

Monte Carlo Cost of Capital

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Overview

Problem Definition

You are an analyst at an investment fund. The fund is considering an investment in Walmart. As part of the decision-making process, your team is building a DCF model to value the stock. Another analyst is working on getting the free cash flows. Your job is to determine the cost of capital for Walmart.

Main Question

Determine the WACC for Walmart. Ensure that you estimate the market value of debt by valuing the individual debt instruments. Once you have a baseline estimate, you want to figure out the variability of that estimate. Given the standard deviations in the Monte Carlo Inputs section, and assuming these variables all follow normal distributions, visualize the probability distribution of the WACC via a histogram and a probability table. Which of the variables has the greatest contribution to the WACC? Use at least 10,000 simulations.

Notes

- Be careful that the returns are daily. You will need to divide the risk free rate by 252 to get a daily rate. After you get an estimate from CAPM, you will need to multiply it by 252.
- You can feel free to modify any of the input files to make them easier to load. But keep in mind that if you did this on the job, and you needed to keep updating the model, you would have to do this every time. If you cleaned it up with code then it would be automated. At the end I will show my model which automates the cleanup process.
- If there is not a specific day associated with a debt maturity, only a year, assume it is December 31st.
- If there is not enough information to calculate a bond price, or the bond already expired, just use the principal as the market price of the bond.

Inputs

Download the following files from Canvas in the Projects > Project 3 folder:

- SP500 Prices.xlsx
- WMT Debt Details.xls
- WMT Prices.xlsx
- WMT Income Statement.xlsx
- WMT Balance Sheet.xlsx

In these files you will find the historical stock prices for Walmart, the historical index values for the S&P 500, the individual debt instruments for Walmart, and the income statement and balance sheet for Walmart.

In addition to the information in the spreadsheets, also consider that Walmart currently has a 15-year 5.25% coupon bond trading at \$130.58 (par value \$100). The risk-free rate is 0.50% and LIBOR is 1.96%. Walmart's stock currently has a price of \$119.51 with 2,850,000,000 shares outstanding.

Monte Carlo Inputs

Standard Deviations	
Variable	Standard Deviation
β	0.2
Market Return	3%
Walmart Bond Market Price	\$30
Tax Rate	5%

Submission & Grading

Submission

You can use any combination of Python and Excel that you would like for this assignment. You can submit Jupyter notebooks, .py files, and Excel workbooks. If you cleaned up any of the data files, then also provide the cleaned data files. Your model should run from end to end from the (cleaned) data files and inputs.

Solutions

Selected solutions with the baseline inputs:

- WACC: 5.17%
- MV Debt: \$86.3 billion
- Cost of Equity: 5.97%

Grading

Grading Breakdown	
Category	Percentage
Model Accuracy	70%
Model Readability	20%
Model Formatting	10%
Bonus	5%
Total Possible	105%