

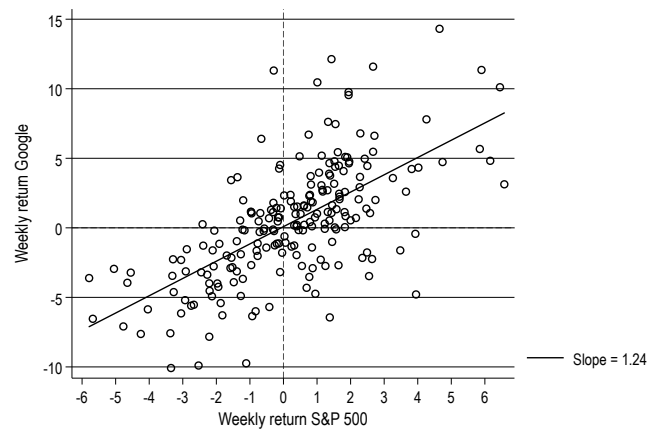
Introduction to Finance

Final Exam 2024 - Sample

Exercise

Google has \$27 billion of debt. The cost of debt is 5%. Its current stock price is \$173 with 12 343 000 000 shares. The expected return on the market portfolio is 12%. Suppose the corporate tax rate is 21%. The risk-free return is 4.5%.

The two figures below show the correlation between Google's stock and the market, identified as S&P 500. The slope of the line is indicated in the legend.



1. What is the beta of Google stock?
2. Using the CAPM, determine the cost of equity of Google (you do not need to unlever the beta). The risk-free rate is 2%.
3. What is Company Google's weighted average cost of capital (WACC)?

Problem (8 points)

You work for the ministry of energy transition. The ministry is willing to introduce a tax on cash flows in order to favor the investment in green projects rather than in polluting projects. The government first need to estimate how profitable are investments in each of these projects. You concentrate on two typical investments.

The Green Company

The Green Company produces solar panels. You gather the following information from publicly listed companies.

Company	Industry	Common Stock Beta	Stock Price	Number of stocks	Debt
A	Green Cars	1.5	27	225M	696M
B	Green Planes	1.1	37	300M	333M
C	Solar Panels	2.4	27	136M	57M
D	Diesel Cars	2.3	12	90M	110M
E	Solar Panels	1.7	7	131M	249M

All companies' debt betas are equal to zero. The market risk premium is 4%, and the risk-free rate is 1%. Assume that the CAPM holds and that there are no corporate taxes.

- (1 point) What is the beta that the Green Company must use for computing its return on assets?
- (1 point) What would be the return on assets of the company using the CAPM?
- (0.5 point) You find another company that is not publicly listed. The stock of this company is traded now at a price of 14 euros. You learn from forecasts that a dividend flow of 1.5 euro is expected next year and that this dividend is forecasted to have a stable growth rate of 1.5%. What is the return of this company?

Using additional information from the market you are finally able to set the opportunity cost of capital to 9.1%. You now want to estimate the NPV of the project. An investment of 10 million is expected in year 0. This will generate cash-flows of 1 million during the 10 next periods. During year 10, a new investment of 20M is also necessary. From year eleven, and in perpetuity, the expected cash flows will then be 2M a year, growing by 4% each year.

- (1.5 point) What is the NPV of the project? [*Hint: Decompose the cash flows between: i) the initial investment, ii) the CF of the first 10 years, iii) the second investment, iv) the CF from year 11*]

The Polluting Company

The Polluting Company has a 12% equity cost of capital, and a 4.5% debt cost of capital. The price of its stock is 12 euros and there are 500M shares. The debt-to-equity ratio of the company is 0.4. The market risk premium is 4%, and the risk-free rate is 1%.

- a. (0.5 point) What is the Beta of the Polluting company?
- b. (0.5 point) What is the WACC of the Polluting Company?

The Cash flows from year 1 are expected to be 3.5M and grow by 7% every year during 20 years. The cash flows then stop after 20 years (a cash flow is paid in year 20 but not in year 21). The initial investment is 40M. Assume the opportunity cost of capital is 7.5%.

- c. (1 point) What is the NPV?

The tax

The ministry is planning to tax the CF of the polluting company. Only the positive CF are taxed. The government wants to tax the Polluting Company so that its NPV is lower than the one of the Green Company. Assume the opportunity cost of capital is still 7.5% for the Polluting Company and 9.1% for the Green Company.

- a. (1 point) What is the minimum tax rate that should be set ?*[Hint: A CF of X taxed at the rate τ brings an after-tax CF of $(1 - \tau) \times X$]*

In addition, the ministry plans to invest 185M in several green projects.

Project	NPV	Cost investment	of Environmental quality (in %)
A	-1	25	95
B	20	40	85
C	12	64	72
D	5	51	71
E	-13	10	59
F	5	53	58

- a. (0.5 point) What projects would be chosen if the environmental quality criterium is the only criteria of choice?
- b. (0.5 point) What projects would be chosen according to the NPV and the profitability index?