Weighted Average Cost of Capital Example

Suppose a company is considering an expansion requiring an investment of $10 million. The expansion project is expected to operate for five years.

The project specifics are:
- annual expected net cash flow is (before interest and taxes) is $3.0 million
- tax bracket for company is 35%
- the initial investment is for assets that fall into 3-year depreciation class (depreciation for the four years is 33.33%, 44.45%, 14.81%, and 7.41%)
- additional up-front costs are anticipated to be $115,385 (expressed on a before tax basis).

Current financial structure details for the company are:
- debt to value ratio of 0.75
- cost of debt of 8%
- cost of equity of 19.8%

\[
\begin{align*}
D &= 0.75 \\
E &= 0.25 \\
V &= 1 \\
\Gamma_D &= 0.08 \\
\Gamma_E &= 0.198
\end{align*}
\]

Required:

Should the project be accepted?

\[
\gamma_{WACC} = \frac{D}{V_L} (1 - \gamma_E) \Gamma_D + \frac{E}{V_L} \Gamma_E
\]

\[
= \frac{0.75}{1} (1 - 0.198) (0.08) + \frac{0.25}{1} (0.198) = 0.0885
\]

Flows

<table>
<thead>
<tr>
<th>Year</th>
<th>Revenue</th>
<th>Revenue After Tax</th>
<th>Dep't Expense</th>
<th>Dep't Tax Paid</th>
<th>Net cf After Tax</th>
<th>PV of Net cf at Use of WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1.95</td>
<td>3.333</td>
<td>1.17</td>
<td>3.12</td>
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<td>3.51</td>
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<td>3</td>
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<td>3</td>
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<td>0.741</td>
<td>0.26</td>
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<td>0.000</td>
<td>0.00</td>
<td>1.95</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Salvage Value 0
Book Value 0
No Cash Flow

Upfront costs after tax = 0.08

\[NPV = -10 + (0.59 - 0.08) = +0.51\]

Since NPV > 0, accept.
Adjusted Present Value Example

Suppose a company is considering a project in a new line of business requiring an investment of $10 million. The project is expected to have a five year life.

The project specifics are:
- annual expected net cash flow is (before interest and taxes) is $3.0 million
- tax bracket for company is 35%
- investment is for assets that fall into 3-year depreciation class (depreciation for the four years is 33.33%, 44.45%, 14.81%, and 7.41%)

Available financing is:
- a five year loan of $7.5 million at a annual rate of 8%
- loan is tied to project and must be repaid in annual installments of $1.5 million plus interest
- issuing costs for the loan are 1.54% of value (expressed on a before tax basis).

A survey of companies in the same line of business as this new project found:
- average debt to value ratio of 0.75
- average cost of debt of 8%  // NOTE D RISK  IS MATCHED
- average cost of equity of 19.8%

Required:

Should the project be accepted?
What role do financing effects play?

Solution:

Base-case NPV = -155,000

PV of financing side effects = PV debt tax shield - issue costs a/t
= 529,000 - 75,000
= 454,000

APV = Base-case NPV + PV of financing side effects
= -155,000 + 454,000
= 299,000.

Decision is to accept the project. The financing side effects lead to the project having a positive NPV.
APV Example (continued)

Base-case NPV calculation: \( r_o = 12\% \)

<table>
<thead>
<tr>
<th>year</th>
<th>NCF</th>
<th>NCF/at</th>
<th>dep'n</th>
<th>dep</th>
<th>NCF/at</th>
<th>p.v. @ ( r_o = 12% )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.000</td>
<td>1.950</td>
<td>3.333</td>
<td>1.167</td>
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<td>3.000</td>
<td>1.950</td>
<td>1.481</td>
<td>0.518</td>
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<td>1.757</td>
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<td>0.741</td>
<td>0.259</td>
<td>2.209</td>
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<td>0.000</td>
<td>0.000</td>
<td>1.950</td>
<td>1.106</td>
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</table>

9.845

Base-case NPV \(-0.155\)

P.V. for financing side effects:

<table>
<thead>
<tr>
<th>Loan</th>
<th>Loan P</th>
</tr>
</thead>
<tbody>
<tr>
<td>year</td>
<td>C/F</td>
</tr>
<tr>
<td>0</td>
<td>7.500</td>
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<tr>
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<tr>
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<tr>
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<tr>
<td>4</td>
<td>-1.500</td>
</tr>
<tr>
<td>5</td>
<td>-1.500</td>
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</table>

0.529

Adjusted Present Value \(0.299\)

\[
\hat{r}_D = \frac{D(1-r_c)}{V_L - r_c D} \hat{r}_E + \frac{E}{V_L - r_c D} \hat{r}_E
\]

\[
= \frac{.75(1.08)}{1 - .35(0.08)} + \frac{.25}{1 - .35(0.75)}(0.198) = 0.12
\]

Use for base-case NPV.
Flow to Equity Example

Suppose a company is considering an equity investment in a project requiring a total investment of $10 million. The project is expected to have a five year life.

The project specifics are:
- annual expected net cash flow is (before interest and taxes) is $3.0 million
- tax bracket for company is 35%
- investment is for assets that fall into 3-year depreciation class (depreciation for the four years is 33.33%, 44.45%, 14.81%, and 7.41%)

Available debt financing is:
- a five year loan of $7.5 million at a annual rate of 8%
- loan is tied to project and must be repaid in annual installments of $1.5 million plus interest
- issuing costs for the loan are 1.54% of value (expressed on a before tax basis).

The beta given the risk of this equity investment is 2.26. (The risk free rate is 4% and the market risk premium is 7%.)

Required:

Should the project be accepted?

Focus on equity
- interest + principal repayment are expenses; interest is tax deductible
- use levered flows

\[
\text{Equity Amount needed} = 10 - 7.5 = 2.5
\]

\[
\hat{r}_E = r_f + \beta_E (r_m - r_f) = .04 + 2.26 (.07) = 0.198
\]
FLOW TO EQUITY EXAMPLE

\[ r_E = 19.8\% \]

<table>
<thead>
<tr>
<th>year</th>
<th>rev</th>
<th>Debt</th>
<th>Equity</th>
<th>2.5</th>
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<tr>
<td></td>
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<tr>
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</table>

Issue Cost 0.075

**TOTAL** 3.050472

\[ NPV = -2.5 + 3.05 - 0.08 \]
\[ = +0.47 \]

Since \( NPV > 0 \) **accept**