Chapter 9: Evaluating Projects

- Methods for Evaluating Project Cash Flows

Firms Cost of Capital = 0.10

<table>
<thead>
<tr>
<th>Year</th>
<th>Project S</th>
<th>Project L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>($1,000)</td>
<td>($1,000)</td>
</tr>
<tr>
<td>1</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>600</td>
</tr>
</tbody>
</table>
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- **PAYBACK PERIOD**

<table>
<thead>
<tr>
<th></th>
<th>Project S</th>
<th>Project L</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1,000)</td>
<td>Total</td>
<td>(1,000) Total</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>400</td>
<td>900</td>
<td>300</td>
</tr>
<tr>
<td>300</td>
<td>1,200</td>
<td>400</td>
</tr>
<tr>
<td>100</td>
<td>1,300</td>
<td>600</td>
</tr>
</tbody>
</table>

Payback for Project S = 2.33 years

Payback for Project L = 3.33
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- **NET PRESENT VALUE (NPV)**

\[
NPV_S = 500(1.1)^{-1} + 400(1.1)^{-2} + 300(1.1)^{-3} + 100(1.1)^{-4} \quad - \quad 1000 \\
= 454.54 + 330.57 + 225.39 + 68.30 \quad - \quad 1000 \\
= 78.80 \\
NPV_L = 100(1.1)^{-1} + 300(1.1)^{-2} + 400(1.1)^{-3} + 600(1.1)^{-4} \quad - \quad 1000 \\
= 90.90 + 247.93 + 300.52 + 409.80 \quad - \quad 1000 \\
= 49.15
\]

- **DECISION RULE**

1) If NPV $\geq 0$, Then Accept Project

2) If NPV $< 0$, Then Reject Project
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- INTERNAL RATE OF RETURN (IRR)

<table>
<thead>
<tr>
<th>K</th>
<th>NPV&lt;sub&gt;S&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>.10</td>
<td>79</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
</tr>
<tr>
<td>.15</td>
<td>-8</td>
</tr>
</tbody>
</table>

\[ .05 \times 79/87 = .045 \]

\[ \text{IRR}_S = .10 + .045 = .145 \]
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\[
\begin{array}{c|c}
K & NPV_L \\
0 & 400 \\
.10 & 49 \\
x & 0 \\
.15 & -80 \\
\end{array}
\]

\[0.05 \times \frac{49}{129} = 0.018\]

\[IRR_L = 0.10 + 0.018 = 0.118\]

- **DECISION RULE**
  1) If IRR \(\geq K_a\), Then Accept Project
  2) If IRR \(< K_a\), Then Reject Project
• Example of What IRR Represents - Using Project S
 Deposit 1000 into a Bank Account Paying 14.5% per year:

1,000.00  @14.5%
145.00     Interest first year
1,145.00   Amount in account at end of first year
500.00     Withdraw 500 from account
645.00     Amount remaining
93.53      Interest second year
738.53     Amount in account at end of second year
400.00     Withdraw 400 from account
338.53     Amount remaining
49.08      Interest third year
387.61     Amount in account at end of third year
300.00     Withdraw 300 from account
87.61      Amount remaining
12.39      Interest fourth year
100.00     Amount in account at end of fourth year
100.00     Withdraw 100 from account
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• Profitability Index

\[ PI = \frac{PV \text{ Future Cash Flows}}{NICO} \]

\[ PI_\text{S} = \frac{1079}{1000} = 1.079 \]
\[ PI_\text{L} = \frac{1049}{1000} = 1.049 \]

• DECISION RULE
1) If \( PI \geq 1 \), Then Accept Project
2) If \( PI < 1 \), Then Reject Project

End of Chapter 9