

Capital Budgeting and Risk

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Case Study Capital Budgeting

Conversion of vacant premises to apartments

As the city manager of Helsingborg, you have just visited vacant premises which have been vacant for a long time. You decide that the opportunity exists to convert the premises into three apartments. When you return to the office, you realize that there are three alternatives for converting the premises to apartments.

| | Alternative 1 | Alternative 2 | Alternative 3 |
|--------------------------------------|---------------|---------------|---------------|
| Rent, sek/sqm/year | 1050 | 1150 | 1250 |
| Sqm | 217 | 217 | 217 |
| Construction cost | 2750000 | 3000000 | 3500000 |
| Life expectancy | 20 | 20 | 20 |
| Yearly rental development= inflation | 2% | 2% | 2% |

Alternative one is performed as a standard construction with plastic/linoleum floors in the whole apartment, the walls and floor surfaces in bathroom would be in plastic/linoleum.

Alternative two is performed as an intermediate construction, in the living room we would have hardwood floors and for the kitchen and hallway we would use laminate floors, the bathroom would be upgraded with standard tiles.

Alternative three would be performed with the highest standards on all floors in the apartment; bathroom and kitchen to be upgraded with the highest quality.

The company that you work for has decided on an annual discount rate for each project, the discount rate for conversion of vacant premises is set to 6%.

The question you need to ask yourself is, which alternative should you choose? Based on the things you already now it is possible to calculate the best alternative. On the following pages I will describe the best alternative for the company.

How to calculate Capital Cost

To determine the minimum yield that the company can tolerate for this project, we use the weighted average cost of capital or WACC. To calculate WACC you can use this formula.

$$WACC = \frac{\text{equity}}{\text{assets}} re + \frac{\text{debt}}{\text{assets}} (1 - T_c) rf$$

WACC for converting vacant premises is as follows

| | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---------------|---------------|---------------|
| Equity | 550000 | 600000 | 700000 |
| Assets | 2750000 | 3000000 | 3500000 |
| Debt | 2200000 | 2400000 | 2800000 |
| Corporate tax (tc) | 25% | 25% | 25% |
| Expected rate of return on firm's equity (re) | 6% | 6% | 6% |
| Risk-free interest rate (rf) | 4% | 4% | 4% |

Alternative 1

$$((550000/2750000)*6\%)+(2200000/2750000)*(1-25\%)*4\%=3.60 \%$$

Alternative 2

$$((600000/3000000)*6\%)+(2400000/3000000)*(1-25\%)*4\%=3.60 \%$$

Alternative 3

$$((700000/3500000)*6\%)+(2800000/3500000)*(1-25\%)*4\%=3.60 \%$$

3.60 percent is the minimum yield on the total assets which the company can tolerate in order to meet its lenders' interest rate requirements and its owner's distribution requirements for this project.

Capital Asset Pricing Model (CAPM)

To calculate the expected yield for this project we use the capital asset pricing model (CAPM)

$$E(r_i) = r_f + \beta_{im}(E(r_m) - r_f).$$

| | Alternative 1 | Alternative 2 | Alternative 3 |
|--|---------------|---------------|---------------|
| Risk-free interest rate (rf) | 4% | 4% | 4% |
| Beta (β) | 0,5 | 0,5 | 0,5 |
| Expected rate of return on the market portfolio (rm) | 8% | 8% | 8% |

With a known beta of (0.5) for this project and the company, you can calculate the CAPM.

$$0.04 + 0.5(8\% - 4\%) = 6\%$$

The minimum return that the company can tolerate is 3.6 percent and the expected return is 6 percent for the project. Now is the time to look at which alternative is most profitable for the company.

The Net Present Value

Alternative 1

$$-2750000 + (227850 / (6\% - 2\%)) - (227850 / (6\% - 2\%)) * (1 + 2\%)^{20} / (1 + 6\%)^{20} = 307033$$

Alternative 2

$$-3000000 + (249550 / (6\% - 2\%)) - (249550 / (6\% - 2\%)) * (1 + 2\%)^{20} / (1 + 6\%)^{20} = 348179$$

Alternative 3

$$-3500000 + (271250 / (6\% - 2\%)) - (271250 / (6\% - 2\%)) * (1 + 2\%)^{20} / (1 + 6\%)^{20} = 139234$$

Apparently alternative two is the most profitable, which means that it is this alternative we will choose.

Initial Yield

Alternative 1; $227850 / 2750000 = 8.28\%$

Alternative 2; $249550 / 3000000 = 8.31\%$

Alternative 3; $271250 / 3500000 = 7.75\%$

Using this method we also come to the same conclusion as above, we will choose alternative two.

Internal Rate of Return

To calculate the IRR we need to use excel, the formula we will use is: $IRR(\text{sum of cash flow})$

Alternative 1; 7.2%

Alternative 2; 7.3%

Alternative 3; 6.5%

Once again IRR tells us that alternative two is the best option for the company to choose.

Summary

The company cost of capital is the cost of capital for investment in the company as a whole. It is usually calculated as a weighted-average cost of capital, that is the average rate of return demanded by investors in the company's debt and equity securities. You define risk as beta, and you use the capital asset pricing model to estimate expected returns on the project.

The company cost of capital is the correct discount rate for projects that have the same risk as the company's existing business.

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Group Work

Conversion of vacant premises to apartments

| | Alternative 1 | Alternative 2 | Alternative 3 |
|---|---------------|---------------|---------------|
| Rent, sek/sqm/year | 1050 | 1150 | 1250 |
| Sqm | 217 | 217 | 217 |
| Construction cost | 2750000 | 3000000 | 3500000 |
| Life expectancy | 20 | 20 | 20 |
| Yearly rental development= inflation | 2% | 2% | 2% |
| Beta (β) | 0,32 | 0,32 | 0,32 |
| Expected rate of return on the market portfolio (r_m) | 8% | 8% | 8% |
| Equity | 1375000 | 1500000 | 1750000 |
| Debt | 1375000 | 1500000 | 1750000 |
| Assets | 2750000 | 3000000 | 3500000 |
| Rate of corporate income tax(t_c) | 25% | 25% | 25% |
| Expected rate of return on firm's equity (r_e) | 7% | 7% | 7% |
| Risk-free interest rate (r_f) | 5% | 5% | 5% |

The company that you work for has decided on an annual discount rate for each project, the discount rate for conversion of vacant premises is set to 6%.

Questions

- 1 Calculate weighted average cost of capital WACC.
- 2 Calculate the expected return for the project, using the CAPM.
- 3 Calculate the NPV for this project.
- 4 Calculate the Initial Yield for this project.
- 5 Calculate the Internal Rate of Return for the project by using excel.

Make the calculations using the information above to solve the questions.

Which alternative should the company choose?

Group Work

Answers

Question 1 - Weighted Average Cost of Capital

Alternative 1

$$((1375000/2750000)*7%)+(1375000/2750000)*(1-25%)*5%=5.38%$$

Alternative 2

$$((1500000/3000000)*7%)+(1500000/3000000)*(1-25%)*5%=5.38%$$

Alternative 3

$$((1750000/3500000)*7%)+(1750000/3500000)*(1-25%)*5%=5.38%$$

Question 2 – Capital Asset Pricing Model

Alternative 1, 2 and 3

$$0,05+0,32*(0.08-0.05)=6%$$

Question 3 – Net Present Value

Alternative 1

$$-2750000+(227850/(6\%-2\%))-((227850/(6\%-2\%))*(1+2\%)^{20}/(1+6\%)^{20})=307033$$

Alternative 2

$$-3000000+(249550/(6\%-2\%))-((249550/(6\%-2\%))*(1+2\%)^{20}/(1+6\%)^{20})=348179$$

Alternative 3

$$-3500000+(271250/(6\%-2\%))-((271250/(6\%-2\%))*(1+2\%)^{20}/(1+6\%)^{20})=139324$$

Question 4 – Initial Yield

Alternative 1: $227850/2750000=8.28\%$

Alternative 2: $249550/3000000=8.31\%$

Alternative 3: $271250/3500000=7.75\%$

Question 5 – Internal Rate of return

Alternative 1: IRR=7.2%

Alternative 2: IRR=7.3%

Alternative 3: IRR=6.5%