Capital Budgeting Problems

Solutions

Capital budgeting is the process of allocating financial capital among various capital investments. A capital investment is an outlay that is expected to result in benefits in the future (e.g., new plants and equipment, real estate).

Three Most Popular Capital Budgeting Techniques: Payback Period, NPV, and IRR

<table>
<thead>
<tr>
<th>Year</th>
<th>Project A Cash Flows</th>
<th>Project B Cash Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Investment</td>
<td>($840,000)</td>
<td>($900,000)</td>
</tr>
<tr>
<td>Year 1</td>
<td>$280,000</td>
<td>$560,000</td>
</tr>
<tr>
<td>Year 2</td>
<td>$280,000</td>
<td>$240,000</td>
</tr>
<tr>
<td>Year 3</td>
<td>$280,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Year 4</td>
<td>$280,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Year 5</td>
<td>$280,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Average</td>
<td>$280,000</td>
<td>$280,000</td>
</tr>
</tbody>
</table>

Assume: same risk for each project; year 1-5 cash flows at end of year

1. What is the payback period for Project A? Project B? Assuming unlimited funds, which project(s) would be undertaken if the company wanted a payback period of 3 years or under?

2. What are the advantages/disadvantages of the payback method for capital budgeting?

Note: The Net Present Value technique for capital budgeting is considered to be a sophisticated technique. The rate used—called the discount rate, required return, cost of capital, or opportunity cost—refers to the minimum return that must be earned on a project to leave the firm’s market value unchanged. So NPV uses a discount rate equal to the firm’s cost of capital (or weighted average cost of capital).

Decision Criteria: If NPV is greater than or equal to $0, accept the project; if NPV is less than $0, reject the project.

3. Assume the company has a cost of capital of 10 percent. What are the NPVs of projects A and B? Which project(s) are acceptable?
Note: **Internal Rate of Return (IRR)** is probably the most sophisticated capital budgeting technique. IRR is the discount rate that equates the present value of cash flow inflows with the cash outflows (usually initial investment) associated with the project or investment. That is, IRR is the discount rate that equates the NPV of an investment opportunity with $0. If the cash inflows and outflows are like a bond, we could calculate the IRR the way we calculate the YTM (Yield-to-Maturity) for a bond.

**Decision Criteria:** If IRR is greater than the cost of capital, accept the project/investment. If IRR is less than the cost of capital, then reject the project/investment.

4. What is the IRR of project A? If the cost of capital is 10 percent, is project A acceptable? Optional: What is the IRR of project B?

\[ \begin{align*}
PV &= -84,000 \\
N &= 5 \\
PMT &= 28,000 \\
I &= ?
\end{align*} \]

\[ I = 19.86\% \]

\[ I > \text{Cost of Capital} \]

Accept

Note: Both NPV and IRR should reach the same conclusion about the acceptability or unacceptability of projects; however, NPV and IRR will not always rank the projects in the same order.

Note: NPV is theoretically superior to IRR because any inflows are assumed to be reinvested in the company at the cost of capital. IRR assumes reinvestment at the often higher rate specified by IRR. However, managers tend to like IRR because there is an emphasis on rate of return rather than an actual dollar return. NPV is a dollar amount but it does not look at benefit relative to the amount invested.

**Solutions**

1. A = 3  B = 2.5

3. A = $221,420; B = $218,488 - Both are acceptable

4. A = 19.86%, yes, project A is acceptable; B = 21.65%