored *five* books that focus on U.S. and international valuation theory, data, and risk premia (e.g., equity risk premia, risk-free rates, size premia, industry risk premia, betas, industry multiples and other statistics, etc.) for use in valuation models.

These five books are (i) the *Cost of Capital: Applications and Examples* (5th edition), and the four “*Valuation Handbooks*”: (ii) the *Valuation Handbook – U.S. Guide to Cost of Capital*, (iii) the *Valuation Handbook – U.S. Industry Cost of Capital*, (iv) the *Valuation Handbook – International Guide to Cost of Capital*, and (v) the *Valuation Handbook – International Industry Cost of Capital*.

The Four *Valuation Handbooks* are Transitioning from *Print* to *Online* Delivery in 2018 and 2019

In 2018 and 2019, the four Duff & Phelps *Valuation Handbooks* are transitioning from *print* to a new *online* delivery platform, the "Cost of Capital Navigator". The Cost of Capital Navigator guides the Analyst through the process of estimating the cost of capital, a key component of any valuation analysis.¹ To learn more about the Cost of Capital Navigator, visit: dpcostofcapital.com.

¹ At launch in February 2018, the Cost of Capital Navigator includes cost of equity capital estimates. Later versions of the Cost of Capital Navigator are scheduled to include cost of debt and weighted average cost of capital (WACC) estimates.

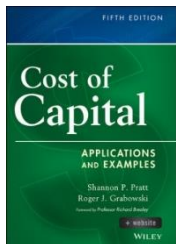
Cost of Capital Resources

- The four *Valuation Handbooks* will be transitioned over to the online Cost of Capital Navigator platform in stages.
 - In the first stage in February 2018, the *Valuation Handbook – U.S. Guide to Cost of Capital* was transitioned over.
 - The three remaining *Valuation Handbooks* (the *Valuation Handbook – U.S. Industry Cost of Capital*, the *Valuation Handbook – International Guide to Cost of Capital*, and the *Valuation Handbook – International Industry Cost of Capital*) will be printed and distributed as books in 2018 and 2019, but the information and data from these books is scheduled to be available exclusively via the Cost of Capital Navigator starting in 2020.
- Duff & Phelps produces *one* book that focuses on U.S. capital markets performance data (i.e., the history of returns of the capital markets in the U.S. from 1926 to the present). This resource, the *Stocks, Bonds, Bills, and Inflation® (SBBi®) Yearbook*, has been published for over 30 years.¹
 - The *SBBi® Yearbook* does not provide extensive valuation data or methodology.²

¹ “Stocks, Bonds, Bills, and Inflation®” and “SBBi®” are registered trademarks of Morningstar, Inc. All rights reserved. Used with permission.

² Morningstar previously published two “Ibbotson SBBi®” yearbooks: (i) *The SBBi® “Classic” Yearbook*, which is now produced by Duff & Phelps as the “*SBBi® Yearbook*” starting in 2016 (the word “Classic” was dropped from the title), and (ii) the *SBBi® “Valuation” Yearbook*, which was discontinued by Morningstar in 2013. The former Ibbotson/Morningstar *SBBi® Valuation Yearbook* was replaced by the Duff & Phelps *Valuation Handbook – U.S. Guide to Cost of Capital* in 2014, and published annually as a hardcover book through 2017. Starting in 2018, Duff & Phelps will not publish a commercially available physical version of the *Valuation Handbook – U.S. Guide to Cost of Capital* that includes the data exhibits; the essential valuation data from the data exhibits will be available only in the Cost of Capital Navigator online platform. To learn more about the Cost of Capital Navigator, visit: dpcostofcapital.com.

Cost of Capital: Applications and Examples 5th edition



Cost of Capital: Applications and Examples 5th edition will continue to be published as a hardcover book. To learn more about *Cost of Capital: Applications and Examples* 5th edition, visit: www.wiley.com/buy/9781118555804.

The *Cost of Capital: Applications and Examples* 5th edition, by Shannon P. Pratt and Roger J. Grabowski (John Wiley & Sons, Inc., 2014) is the authoritative, comprehensive overview of valuation theory, best practices, and proper use of data. This book puts an emphasis on practical application. The *Cost of Capital: Applications and Examples* 5th edition is a one-stop shop for background and current thinking on the development and uses of rates of return on capital. This book contains expanded materials on estimating the basic building blocks of the cost of equity capital, the risk-free rate, and the equity risk premium, plus in-depth discussion of the volatility created by the 2008 financial crisis, the subsequent recession and uncertain recovery, and how those events have fundamentally changed how we need to interpret the inputs to the models we use to develop these estimates.

The *Cost of Capital: Applications and Examples* 5th edition includes case studies providing comprehensive discussion of cost of capital estimates for valuing a business and damages calculations for small and medium-sized businesses, cross-referenced to the chapters covering the theory and data. This book puts an emphasis on practical application. To that end, this updated edition provides readers with exclusive access to a companion website filled with supplementary materials, allowing you to continue to learn in a hands-on fashion long after closing the book. The 6th edition of this book is planned for 2020.

"Shannon Pratt and Roger Grabowski have produced a remarkably comprehensive review of the subject...it is a work that valuation practitioners, CFOs, and others will find an invaluable reference".

– **Professor Richard Brealey**, Emeritus Professor of Finance, London Business School

"Estimating the cost of capital is critical in determining the valuation of assets, in evaluating the capital structure of corporations, and in estimating the long-run expected return of investments. Shannon Pratt and Roger Grabowski have the most thorough text on the subject, not only providing various estimation methods, but also numerous ways to use the cost of capital".

– **Professor Roger G. Ibbotson**, Professor Emeritus of Finance at the Yale School of Management, Chairman and Chief Investment Officer of Zebra Capital LLC, and former Chairman and founder of Ibbotson Associates, now part of Morningstar, Inc.

Cost of Capital Navigator (the information and data previously published in the *Valuation Handbook – U.S. Guide to Cost of Capital*)



Starting in 2018, the information and valuation data from the *Valuation Handbook – U.S. Guide to Cost of Capital* is available exclusively in the online Cost of Capital Navigator platform. A physical book that includes the data exhibits is not commercially available.

To learn more about the online Cost of Capital Navigator, visit: dpcostofcapital.com.

The *Valuation Handbook – U.S. Guide to Cost of Capital* was published as a hardcover book from 2014–2017, and included the U.S. cost of capital data inputs (equity risk premia, size premia, industry risk premia, risk premia over the risk-free rate, risk-free rates) that were previously published in the Ibbotson Associates/Morningstar *Stocks, Bonds, Bills, and Inflation® (SBBi®) Valuation Yearbook* and the Duff & Phelps Risk Premium Report. This data can be used to develop cost of equity capital estimates (using both the build-up method and CAPM) for an individual business, business ownership interest, security, or intangible asset.

Starting in 2018, the essential valuation data previously published in the *Valuation Handbook – U.S. Guide to Cost of Capital* will be available exclusively in the new online Cost of Capital Navigator platform. The 2018 Cost of Capital: Annual U.S. Guidance and Examples is a companion publication (sold separately) available to licensees of the Cost of Capital Navigator.

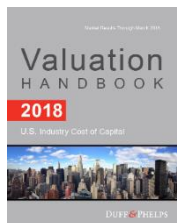
The 2018 Cost of Capital: Annual U.S. Guidance and Examples:

- Includes the content, examples, frequently asked questions (FAQs), and methodology previously published in the Duff & Phelps *Valuation Handbook – U.S. Guide to Cost of Capital*, updated through December 31, 2017.
- Does **not include the data exhibits** previously published in the *Valuation Handbook – U.S. Guide to Cost of Capital*, which are available exclusively in the online Cost of Capital Navigator platform starting in 2018.
- Is provided as a reference book and teaching aid only.

The two valuation data sets previously published in the *Valuation Handbook – U.S. Guide to Cost of Capital* and now available exclusively in the online Cost of Capital Navigator are: (i) the CRSP Deciles Size Study (the former Ibbotson Associates/Morningstar *SBBi® Valuation Yearbook* data), and (ii) the Risk Premium Report Study. As of the initial launch of the online Cost of Capital Navigator platform in February 2018, both the CRSP Deciles Size Study and the Risk Premium Report Study are available online for all years from 1999–present.¹

¹ There are two Cost of Capital Navigator subscription levels: (i) the “Basic” annual subscription includes the two most recent years of valuation data; and (ii) the “Pro” annual subscription includes all years of data from 1999–present. As of the initial launch of the Cost of Capital Navigator in February 2018, the “two most recent years” are 2017 and 2018 data, with data through December 31, 2016 and December 31, 2017, respectively. As of the initial launch of the Cost of Capital Navigator in February 2018, “1999–present” is all years from 1999 through 2018. To learn more, please visit dpcostofcapital.com.

Valuation Handbook – U.S. Industry Cost of Capital



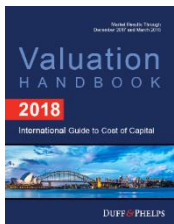
The *Valuation Handbook – U.S. Industry Cost of Capital* is being distributed as a physical book in 2018 and 2019, but the information and data from this book will be migrated to the Cost of Capital Navigator later in 2019. Starting in 2020, information and valuation data from this book is scheduled to be available exclusively via the online Cost of Capital Navigator.

To learn more about the *Valuation Handbook – U.S. Industry Cost of Capital*, visit:
duffandphelps.onfastspring.com/books.

This annual book provides industry-level cost of capital estimates (cost of equity capital, cost of debt capital, and weighted average cost of capital, or WACC), plus detailed industry-level statistics for sales, market capitalization, capital structure, various levered and unlevered beta estimates (e.g., ordinary-least squares (OLS) beta, sum beta, peer group beta, downside beta, etc.), valuation (trading) multiples, financial and profitability ratios, equity returns, aggregate forward-looking earnings-per share (EPS) growth rates, and more. Over 300 critical industry-level data points are calculated for approximately 180 U.S. industries (depending on data availability). Industries are organized by standard industrial classification (SIC) code.

The *Valuation Handbook – U.S. Industry Cost of Capital* can be used to benchmark, augment, and support the analyst's own custom analysis of the industry in which a subject business, business ownership interest, security, or intangible asset resides.

The *Valuation Handbook – U.S. Industry Cost of Capital* has been published since 2014, and is updated annually with data through March 31 of the current year (e.g., the 2014 *Valuation Handbook – U.S. Industry Cost of Capital* is “data through” March 31, 2014; the 2015 *Valuation Handbook – U.S. Industry Cost of Capital* is “data through” March 31, 2015, etc.). This book includes three intra-year quarterly updates (June, September, and December).



The *Valuation Handbook – International Guide to Cost of Capital* is being distributed as a physical book in 2018 and 2019, but the information and data from this book will be migrated to the Cost of Capital Navigator later in 2019. Starting in 2020, information and valuation data from this book is scheduled to be available exclusively via the online Cost of Capital Navigator.

To learn more about the *Valuation Handbook – International Guide to Cost of Capital*, visit:
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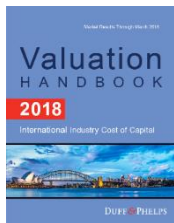
This annual book provides country-level equity risk premia (ERPs), relative volatility (RV) factors, and country risk premia (CRPs). This book can be used to estimate country-level cost of equity capital globally, for up to 188 countries, from the perspective of investors based in any one of up to 56 countries (depending on data availability).

The *Valuation Handbook – International Guide to Cost of Capital* has been published since 2014, and is updated annually with data through December of the previous year and March of the current year (e.g., the 2014 *Valuation Handbook – International Guide to Cost of Capital* is “data through” December 31, 2013 and March 31, 2014; the 2015 *Valuation Handbook – International Guide to Cost of Capital* is “data through” December 31, 2014 and March 31, 2015, etc.). This book includes one semi-annual update with data through June and September.

“Measuring the impact of country risk in determining the international cost of capital is one of the most vexing issues in finance. Any company doing international cost of capital estimation must, at minimum, consult the *Valuation Handbook – International Guide to Cost of Capital*”.

– **Campbell R. Harvey**, Professor of International Business at the Fuqua School of Business, Duke University

The *Valuation Handbook – International Industry Cost of Capital* is being distributed as a physical book 2018 and 2019, but the information and data from this book will be migrated to the Cost of Capital Navigator later in 2019. Starting in 2020, information and valuation data from this book is scheduled to be available exclusively in the online Cost of Capital Navigator.



To learn more about the *Valuation Handbook – International Industry Cost of Capital*, visit: duffandphelps.onfastspring.com/books.

This annual book provides the same type of rigorous industry-level analysis published in the U.S.-centric *Valuation Handbook – U.S. Industry Cost of Capital*, on a global scale.

Includes industry-level analyses for four global economic areas: (i) the “World”, (ii) the European Union, (iii) the Eurozone, and (iv) the United Kingdom.¹ Industries in the book are identified by their Global Industry Classification Standard (GICS) code. Each of the four global economic area’s industry analyses are presented in three currencies: (i) the euro (€ or EUR), (ii) the British pound (£ or GBP), and (iii) the U.S. dollar (\$) or USD).

This annual book provides industry level cost of capital estimates (cost of equity capital, cost of debt capital, and weighted average cost of capital, or WACC), plus detailed industry-level statistics for sales, market capitalization, capital structure, various levered and unlevered beta estimates (e.g., ordinary-least squares (OLS) beta, sum beta, peer group beta, downside beta, etc.), valuation (trading) multiples, financial and profitability ratios, equity returns, aggregate forward-looking earnings-per share (EPS) growth rates, and more. Over 300 critical industry-level data points are calculated for each industry (depending on data availability). Industries are organized by global industry classification standard (GICS) code.

The *Valuation Handbook – International Industry Cost of Capital* can be used to benchmark, augment, and support the analyst's own custom analysis of the industry in which a subject business, business ownership interest, security, or intangible asset resides. The *Valuation Handbook – International Industry Cost of Capital* has been published since 2015, and is updated annually with data through March 31 of the current year (e.g., the 2015 *Valuation Handbook – International Industry Cost of Capital* is “data through” March 31, 2015; the 2016 *Valuation Handbook – International Industry Cost of Capital* is “data through” March 31, 2016, etc.). This book includes one semi-annual update with data through September.

¹ There In the *Valuation Handbook – International Industry Cost of Capital*, “World” companies are defined as companies that (i) are components of the MSCI ACWI IMI, and (ii) satisfy the rigorous screening requirements that are employed to define the company sets used therein



The *Stocks, Bonds, Bills, and Inflation*[®] (SBBI[®]) Yearbook will continue to be published as a hardcover book.

To learn more about the *Stocks, Bonds, Bills, and Inflation*[®] (SBBI[®]) Yearbook, visit:
duffandphelps.onfastspring.com/books.

This annual book has been the definitive annual resource for historical U.S. capital markets performance data for over 30 years.

Starting with the 2016 edition, the *Stocks, Bonds, Bills, and Inflation*[®] (SBBI[®]) Yearbook is now produced by Duff & Phelps. The SBBI[®] Yearbook was previously published by Morningstar, Inc. under the name “Ibbotson[®] *Stocks, Bonds, Bills, and Inflation*[®] (SBBI[®]) Classic Yearbook”.^{1, 2, 3}

This book includes returns, index values, and statistical analyses of U.S. large company stocks, small company stocks, long-term corporate bonds, long-term government bonds, intermediate term government bonds, U.S. Treasury bills, and inflation from January 1926 to present (monthly).

Anyone serious about investments or investing needs an appreciation of capital market history. Such an appreciation, which can be gained from this book, is equally valuable to the individual and institutional investor, practitioners and scholars in finance, economics, and business; portfolio strategists, and security analysts seeking to benchmark their own investment performance. The *SBBI*[®] Yearbook is a thinking person’s guide to using historical data to understand the financial markets and make decisions.

¹ The *SBBI*[®] Classic Yearbook (as it was known at that time) was published by Morningstar, Inc. from 2007 through 2015, and by Ibbotson Associates in years prior to 2007.

² The *SBBI*[®] Yearbook provides historical “performance” data of U.S. asset classes, while the other Duff & Phelps data resources provide “valuation” data. Specifically, the other Duff & Phelps data resources focus on U.S. and international valuation data and risk premia (e.g., equity risk premia, risk-free rates, size premia, industry risk premia, betas, industry multiples and other statistics, etc.) for use in valuation models, while the *SBBI*[®] Yearbook is (i) a history of the returns of the capital markets in the U.S. (thus the name, “*Stocks, Bonds, Bills, and Inflation*”, or “*SBBI*”) from 1926 to the present, and (ii) an analysis of the relative performance of U.S. asset classes. The *SBBI*[®] Yearbook has been published annually for over 30 years. The *SBBI*[®] Yearbook does not provide extensive valuation data or methodology.

³ Beginning with the 2018 edition, the *SBBI*[®] Yearbook is now self-published by Duff & Phelps. The 2016 and 2017 editions were published by John Wiley & Sons.

Duff & Phelps Cost of Capital Navigator

All you need to estimate cost of capital in one place

About the Cost of Capital Navigator

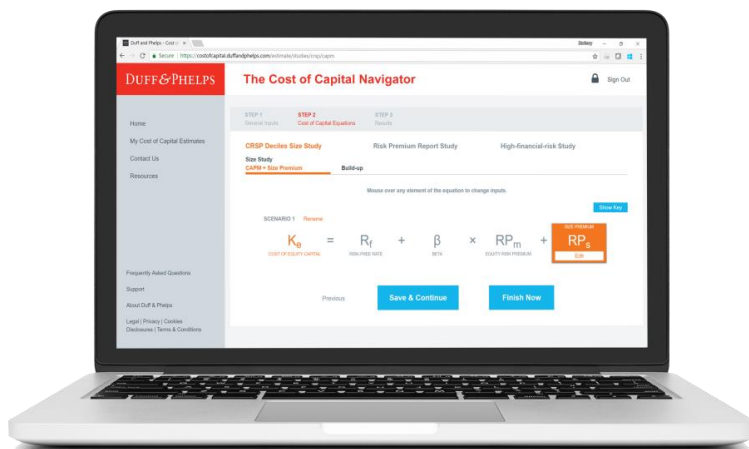


The Cost of Capital Navigator:

- The Duff & Phelps Cost of Capital Navigator guides you through the process of estimating the cost of capital, a key component of any valuation analysis.
- Available on Laptop, Tablet or PC
- Provides comprehensive documentation of your valuation estimates

About the Cost of Capital Navigator

The Duff & Phelps Cost of Capital Navigator includes all the critical data and information from the Duff & Phelps *Valuation Handbook – U.S. Guide to Cost of Capital* that you have used and trusted for years



- Risk-free Rate
- Equity Risk Premia
- CRSP Deciles Size Premia
- Risk Premium Report Size Study
- Risk Premium Report Risk Study
- Industry Risk Premia

The Cost of Capital Navigator is available in three subscription options:

- ★ **Basic** (two most recent data years of data)
- ★ **Pro** (all data going back to December 31, 1998)
- ★ **Enterprise** (16+ Pro user Licenses needed)

Each option is dependent upon the total number of licensed users and the number of years of historical data needed.

The Cost of Capital Navigator How it works

DPcostofcapital.com

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The Duff & Phelps Cost of Capital Navigator guides you through the process of estimating the cost of capital, a key component of any valuation analysis.

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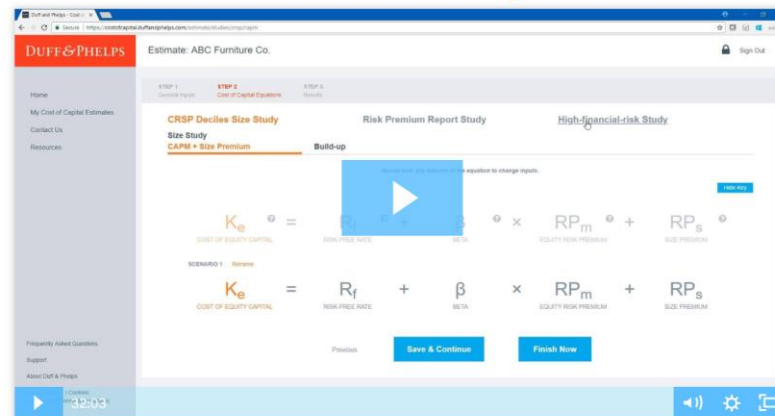
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DPcostofcapital.com – Case Study (Demo Video)

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Thank you for subscribing to the Duff & Phelps **Cost of Capital Navigator**.

The Cost of Capital Navigator includes valuation data and information for all years from 1999–present. The Cost of Capital Navigator is updated regularly. Current updates to the CRSP Deciles Size Study and the Risk Premium Report Study in the Cost of Capital Navigator include data through December 31, 2017.

Update! Betas and Industry Risk Premia Now Available as of June 30, 2018

Full-information betas and industry risk premia have been updated through June 30, 2018 and are now available in the Cost of Capital Navigator. Duff & Phelps calculates new full-information betas and industry risk premia quarterly.

Industry risk premia are full-information industry betas that have been adjusted so that they can be used within the context of the Build-up method of estimating cost of equity capital. For more information about full-information betas and industry risk premia, visit the “Resources” section, 20xx Valuation Handbook – U.S. Guide to Cost of Capital, Chapter 5, “Basic Building Blocks of the Cost of Equity Capital – Betas and Industry Risk Premia”.

Update! The 2018 Edition of Chapter 3 “Basic Building Blocks of the Cost of Equity Capital – Risk-free Rate & Equity Risk Premium” is now available

Please visit the “Resources” section under 2018 Valuation Handbook – U.S. Guide to Cost of Capital to view the critical year-end Duff & Phelps Risk-free Rate & Equity Risk Premium write-up today.

Recent Cost of Capital Estimates

Modified	Cost of Capital Estimate Name
9/7/18	Screen Shots Inc
9/7/18	Screen Shots Inc1
8/31/18	TEST

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https://costofcapital.duffandphelps.com

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Cost of Capital Content (No Data Tables)

Foreword

- ▶ 2014 Valuation Handbook – U.S. Guide to Cost of Capital
- ▶ 2015 Valuation Handbook – U.S. Guide to Cost of Capital
- ▶ 2016 Valuation Handbook – U.S. Guide to Cost of Capital
- ▶ 2017 Valuation Handbook – U.S. Guide to Cost of Capital
- ▶ 2018 Valuation Handbook – U.S. Guide to Cost of Capital
- ▶ Appendices
- ▶ Technical Questions About the Data
- ▶ Examples of Using the Data Properly

Supplementary Data

- ▶ Supplementary CRSP Deciles Size Study Data
- ▶ Supplementary Risk Premium Report Study Data
- ▶ Full Information Beta Company List
- ▶ Debt Betas

Cost of Capital Navigator

- ▶ Quick Start Guide
- ▶ Data Release Schedule
- ▶ Demo Video

Note:

This section contains the text from the former *Valuation Handbook – U.S. Guide to Cost of Capital* regarding theory, methodology, and examples of using the data. Also included is supplementary data from the CRSP Deciles Size Study and the Risk Premium Report Study, debt betas, and a Navigator Quick Start guide plus a case study video that explores all of the key functionality available in the Navigator.

The Resources section does not include any long-form data tables, industry risk premia, or size premia. To access this data, click "home", then start a new cost of capital estimate.

My Cost of Capital Estimates

Aaron Russo arnavtestdp@gmail.com
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My Cost of Capital Estimates

	Modified	Cost of Capital Estimate Name	All Actions		
▼	9/7/18	Test 2	Select	:	
▼	9/7/18	Continental Rail	Select	:	
▼	9/7/18	Yes Co.	Select	:	
▼	9/7/18	Home Inc.	Select	:	
▼	9/7/18	Bakedgoods.com	Select	:	
▼	9/7/18	La Cerveceria	Select	:	
▼	9/7/18	Easy Inc.	Select	:	
▼	9/7/18	CZ	Select	:	
▼	9/7/18	Fred's Computer Shack	Select	:	
▼	9/7/18	AV Watches	Select	:	
▼	9/7/18	Posters by Z	Select	:	
▼	9/7/18	AR's Drum Shop	Select	:	
▼	9/7/18	ABC Furniture	Select	:	
▼	9/7/18	Jim's Suits	Select	:	
▼	9/7/18	Test 1	Select	:	

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Industry risk premia are full-information industry betas that have been adjusted so that they can be used within the context of the Build-up method of estimating cost of equity capital. For more information about full-information betas and industry risk premia, visit the "Resources" section, *20xx Valuation Handbook – U.S. Guide to Cost of Capital*, Chapter 5, "Basic Building Blocks of the Cost of Equity Capital – Betas and Industry Risk Premia".

Update! The 2018 Edition of Chapter 3 "Basic Building Blocks of the Cost of Equity Capital – Risk-free Rate & Equity Risk Premium" is now available

Please visit the "Resources" section under *2018 Valuation Handbook – U.S. Guide to Cost of Capital* to view the critical year-end Duff & Phelps Risk-free Rate & Equity Risk Premium write-up today.

Recent Cost of Capital Estimates

Modified	Cost of Capital Estimate Name
9/7/18	Test 2
9/7/18	Continental Rail
9/7/18	Yes Co.
9/7/18	Home Inc.

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Quickly calculate your estimate or take time to explore options

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STEP 2

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Results

What are the high-level elements of your cost of capital estimate?

Enter the information below to start your estimate.

Valuation Date

Home Country

Investee Country

Industry

☐ My industry is not in the list above

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First Equation: CRSP Deciles Size Study, CAPM + Size Premium

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Estimate: Screen Shots Inc

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Size Study
CAPM + Size Premium

Risk Premium Report Study

High-financial-risk Study

Build-up

Mouse over any element of the equation to change inputs.

K_e

COST OF EQUITY CAPITAL

$=$

R_f

RISK-FREE RATE

$+$

β

BETA

\times

RP_m

EQUITY RISK PREMIUM

$+$

RP_s

SIZE PREMIUM

SCENARIO 1
Rename

K_e

COST OF EQUITY CAPITAL

$=$

R_f

RISK-FREE RATE

$+$

β

BETA

\times

RP_m

EQUITY RISK PREMIUM

$+$

RP_s

SIZE PREMIUM

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Finish Now

Hide Key

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CRSP Deciles Size Study CAPM – Entering a Risk-free Rate

<https://costofcapital.duffandphelps.com>

CRSP Deciles Size Study, CAPM – Adding Size Premium

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Build-up

SCENARIO 1

Rename

15.97%

=

3.50%

+

1.42

×

5.00%

+

5.37%

Market Value of Common Equity (\$USD in Millions)

100

?

CRSP Decile (Select a Size Premium)

Decile	Market Cap of Smallest Company (\$USD in millions)	Market Cap of Largest Company (\$USD in millions)	Size Premium (Return in Excess of CAPM)
8	657.705	1,170.063	
9	299.4	656.845	
10	2.531	299.29	5.37%
10B	2.531	166.349	8.41%
10Y	87.646	166.349	6.98%

Deciles Size Grouping

Micro Cap	2.531	656.845	3.48%
-----------	-------	---------	-------

Show Key

Duplicate

Cancel

Save

CRSP Deciles Size Study, Build-up

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Size Study
CAPM + Size Premium

Build-up

Mouse over any element of the equation to change inputs.
 [Show Key](#)

SCENARIO 1 [Rename](#)

K_e
COST OF EQUITY CAPITAL

=

3.50%

DUFF & PHELPS
NORMALIZED RATE

+

5.00%

DUFF & PHELPS
RECOMMENDED

+

2.10%

SIC 45 INDUSTRY RISK
PREMIUM

+

RP_s

SIZE PREMIUM

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Mouse over any element of the equation to change inputs.

SCENARIO 1

Show Key
Duplicate
Rename

Would you like to use the Regression Equation Method? ☐ NO

Market Value of Common Equity

K_e

COST OF EQUITY CAPITAL

=

3.50%

DUFF & PHELPS
NORMALIZED RATE

+

1.42

BETA

×

5.00%

DUFF & PHELPS
RECOMMENDED

+

RP_s

SIZE PREMIUM

Book Value of Equity

K_e

COST OF EQUITY CAPITAL

=

3.50%

DUFF & PHELPS
NORMALIZED RATE

+

1.42

BETA

×

5.00%

DUFF & PHELPS
RECOMMENDED

+

RP_s

SIZE PREMIUM

5-Year Average Net Income

K_e

=

3.50%

+

1.42

×

5.00%

+

RP_s

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Risk Premium
Report Study,
CAPM +
Size Premium



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CAPM + Size Premium

Mouse over any element of the equation to change inputs.

SCENARIO 1

Show Key

Duplicate

Rename

Would you like to use the Regression Equation Method?

NO

Market Value of Common Equity

15.82%

=

3.50%

+

1.42

×

5.00%

+

5.22%

COST OF EQUITY CAPITAL

DUFF & PHELPS
NORMALIZED RATE

BETA

DUFF & PHELPS
RECOMMENDED

PORTFOLIO25

Estimate: Screen Shots Inc

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CAPM + Size Premium

Mouse over any element of the equation to change inputs.

SCENARIO 1

Show Key

Duplicate

Rename

Would you like to use the Regression Equation Method?

YES

Market Value of Common Equity

16.11%

=

3.50%

+

1.42

×

5.00%

+

5.51%

COST OF EQUITY CAPITAL

DUFF & PHELPS
NORMALIZED RATE

BETA

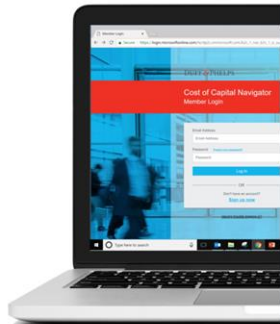
DUFF & PHELPS
RECOMMENDED

= 0.089782 - 0.017334 *
LOG(100)

Guideline
Portfolio
Method

Regression
Method

Risk Premium
Report Study,
Build-up 1
(Levered,
Unlevered,
Relevered)



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Mouse over any element of the equation to change inputs.

LEVERED ESTIMATES

SCENARIO 1

UNLEVERED ESTIMATES

RELEVERED ESTIMATES

Show Key

Rename

Would you like to use the Regression Equation Method? ☐ NO

Market Value of Common Equity

15.53%

=

3.50%

+

12.31%

+

-0.28%

COST OF EQUITY CAPITAL

DUFF & PHELPS NORMALIZED RATE

PORTFOLIO 25 D/E 36.00%

EQUITY RISK PREMIUM ADJUSTMENT BASED ON

Mouse over any element of the equation to change inputs.

Show Key

Rename

LEVERED ESTIMATES

SCENARIO 1

UNLEVERED ESTIMATES

RELEVERED ESTIMATES

Show Key

Rename

Market Value of Common Equity

13.84%

=

3.50%

+

10.62%

+

-0.28%

COST OF EQUITY CAPITAL

DUFF & PHELPS NORMALIZED RATE

PORTFOLIO 25 D/E 0.00%

EQUITY RISK PREMIUM ADJUSTMENT BASED ON DUFF & PHELPS RECOMMENDED

Book Value of Equity

Show Key

Rename

LEVERED ESTIMATES

SCENARIO 1

UNLEVERED ESTIMATES

RELEVERED ESTIMATES

Show Key

Rename

Market Value of Common Equity

16.09%

=

3.50%

+

12.87%

+

-0.28%

COST OF EQUITY CAPITAL

DUFF & PHELPS NORMALIZED RATE

PORTFOLIO 25 D/E 50.00%

EQUITY RISK PREMIUM ADJUSTMENT BASED ON DUFF & PHELPS RECOMMENDED

Book Value of Equity

Risk Premium Report Study, Build-up 3 – Risk Premium over the Risk-free Rate

Milan, 12 November 2018

Risk Premium Report Study, Build-up 3 – Comparative Risk Study

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CRSP Deciles Size Study

Size Study

CAPM + Size Premium

Risk Premium Report Study

Build-up 1

Build-up 2

Build-up 3

High-financial-risk Study

Risk Study

Build-up 3

Mouse over any element of the equation to change inputs.

SCENARIO 1

Hide Key

Duplicate

Rename

LEVERED ESTIMATES

COMPARATIVE RISK STUDY ADJUSTMENT

Would you like to use the Regression Equation Method?

YES

Operating Margin					
Operating Margin of Subject Company	= 10.7%	Average Operating Margin of Companies Across Indicated Guidelines Size Portfolios	= 7.4%	Subject Company is Less Risky than other companies of similar size	↓
Coefficient of Variation in Operating Margin					
Coefficient of Variation in Operating Margin of Subject Company	= 41.0%	Average Coefficient of Variation in Operating Margin of Subject Company of Companies Across Indicated Guidelines Size Portfolios	= 39.1%	Subject Company is More Risky than other companies of similar size	↑
Coefficient of Variation of Return on Equity					
Coefficient of Variation of Return on Equity of Subject Company	= 64.7%	Average Coefficient of Variation of Return on Equity of Companies Across Indicated Guidelines Size Portfolios	= 57.8%	Subject Company is More Risky than other companies of similar size	↑

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High-financial-risk Study, CAPM + HFR Size Premium

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CRSP Deciles Size Study
Risk Premium Report Study
High-financial-risk Study

High Financial Risk Study
CAPM + HFR Size Premium
Build-up HFR

Mouse over any element of the equation to change inputs.

SCENARIO 1
Rename

26.92%
=
3.50%
+
1.42
×
5.00%
+

HIGH-FINANCIAL-RISK RISK
PREMIA OVER CAPM
16.32%

Cancel
Save

Duplicate

Z-Scores Inputs (\$USD in millions)

☒ Service
or
☐ Manufacturing

Market Value of Equity	<input type="text" value="100"/>	Current Year Sales	<input type="text" value="100"/>
Book Value of Equity	<input type="text" value="70"/>	Current Assets	<input type="text" value="50"/>
Total Assets	<input type="text" value="90"/>	Current Liabilities	<input type="text" value="115"/>
Current Year EBIT	<input type="text" value="4"/>	Retained Earnings	<input type="text" value="2"/>

Your Z-Score: 0.88

Your Company has a z-Score = 0.88 as calculated using the Altman z-Score Model. z-Scores < 1.1 suggest your Company is distressed. High-financial-risk premia are calculated only if your company is in the "distress zone" (z-Scores < 1.1).

Step 3: Results

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Step 3: Results continued

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General Inputs

Valuation Date:**06/03/2018**

Home Country:**United States**

Investee Country:**United States**

Industry:**45 - Transportation By Air**

Size Measures

(USD in millions, except for Number of Employees)

Market Value of Common Equity:**\$100m**

Book Value of Equity:**\$70m**

5-Year Average Net Income:**n/a**

Market Value of Invested Capital:**n/a**

Total Assets:**\$90m**

5-Year Average EBITDA:**n/a**

Net Sales:**\$100m**

Number of Employees:**n/a**

Risk Measures

Average Operating Margin:**10.72%**

Coefficient of Variation of Operating Margin:**41.01%**

Coefficient of Variation of Return on Equity:**n/a**

CRSP Deciles Size Study

CRSP Decile Size Premium:**5.37% (Decile 10)**

Size Group Size Premium:**n/a**

Risk Premium Report Study

Average Risk Premium over CAPM:**4.94%**

Median Risk Premium over CAPM:**4.94%**

Average Risk Premium over the Risk-Free Rate:**12.16%**

Median Risk Premium over the Risk-Free Rate:**12.16%**

Average Risk Study Premium (RPM+c):**9.75%**

Median Risk Study Premium (RPM+c):**9.75%**

High Financial Risk Study

Z-Score (Service):**2.01 (Not Distressed)**

Risk Premium over the Risk-Free rate:**n/a**

Risk Premium over CAPM:**n/a**

Assumptions

Scenario 1

Equity Risk Premium (ERP):**5.88%** Duff & Phelps Recommended

Step 3: Results continued – Downloading in PDF or Excel

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PDF or Excel Exports

Average Cost of Equity

14.81%

13.25%

15.55%

26.92%

Levered

Unlevered

Relevered

High Financial Risk

Median Cost of Equity

14.88%

13.25%

15.59%

26.92%

Levered

Unlevered

Relevered

High Financial Risk

My Range of Levered Estimates

Industry Benchmarks*

Average Cost of Equity

11.03%

Median Cost of Equity

10.40%

Industry Range of Levered Estimates

General Inputs

CRSP Deciles Size Study

Milan, 12 November 2018

75

Enhancements for 2019 – webinar December 6



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