Cost of Capital

Learning Problems

**WACC at Winnipeg Electric**

The following are financial data for Winnipeg Electric Company:

|  |  |
| --- | --- |
| Debt | 1,500, 6.80% coupon bonds outstanding; par value CAD 1,000; 10 years to maturity; current bond quotation of 105.32 |
| Common shares | 65,000 shares outstanding; selling for CAD 38.00 per share; beta is 0.78 |
| Preferred shares | 5,000 preferred shares in circulation; an annual dividend of CAD 4.00; selling for CAD 80.00 per share |
| Market data | 4.0% risk-free rate; 5.0% market risk premium |
| Tax rate | 30.0% |

The company does not have a formal target capital structure, and its policy is not to include issuance costs in the cost of capital.

# REQUIRED:

1. Calculate Winnipeg Electric’s WACC.
2. Why should the company have a target capital structure?

**WACC at Balmer**

Balmer Ltd. has 4.5 million common shares and 540,000 CAD 5.00 preferred shares outstanding. The common shares currently sell for CAD 38.00 per share and have a beta of 1.3. The preferred shares sell for CAD 72.00.

The company also has 300,000 CAD 1,000.00 bonds outstanding. The bonds currently sell for 95.2 and have 20 years to maturity. The coupon rate is 6.00%, compounded semi-annually.

The corporate tax rate is 30.0%. The market risk premium is 5.0%, and the risk-free rate is 3.0%. Company policy is not to include issuance costs in the cost of capital.

# REQUIRED:

1. Calculate Balmer’s WACC.

**WACC at Jackson**

Jackson Company wants to determine its WACC and has gathered the following information:

**Debt.** The firm can raise debt by selling CAD 1,000 par value, 8.00% coupon rate, and 20-year bonds with semi-annual interest payments. To sell the issue, a discount of 3.00% will have to be given.

**Preferred shares.** The firm can sell preferred shares with a CAD 95.00 stated value and an 8.00% dividend rate. The preferred shares sell currently for CAD 90.00.

**Common equity.** The firm’s common shares are currently selling for CAD 90.00 per share. The firm expects to pay cash dividends of CAD 7.00 per share next year. The firm’s dividends have been growing at an annual rate of 6.0%, and this is expected to continue.

Jackson Company has decided that a target capital structure of 30.0% equity, 20.0% preferred shares, and 50.0% debt is desirable. The marginal tax rate is 25.0%. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate Jackson Company’s WACC.

**WACC at Anderson**

Anderson Company’s capital structure consists of common shares, preferred shares, and bonds. It currently has 35,000 common shares in circulation, trading at CAD 10.00 per share. The common share has a beta of 1.21. Fifteen thousand preferred shares are trading at CAD 4.00 per share. The shares pay an annual dividend of CAD 0.30. There are 450 CAD 1,000, 10-year bonds outstanding. The coupon rate is 9.00%, compounded semi-annually, and the bonds trade at 97.00. The risk-free rate is 3.0%, and the market risk premium is 5.0%. The marginal tax rate is 25.0%. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate Anderson Company’s WACC.

**Issuance Costs at Wilson**

Wilson Ltd. is considering a project that requires an initial investment of CAD 5,000,000. The company has a target capital structure of 35.0% debt, 20.0% preferred shares, and 45.0% common shares. Historical records show that the costs of issuing new debt, preferred shares, and common shares are 3.0%, 5.0%, and 10.0% of the market value of these securities. The company's marginal tax rate is 25.0%.

REQUIRED:

1. How should issuance costs be incorporated into the cost of capital and the capital budgeting process?
2. How would this change if Wilson used internally generated equity to finance the project?

**WMCC at Greyhound**

Greyhound Bus Lines of Canada is contemplating diversifying into the air passenger industry. From its headquarters in Calgary, it plans to offer short-haul flights between all major cities in Western Canada. The company is trying to determine if this expansion is feasible. Greyhound's current WACC is 8.00%, but its controller is wondering whether this figure should be used.

Greyhound's current target capital structure is 30.0% debt, 10.0% preferred shares, and 60.0% common shares. It plans to maintain this capital structure in the future. In analyzing this expansion, the following market data were collected about other airlines:

|  |  |  |
| --- | --- | --- |
|  | Western Canadian  Airlines | Point-to-Point  Airways |
| Target capital structure |  |  |
| Debt | 15.0% | 28.0% |
| Preferred shares | 10.0% | 11.0% |
| Common shares | 75.0% | 61.0% |
| Common share beta | 1.20 | 1.65 |
| Preferred shares |  |  |
| Share price | CAD 50.00 | CAD 100.00 |
| Current dividend | CAD 3.50 | CAD 9.00 |
| Bond |  |  |
| Coupon rate | 8.00% | 8.00% |
| Implied kd | 9.50% | 11.30% |
| Term | 10 years | 15 years |

The risk-free rate is currently 4.0%, and the market risk premium is 6.0%. The marginal tax rate is 25.0%.

REQUIRED:

1. Should the current WACC of 8.00% be used?
2. What cost of capital should Greyhound use?

# WMCC at Predator

Predator Ltd. is contemplating expanding its operations into the computer software industry from its base operations in logistical services. The CFO, Rilla Rankin, realizes that this new industry is more cyclical than its current operations, but the company feels this expansion is still in its best interests.

Instead of using Predator’s current WACC, Rankin has decided to estimate a WMCC that is more reflective of the software industry. A pure play with a similar capital structure was found. This company’s common shares have a beta of 1.7, while its preferred shares have a dividend yield of 8.50%. It recently negotiated a 10-year term loan with an interest rate of 9.00%, compounded semi-annually.

Predator Ltd. has decided on a capital structure of 50.0% common equity, 10.0% preferred shares, and 40.0% debt. The market risk premium is 5.0%, and the risk-free rate is 4.0%. The marginal tax rate is 25.0%. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate an appropriate cost of capital for analyzing the expansion.

# WMCC at Allison with Project Risk

Allison Company is contemplating expanding its operations into the manufacturing of medical equipment from its current base in electronic automotive components. It currently has a common share beta of 1.40 and recently paid 10.00%, compounded semi-annually on new bank term loans. For the new industry, Allison collected data for four pure plays:

|  |  |  |
| --- | --- | --- |
|  | **Beta** | **Treasury Spread** |
| Ester Enterprise | 1.21 | 4.10% |
| Hollywood Inc. | 1.15 | 3.85% |
| Tanis Corp. | 1.11 | 3.50% |
| Wellington Ltd. | 1.32 | 3.95% |

The company determined that the target capital structure should be 40.0% common equity and 60.0% debt. Company policy is to add 2.00% to the cost of capital for any project undertaken that involves the introduction of a new product to incorporate the added risk.

The current risk-free rate is 4.0%, and the market risk premium is 5.0%. The marginal tax rate is 25.0%. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate an appropriate cost of capital for evaluating this project.

# WMCC at Harrison with Project Risk

Harrison Ltd. is a manufacturer of injection moulding equipment used in the production of plastic food containers. It has a common share beta of 0.85 and a dividend yield of 32.0% on its preferred shares. It recently negotiated a bank loan with the Royal Bank that had an interest rate of 4.00%, compounded semi-annually.

Harrison is considering diversifying into the production of aerospace parts for major aircraft producers such as Boeing, Airbus, and Bombardier. For this industry, Harrison collected data for four pure plays:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Common Share Beta** | **Preferred Share Dividend Yield (%)** | **Treasury Spread**  **(%)** |
| Corsair | 1.45 | 5.40 | 2.45 |
| Mustang | 1.56 | 6.10 | 2.58 |
| Mosquito | 1.39 | 4.90 | 2.10 |
| Liberator | 1.48 | 5.50 | 2.49 |

Harrison’s optimal capital structure is 40.0% debt, 10.0% preferred shares, and 50.0% equity.

The risk-free rate is currently 3.0%, and the market risk premium is 5.0%. The marginal tax rate is 25.0%. Due to the high project risk of this new venture, Harrison’s policy is to add 3.00% to the cost of capital. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate an appropriate cost of capital for this new venture.

# Adjusting Beta for Leverage

Boswal Inc. is a manufacturing company. Its shares do not trade publicly, so it has decided to calculate the average beta of a group of public companies in the industry. The following data was collected:

|  |  |  |
| --- | --- | --- |
| **Firm** | **Beta** | **Debt-to-Equity (%)** |
| River Crossing | 1.31 | 35.0 |
| Atlas Manufacturing | 1.26 | 22.0 |
| Innovative Technologies | 1.26 | 24.0 |
| Hanson Brothers | 1.14 | 10.0 |
| West Coast Fabrication | 1.16 | 27.0 |
| Average | 1.23 | 24.0 |

Boswal has a debt ratio of 0.30. The industry has an average tax rate of 25.0%.

# REQUIRED:

1. Estimate a leverage-adjusted beta for Boswal Company

**WMCC at Baxter**

Baxter Ltd. is a privately held company operating in the building materials industry and is trying to calculate the cost of capital to use in the capital budgeting process. Future projects will continue to be in the same industry, so it was felt that an accurate WACC could be calculated using company data.

Since Baxter is privately held, no price information was available for the calculation of its beta. To estimate beta, it decided to use several pure plays for comparison, and was able to collect the following information:

|  |  |  |
| --- | --- | --- |
| **Company** | **Beta** | **Debt-to-Equity (%)** |
| Wilson | 1.21 | 40.0 |
| Jacob and Sons | 1.34 | 50.0 |
| Mathew Jenkins | 1.53 | 65.0 |
| Average | 1.36 | 52.0 |

The value of Wilson as a pure play is questionable since it has two separate divisions. The auto parts division has a beta of 1.45 and is approximately equal in market value to the building materials division.

Baxter’s bonds do trade publicly and currently sell at 99.00. The bonds all have coupon rates of 6.00%, compounded semi-annually and terms of 15 years.

Baxter has a target capital structure of 40.0% debt and 60.0% equity. The current 90-day treasury bill rate is 1.50%, and the 20-year treasury bond rate is 4.00%. The market risk premium is 5.0%. Baxter is subject to a marginal tax rate of 25.0%. Company policy is not to include issuance costs in the cost of capital.

**REQUIRED:**

1. Calculate Baxter’s cost of capital.

**Geometric and Arithmetic Mean**

Selkirk Company had the following sales in CAD over the last five years:

|  |  |
| --- | --- |
| 2013 | 200,000 |
| 2012 | 400,000 |
| 2011 | 200,000 |
| 2010 | 350,000 |
| 2009 | 200,000 |

**REQUIRED:**

1. Calculate the arithmetic and geometric mean growth rate for sales. Which method is preferred?

2. Describe a major limitation of the geometric mean and how it might be addressed.

**Historical Market Risk Premium at Grayson**

Jackie Bloggins is the CFO of Grayson Ltd. She is calculating the market risk premium using the following U.S. stock and long-term treasury-bond total return index figures:

|  |  |  |
| --- | --- | --- |
| **Year** | **Stock Index** | **Bond Index** |
| 1928 | 143.81 | 100.84 |
| 1929 | 131.88 | 105.07 |
| 1930 | 98.75 | 109.85 |
| 1931 | 55.46 | 107.03 |
| 1932 | 50.66 | 116.44 |
| 1933 | 75.00 | 118.60 |
| 1934 | 75.09 | 128.05 |
| 1935 | 110.18 | 133.78 |
| 1936 | 145.38 | 140.49 |
| 1937 | 94.00 | 142.43 |
| 1938 | 121.53 | 148.43 |
| 1939 | 120.20 | 154.98 |
| 1940 | 107.37 | 163.35 |
| 1941 | 93.66 | 160.04 |
| 1942 | 111.61 | 163.72 |
| 1943 | 139.59 | 167.79 |
| 1944 | 166.15 | 172.12 |
| 1945 | 225.67 | 178.67 |
| 1946 | 206.65 | 184.26 |
| 1947 | 217.39 | 185.95 |
| 1948 | 229.79 | 189.58 |
| 1949 | 271.85 | 198.42 |
| 1950 | 355.60 | 199.27 |
| 1951 | 439.80 | 198.68 |
| 1952 | 519.62 | 203.19 |
| 1953 | 513.35 | 211.61 |
| 1954 | 783.18 | 218.57 |
| 1955 | 1038.47 | 215.65 |
| 1956 | 1115.73 | 210.79 |
| 1957 | 999.05 | 225.11 |
| 1958 | 1435.84 | 220.39 |
| 1959 | 1608.95 | 214.56 |
| 1960 | 1614.37 | 239.53 |
| 1961 | 2044.40 | 244.46 |
| 1962 | 1864.26 | 258.38 |
| 1963 | 2285.80 | 262.74 |
| 1964 | 2661.02 | 272.53 |
| 1965 | 2990.97 | 274.49 |
| 1966 | 2692.74 | 282.47 |
| 1967 | 3333.69 | 278.01 |
| 1968 | 3694.23 | 287.11 |
| 1969 | 3389.77 | 272.71 |
| 1970 | 3510.49 | 318.41 |
| 1971 | 4009.72 | 349.57 |
| 1972 | 4761.76 | 359.42 |
| 1973 | 4080.44 | 372.57 |
| 1974 | 3023.54 | 379.98 |
| 1975 | 4142.10 | 393.68 |
| 1976 | 5129.20 | 456.61 |
| 1977 | 4771.20 | 462.50 |
| 1978 | 5081.77 | 458.90 |
| 1979 | 6022.89 | 461.98 |
| 1980 | 7934.26 | 448.17 |
| 1981 | 7561.16 | 484.91 |
| 1982 | 9105.08 | 644.04 |
| 1983 | 11138.90 | 664.65 |
| 1984 | 11823.51 | 755.92 |
| 1985 | 15516.60 | 950.29 |
| 1986 | 18386.33 | 1181.06 |
| 1987 | 19455.08 | 1122.47 |
| 1988 | 22672.40 | 1214.78 |
| 1989 | 29808.58 | 1429.72 |
| 1990 | 28895.11 | 1518.87 |
| 1991 | 37631.51 | 1746.77 |
| 1992 | 40451.51 | 1910.30 |
| 1993 | 44483.33 | 2181.77 |
| 1994 | 45073.14 | 2006.43 |
| 1995 | 61838.19 | 2477.55 |
| 1996 | 75863.69 | 2512.94 |
| 1997 | 100977.34 | 2762.71 |
| 1998 | 129592.25 | 3174.95 |
| 1999 | 156658.05 | 2912.88 |
| 2000 | 142508.98 | 3398.03 |
| 2001 | 125622.01 | 3587.37 |
| 2002 | 98027.83 | 4129.65 |
| 2003 | 125824.39 | 4145.15 |
| 2004 | 139341.42 | 4331.30 |
| 2005 | 146077.85 | 4455.50 |
| 2006 | 168884.34 | 4542.87 |
| 2007 | 178147.20 | 5005.69 |
| 2008 | 113030.22 | 6013.10 |
| 2009 | 142344.87 | 5344.65 |
| 2010 | 163441.94 | 5796.96 |
| 2011 | 166871.56 | 6726.52 |
| 2012 | 193388.43 | 6926.40 |
| 2013 | 255553.31 | 6295.79 |
| 2014 | 290115.42 | 6972.34 |
| 2015 | 294115.79 | 7061.89 |
| 2016 | 328742.28 | 7110.65 |
| 2017 | 399768.64 | 7309.87 |
| 2018 | 382870.94 | 7308.65 |
| 2019 | 502417.21 | 8012.89 |

Both the stock and bond indexes were 100 at the beginning of 1928.

**REQUIRED:**

1. Calculate market risk premium using both the arithmetic and geometric mean growth rates over the 1928-2019 period. Which method is preferred? What measures could be taken to improve these results?
2. How would the results in Part 1 change if the 2000-2019 period were used? What are the implications for CAPM users?

**Forward-looking Market Risk Premium at Gagne**

Sally Tyler is the CFO of Gagne Industries. A financial information provider supplied the company with a market risk premium estimate based on historical stock and bond market data going back to 1928. Tyler believed this value overstated the market risk premium, so she calculated a forward-looking market risk premium using the following information for the S&P 500 stock index:

|  |  |
| --- | --- |
| Trailing dividend yield | 3.81% |
| Trailing earnings yield | 7.93% |
| Long-term dividend growth rate | 3.50% |
| Normalized risk-free rate | 3.00% |

The dividend yield includes all cash dividends and stock repurchases.

**REQUIRED:**

1. Calculate the market risk premium using the one-stage DDM.
2. How could the estimate be improved?

**Calculating Beta at Stead**

Stead Industries is a large-cap company that produces safety clothing and equipment. After attending a financial seminar on the cost of capital, the company’s CFO decided to adjust the firm’s raw beta separately for the shrinkage effect, lag effect, and downside risk. The following data was collected:

|  |  |  |
| --- | --- | --- |
| **Date** | **Stead**  **Share Price** | **S&P 500 Index** |
| 1/3/17 | 109.44 | 2,275 |
| 12/1/16 | 104.22 | 2,239 |
| 11/1/16 | 98.36 | 2,199 |
| 10/3/16 | 91.98 | 2,126 |
| 9/1/16 | 92.15 | 2,168 |
| 8/1/16 | 93.74 | 2,171 |
| 7/1/16 | 95.22 | 2,174 |
| 6/1/16 | 96.37 | 2,099 |
| 5/2/16 | 97.75 | 2,097 |
| 4/1/16 | 101.73 | 2,065 |
| 3/1/16 | 97.84 | 2,060 |
| 2/1/16 | 94.11 | 1,932 |
| 1/4/16 | 94.40 | 1,940 |
| 12/1/15 | 103.52 | 2,044 |
| 11/2/15 | 111.08 | 2,080 |
| 10/1/15 | 111.34 | 2,079 |
| 9/1/15 | 100.05 | 1,920 |
| 8/3/15 | 99.73 | 1,972 |
| 7/1/15 | 117.47 | 2,104 |
| 6/1/15 | 111.09 | 2,063 |
| 5/1/15 | 107.42 | 2,107 |
| 4/1/15 | 105.81 | 2,086 |
| 3/2/15 | 102.09 | 2,068 |
| 2/2/15 | 101.30 | 2,104 |
| 1/2/15 | 88.53 | 1,995 |
| 12/1/14 | 91.67 | 2,059 |
| 11/3/14 | 88.91 | 2,068 |
| 10/1/14 | 87.82 | 2,018 |
| 9/2/14 | 85.56 | 1,972 |
| 8/1/14 | 86.38 | 2,003 |
| 7/1/14 | 82.53 | 1,931 |
| 6/2/14 | 82.40 | 1,960 |
| 5/1/14 | 80.74 | 1,924 |
| 4/1/14 | 76.25 | 1,884 |
| 3/3/14 | 76.95 | 1,872 |
| 2/3/14 | 77.66 | 1,859 |
| 1/2/14 | 69.78 | 1,783 |
| 12/2/13 | 73.42 | 1,848 |
| 11/1/13 | 66.97 | 1,806 |
| 10/1/13 | 65.11 | 1,757 |
| 9/3/13 | 61.22 | 1,682 |
| 8/1/13 | 57.75 | 1,633 |
| 7/1/13 | 61.37 | 1,686 |
| 6/3/13 | 59.95 | 1,606 |
| 5/1/13 | 59.88 | 1,631 |
| 4/1/13 | 59.66 | 1,598 |
| 3/1/13 | 53.92 | 1,569 |
| 2/1/13 | 51.82 | 1,515 |
| 1/2/13 | 51.15 | 1,498 |
| 12/3/12 | 47.27 | 1,426 |
| 11/1/12 | 46.43 | 1,416 |
| 10/1/12 | 45.93 | 1,412 |
| 9/4/12 | 48.88 | 1,441 |
| 8/1/12 | 46.25 | 1,407 |
| 7/2/12 | 45.94 | 1,379 |
| 6/1/12 | 45.35 | 1,362 |
| 5/1/12 | 42.74 | 1,310 |
| 4/2/12 | 40.31 | 1,398 |
| 3/1/12 | 40.93 | 1,408 |
| 2/1/12 | 39.26 | 1,366 |
| 1/3/12 | 36.37 | 1,312 |
| 12/1/11 | 35.06 | 1,258 |

The following information relates to Stead’s industry competitors:

|  |  |  |
| --- | --- | --- |
| **Company** | **Raw Beta** | **Market Cap (CAD Millions)** |
| Ortona | 0.93 | 155 |
| Juno | 1.23 | 444 |
| Dresser | 0.95 | 489 |
| Montana | 1.09 | 859 |
| Spirit | 0.92 | 14 |
| Ranson | 1.12 | 73 |
| Enfield | 1.07 | 113 |
| Browning | 1.21 | 13 |
| Jenson | 0.83 | 59 |
| Augusta | 1.25 | 154 |

**REQUIRED:**

1. Calculate Stead’s raw beta using company and market returns. Analyze its statistical reliability.
2. Calculate Stead’s raw beta using company and market excess returns. Comment on the difference with Part 1.
3. Calculate Stead’s Blume Adjusted Beta. Describe how it measures the shrinkage effect.
4. Calculate Stead’s Vasicek Adjusted Beta. Describe how it measures the shrinkage effect.
5. Calculate Stead’s sum beta. Describe how it measures the lag effect.
6. Calculate Stead’s downside beta. Describe how it measures downside risk.

**Industry and Peer Group Betas at Cascade**

Cascade Ltd. is a paper and paper products manufacturer with three operating segments based on SIC codes. The company trades publicly but believes that a peer group beta based on industry data is more accurate than a raw or adjusted beta using company data. Cascade collected the following information for its eight competitors who operate in the same segments:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Company** | **Raw Beta** | **Operating Segment Sales** | | | | |
| **Paper Mills** | **Paperboard Containers and Boxes** | **Commercial Paper and Paperboard Products** | **Other** | **Total** |
| Trenton Industries | 1.32 | 32% | 44% | 17% | 7% | 100% |
| Emerson Ltd. | 1.18 | 42% | 18% | 35% | 5% | 100% |
| Hollinger Enterprises | 1.44 | 25% | 65% | 5% | 5% | 100% |
| Aniston Consolidated | 1.57 | 18% | 75% | 0% | 7% | 100% |
| Inkster Corp. | 1.28 | 31% | 38% | 28% | 3% | 100% |
| Edmonds Industries | 1.38 | 25% | 51% | 18% | 6% | 100% |
| Sanger Ltd. | 1.47 | 23% | 58% | 13% | 6% | 100% |
| Wexler Corp. | 1.23 | 64% | 20% | 8% | 8% | 100% |

Cascade has 35% of its sales in paper mills, 52% in paperboard containers and boxes, 11% in commercial paper and paperboard products, and 2% in the other category.

**REQUIRED:**

1. Calculate an industry or full-information beta for each operating segment.
2. Calculate Cascade’s peer group beta.

**Accounting Beta at Excalibur**

Excalibur is determining the appropriate cost of capital for a potential acquisition in the trucking industry. It plans on using an industry average beta to determine the cost of common equity, but most of the companies are smaller organizations that do not trade publicly.

The CFO, Guy Smithers, has decided to calculate accounting betas for each of the firms in the industry and then calculate the average industry beta. This requires that the change in company earnings be regressed against the change in the earnings of the companies making up the S&P 500. The following data has been collected for one company in the industry:

|  |  |  |
| --- | --- | --- |
| **Year** | **Net Income (CAD)** | **Average Net Income**  **S&P 500 Companies (CAD)** |
| 2012 | 350 | 1,300 |
| 2011 | 275 | 1,400 |
| 2010 | 400 | 1,400 |
| 2009 | 350 | 1,350 |
| 2008 | 200 | 760 |
| 2007 | 50 | 500 |
| 2006 | 190 | 1,100 |
| 2005 | 230 | 1,200 |
| 2004 | 274 | 1,050 |
| 2003 | 250 | 1,000 |

**REQUIRED:**

1. Calculate the company’s accounting beta.
2. Why was net income used instead of sales or operating income?
3. Describe three major concerns with the calculation in Part 1.

**Accounting Beta at Allison**

Quazar Research has developed a regression model that indicates beta is a function of:

Business risk – Coefficient of variation of operating income (A)

Finance risk – Debt-to-equity ratio (B)

Maturity of the firm – Dividend payout ratio (C)

Earnings growth – Growth in EPS (D)

Based on information from all companies in the S&P 500 in 2013, the following equation was calculated:

Beta = .9783 + .078A + .138B - .171C + .025D

All variables are calculated over the last five years using annual figures.

Allison Company decided to use this model to calculate its beta since its shares do not trade publicly. The following data were collected:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Operating Income (CAD)** | **Debt-to-Equity Ratio (%)** | **Payout Ratio** | **EPS**  **(CAD)** |
| 2012 | 310,000 | 40.0 | 0.14 | 15.50 |
| 2011 | 350,000 | 39.0 | 0.13 | 17.50 |
| 2010 | 300,000 | 41.0 | 0.11 | 15.00 |
| 2009 | 125,000 | 36.0 | 0.05 | 6.25 |
| 2008 | 220,000 | 39.0 | 0.10 | 11.00 |

**REQUIRED:**

1. Estimate Allison Company’s beta using the regression model developed by Quazar.
2. What are possible statistical concerns relating to this approach?

**Unlevered and Levered Beta at Seymour**

Seymour Ltd. has decided to use the average beta of a group of comparable companies to estimate its cost of common equity. The CFO feels this will provide a more reliable beta estimate than using stock market data, but is concerned that Seymour’s levels of operating and financial leverage are significantly different from the peer group average. Seymour collected the following data:

|  |  |  |  |
| --- | --- | --- | --- |
| **Comparable Companies** | **Beta** | **Debt-to-Equity (%)** | **Fixed/Variable Costs** |
| River Crossing Industries | 1.44 | 63.0 | 1.32 |
| Total Manufacturing | 1.20 | 59.0 | 1.25 |
| Able Technologies | 1.11 | 54.0 | 1.19 |
| Selma Consolidated | 1.26 | 61.0 | 1.27 |
| East Coast Manufacturing | 1.29 | 72.0 | 1.20 |
| Average | 1.26 | 62.0 | 1.25 |

Seymour’s debt-to-equity ratio is 40.0%, and its fixed/variable cost ratio is 1.45. Its marginal tax rate is 25.0%.

**REQUIRED:**

1. Calculate Seymour’s beta.

**Weighted Average Cost of Debt at Ryerson**

Ryerson Ltd. collected the following information to determine its weighted average cost of debt financing:

|  |  |
| --- | --- |
| Bonds | Face value: CAD 6,500,000  Term: 20 years remaining  Coupon rate: 7.00%, compounded semi-annually  Bond quotation: 99.3438 |
| Term loan | Remaining term: 8 years  Payments: CAD 36,100 at the end of each month |
| Lease | Remaining term: 5 years  Payments: CAD 16,450 at the beginning of each month |

Ryerson’s bank indicated that, based on the remaining life of the term loan, Ryerson’s credit rating, and the loan’s conditions and collateral, the current market rate would be 6.00%, compounded monthly. Based on quotations Ryerson received from its leasing company, a five-year lease would currently have a market rate of 4.00%, compounded monthly. All leases have a third-party guarantee that reduces the borrowing rate by approximately 1.00%.

**REQUIRED:**

1. Calculate Ryerson’s weighted average cost of debt financing.

**Weighted Average Cost of Debt at Sanders**

Sanders Ltd. is calculating its cost of debt and has collected the following data:

|  |  |
| --- | --- |
| Lease | Remaining term: 2 years  Payments: CAD 14,450 at the beginning of each month  Estimated market rate: 5.00%, compounded monthly |
| Term loan | Remaining term: 7 years  Payments: CAD 32,950 at the end of each month  Estimated market rate: 7.00%, compounded monthly |
| Bonds | Face value: CAD 5,900,000  Term: 15 years remaining  Implied kd: 8.72%, compounded semi-annually  Bond quotation: 102.345 |

None of the sources of financing carries a third-party guarantee.

**REQUIRED:**

1. Calculate Ryerson’s cost of debt.
2. Briefly explain how the process for calculating the cost of debt would be modified if the bonds had varying maturities and features such as conversion or call options.

**Convertible Bonds at Grayson**

Grayson Industries has CAD 15,000,000 in 10-year convertible bonds that pay a semi-annual coupon of 4.82% that trade at 112.310. Equivalent straight bonds yield 5.20%, compounded semi-annually. The company wants to divide the convertible bond into its debt and equity components to calculate WACC.

**REQUIRED:**

1. What portions of the convertible bond should be classified as debt and equity? What is the current market rate for the bond component?

**Callable Bonds at Wilkinson**

Wilkinson Ltd. has CAD 10,000,000 in 10-year callable bonds with a semi-annual coupon of 5.00% that trade at 103.521. These bonds are callable at 102 in two years. It is expected that the bonds will be called due to a significant decline in interest rates. The company wants to determine the current market rate and fair value of the callable bonds for calculating WACC.

**REQUIRED:**

1. What is the current market rate and fair market value for the callable bonds?

**Yield Curve Approach at Ranson**

Ranson Inc. is calculating its cost of debt financing. The CFO’s first step is to determine a yield curve for different groupings of bond ratings:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Corporate Borrowing Rate Yield Curves** | | | | | | | |
| **Bond Rating** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6+** |
| AAA, AA, A | 2.67% | 2.96% | 3.21% | 3.49% | 3.73% | 4.92% |
| BBB | 4.87% | 5.12% | 5.59% | 5.81% | 6.17% | 7.01% |
| BB, B, CCC, CC, C, D | 12.27% | 12.85% | 13.31% | 13.33% | 13.83% | 14.71% |

Ryan then determines the total amount of company debt at each of the maturities:

|  |  |
| --- | --- |
|  | **Maturity of Debt**  **Financing**  **(CAD Thousands)** |
| Year 1 | 10,180 |
| Year 2 | 9,166 |
| Year 3 | 15,978 |
| Year 4 | 14,108 |
| Year 5 | 8,048 |
| Year 6+ | 8,200 |
| Total | 65,680 |

Ranson is currently not rated but was assessed by Moody’s to have a synthetic bond rating of BBB.

**REQUIRED:**

1. Calculate Ranson’s cost of debt.

**WMCC at Wilcox**

Wilcox Ltd. is considering the acquisition of Delta Inc., which manufactures tractor-trailers for the trucking industry. Delta is a small, privately held company, so Wilcox has decided to estimate its cost of capital using several public companies from the trucking industry. The following data was collected:

|  |  |  |
| --- | --- | --- |
| **Company** | **Levered**  **Raw Beta** | **Debt-to-Equity Ratio (%)** |
| Long Haul Ltd. | 1.31 | 35.0 |
| Buffalo Transport Inc. | 1.25 | 26.0 |
| Carrier Co. | 1.39 | 32.0 |
| Average | 1.32 | 31.0 |

All companies produce tractor-trailers, but they also have extensive trucking and truck service operations. Raw betas were calculated using monthly observations for the last five years for each company. The average raw beta was unlevered and then re-levered.

Based on Delta’s financial statements, the company’s debt maturities were:

|  |  |
| --- | --- |
|  | **Debt Maturities (CAD Thousands)** |
| Year 1 | 12,380 |
| Year 2 | 19,840 |
| Year 3 | 17,450 |
| Year 4 | 12,390 |
| Year 5 | 7,890 |
| Year 6+ | 5,320 |
| Total | 75,270 |

Wilcox was also able to obtain the following yield curve information:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Corporate Yield Curves** | | | | | | |
| **Bond Rating** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6+** |
| AAA, AA, A | 3.45% | 3.89% | 4.23% | 4.51% | 4.70% | 5.91% |
| BBB | 5.83% | 6.21% | 6.63% | 6.73% | 7.09% | 7.94% |
| BB, B, CCC, CC, C, D | 11.12% | 11.68% | 12.23% | 12.45% | 12.63% | 13.51% |
| Note: All rates are before tax. | | | | | | |

Delta did not have a current bond rating, but a synthetic bond rating of BB was estimated using multiple regression. Wilcox’s policy is to add an extra 3.00% to the final cost of capital to reflect the additional risk associated with an acquisition in a new industry.

The current rate on the five-year, zero-coupon government bond is 4.00%. The market risk premium is estimated at 5.5% based on S&P 500 data from 1997 to 2017 using the arithmetic mean return. Wilcox has a target capital structure of 30.0% debt and 70.0% equity. Its marginal tax rate is 25.0%.

**REQUIRED:**

1. Calculate the WACC for the Delta acquisition.
2. Describe any problems with how Wilcox calculated its WACC.

**Build-up Method at Creative Impressions**

Jane Francis was a successful advertising executive at a national firm in New York City for over 20 years. After her vice-president position was eliminated in a corporate reorganization in 2015, she took her sizeable severance package and started a small advertising agency, Creative Impressions, with two other colleagues.

In the first two years of operations, Francis had considerable success with CAD 75,000,000 in billings last year. Her two partners have departed because of creative differences, and company revenues are concentrated in just five major accounts.

Information providers recommend a risk-free rate of 3.0%, a market risk premium of 5.0%, a size premium of 3.5%, and an unlevered industry raw beta of 0.8. The company’s debt ratio is 35.0%, and its marginal tax rate is 25.0%. The industry average debt ratio is only 20.0%. A consultant recommended that Creative Impressions’ cost of common equity be adjusted upward by 4.00% to reflect its concentrated customer base, key manager dependence, and overuse of financial leverage compared to the industry.

**REQUIRED:**

1. Determine Creative Impressions’ cost of common equity.

**3-Stage Implied Cost of Common Equity at Rebecca**

Rebecca Company’s common shares currently trade at CAD 25.00, and its dividend at the end of last year was CAD 1.50. It is attempting to estimate its cost of common equity using the dividend growth model, but it requires a dividend growth rate. The growth in earnings per share is used as a proxy for the growth in dividends per share, and it is estimated using historical data for the last ten years, which is a complete business cycle.

|  |  |
| --- | --- |
| **Year** | **EPS (CAD)** |
| 2013 | 2.50 |
| 2012 | 2.40 |
| 2011 | 2.35 |
| 2010 | 2.11 |
| 2009 | 2.01 |
| 2008 | 1.93 |
| 2007 | 1.99 |
| 2006 | 1.83 |
| 2005 | 1.74 |
| 2004 | 1.69 |

**REQUIRED:**

1. Calculate the 1-stage implied cost of common equity using the arithmetic and geometric growth rates of dividends per share.
2. What would the 3-stage implied cost of common equity be using a professional forecast of 10.0% for the next five years, followed by an estimated industry growth rate of 7.5% for Years 6 through 10, and long-term growth of 4.3% in subsequent years?

**Fama and French 3-Factor Model at IBM**

IBM decided to use the Fama-French 3-Factor Model instead of CAPM to calculate its cost of common equity. To support his model, Dr. Kenneth French provides yearly and monthly historical measures of the three factors. IBM used this data to determine the average annual market, size, and value risk premiums from 1927 to 2019. It also used historical monthly return data for 2015-2019 to determine IBM’s sensitivity coefficients for the market, size, and value factors. The normalized risk-free rate is 3.0%.

**REQUIRED:**

1. Determine the average yearly market, size, and value risk premiums using data from 1927 to 2019.

Note: Dr. Kenneth French maintains a data library online containing market, size, and value risk premiums from 1927 to 2019.

1. Calculate IBM’s cost of common equity using the Fama and French 3-Factor Model. Comment on the statistical validity of this estimate.

Note: Monthly share price data over the last five years for IBM can be found on the Yahoo Finance website. The adjusted closing price is used so dividends and stock splits are included. Monthly values over the last five years for the market, size, and value risk premiums are also available on Dr. French’s website.

**Fama and French 3-factor Model at Delaware**

Delaware Ltd. currently uses CAPM to estimate its cost of common equity, but feels the model is limited as it only uses the market risk premium factor. Delaware has decided to experiment with the Fama-French 3-factor Model to see if a more accurate estimate of the cost of common equity can be calculated. The following data was collected:

|  |  |  |
| --- | --- | --- |
| **Factor** | **Sensitivity Coefficient** | **Risk Premium** |
| Market | 1.22 | 8.50% |
| Size | -0.33 | 3.07% |
| Value | -0.18 | 4.49% |

The normalized risk-free rate is 4.0%.

**REQUIRED:**

1. Calculate Delaware’s cost of common equity using the Fama-French 3-factor Model.
2. Describe Delaware’s investment style based on the results in Part 1.

**Cost of Capital in Regulated Industries**

**REQUIRED:**

1. Access online “An Introduction to Utility Cost of Capital,” published by the California Public Utilities Commission.
2. Prepare a 200-word submission discussing the role of a utilities regulatory commission.
3. Respond to the posts of at least three classmates.