Some Alternative Investment Rules

Chapter Outline

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6.2 The Payback Period Rule
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6.1 Why Use Net Present Value?

Accepting positive NPV projects benefits shareholders.
- NPV uses all cash flows of the project
- NPV discounts the cash flows properly

The Net Present Value (NPV) Rule

Net Present Value (NPV) = Total PV of future CF’s + Initial Investment

Estimating NPV:
- 1. Estimate future cash flows: how much? and when?
- 2. Estimate discount rate
- 3. Estimate initial costs

Minimum Acceptance Criteria: Accept if NPV > 0
Ranking Criteria: Choose the highest NPV

6.2 The Payback Period Rule

How long does it take the project to “pay back” its initial investment?
Payback Period = number of years to recover initial costs

Minimum Acceptance Criteria: set by management
Ranking Criteria: set by management

Good Attributes of the NPV Rule

- Uses cash flows
- Uses ALL cash flows of the project
- Discounts ALL cash flows properly
- Reinvestment assumption: the NPV rule assumes that all cash flows can be reinvested at the discount rate.
6.5 The Internal Rate of Return (IRR) Rule

- IRR: the discount that sets NPV to zero
- Minimum Acceptance Criteria:
  - Accept if the IRR exceeds the required return.
- Ranking Criteria:
  - Select alternative with the highest IRR
  - Reinvestment assumption:
    - All future cash flows assumed reinvested at the IRR.
- Disadvantages:
  - Does not distinguish between investing and borrowing.
  - IRR may not exist or there may be multiple IRR
  - Problems with mutually exclusive investments
- Advantages:
  - Easy to understand and communicate

6.6 Problems with the IRR Approach

- Multiple IRRs.
- Are We Borrowing or Lending?
- The Scale Problem
- The Timing Problem

The Scale Problem

- Would you rather make 100% or 50% on your investments?
- What if the 100% return is on a $1 investment while the 50% return is on a $1,000 investment?

The Timing Problem

<table>
<thead>
<tr>
<th>Project A</th>
<th>$10,000</th>
<th>$1,000</th>
<th>$1,000</th>
</tr>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>$12,000</td>
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<table>
<thead>
<tr>
<th>Project B</th>
<th></th>
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<tbody>
<tr>
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<td></td>
<td>-10,000</td>
</tr>
<tr>
<td>1</td>
<td></td>
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<tr>
<td>3</td>
<td></td>
<td></td>
<td>$12,000</td>
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</tbody>
</table>

The preferred project in this case depends on the discount rate, not the IRR.
The Timing Problem

Mutually Exclusive vs. Independent Project

6.7 The Profitability Index (PI) Rule

6.8 The Practice of Capital Budgeting

Example of Investment Rules

Example of Investment Rules
Example of Investment Rules

<table>
<thead>
<tr>
<th>Time</th>
<th>CF</th>
<th>Cum. CF</th>
<th>CF</th>
<th>Cum. CF</th>
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<tbody>
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<td>-150</td>
<td>-150</td>
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<tr>
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<tr>
<td>3</td>
<td>-800</td>
<td>0</td>
<td>150</td>
<td>150</td>
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</tbody>
</table>

Payback period for project B = 2 years.

Payback period for project A = 1 or 3 years?

Relationship Between NPV and IRR

<table>
<thead>
<tr>
<th>Discount rate</th>
<th>NPV for A</th>
<th>NPV for B</th>
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</thead>
<tbody>
<tr>
<td>-10%</td>
<td>-87.52</td>
<td>234.77</td>
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<tr>
<td>0%</td>
<td>0.00</td>
<td>150.00</td>
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<tr>
<td>20%</td>
<td>59.26</td>
<td>47.92</td>
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<tr>
<td>40%</td>
<td>59.48</td>
<td>-8.60</td>
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<td>60%</td>
<td>42.19</td>
<td>-43.07</td>
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<td>80%</td>
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<td>100%</td>
<td>0.00</td>
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<tr>
<td>120%</td>
<td>-18.93</td>
<td>-92.52</td>
</tr>
</tbody>
</table>

6.9 Summary and Conclusions

This chapter evaluates the most popular alternatives to NPV:
- Payback period
- Accounting rate of return
- Internal rate of return
- Profitability index

When it is all said and done, they are not the NPV rule; for those of us in finance, it makes them decidedly second-rate.