

CHAPTER 10

The Basics of Capital Budgeting

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What is capital budgeting?

- Analysis of potential additions to fixed assets.
- Long-term decisions; involve large expenditures.
- Very important to firm's future.

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Steps to capital budgeting

1. Estimate Costs (outflows).
2. Estimate CFs (inflows).
3. Assess riskiness of CFs.
4. Determine the appropriate cost of capital.
5. Find NPV and/or IRR.
6. Accept if NPV > 0 and/or IRR > WACC.

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What is the difference between independent and mutually exclusive projects?

- Independent projects – if the cash flows of one are unaffected by the acceptance of the other.
- Mutually exclusive projects – if the cash flows of one can be adversely impacted by the acceptance of the other.

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What is the payback period?

- The number of years required to recover a project's cost, or "How long does it take to get our money back?"
- Calculated by adding project's cash inflows to its cost until the cumulative cash flow for the project turns positive.

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Calculating payback

Project L	0	1	2	2.4	3	
CF _t	-100	10	60	100	80	
Cumulative	-100	-90	-30	0	50	
Payback _L	= 2	+	30 / 80	= 2.375 years		

Project S	0	1	1.6	2	3	
CF _t	-100	70	100	50	20	
Cumulative	-100	-30	0	20	40	
Payback _S	= 1	+	30 / 50	= 1.6 years		

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Strengths and weaknesses of payback

Strengths

Provides an indication of a project's risk and liquidity.

Easy to calculate and understand.

Weaknesses

Ignores the time value of money.

Ignores CFs occurring after the payback period.

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Discounted payback period

Uses discounted cash flows rather than raw CFs.

	0	10%	1	2	2.7	3
CF _t	-100		10	60		80
PV of CF _t	-100		9.09	49.59		60.11
Cumulative	-100		-90.91	-41.32		18.79
Disc Payback _L	= 2 + 41.32 / 60.11 = 2.7 years					

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Net Present Value (NPV)

Sum of the PVs of all cash inflows and outflows of a project:

$$NPV = \sum_{t=0}^n \frac{CF_t}{(1+k)^t}$$

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What is Project L's NPV?

Year	CF _t	PV of CF _t
0	-100	-\$100
1	10	9.09
2	60	49.59
3	80	60.11
	NPV _L	\$18.79

NPV_S = \$19.98

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Solving for NPV: Financial calculator solution

Enter CFs into the calculator's CFLO register.

CF₀ = -100

CF₁ = 10

CF₂ = 60

CF₃ = 80

Enter I/YR = 10, press NPV button to get NPV_L = \$18.78.

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Rationale for the NPV method

NPV = PV of inflows ± Cost
= Net gain in wealth

If projects are independent, accept if the project NPV > 0.

If projects are mutually exclusive, accept projects with the highest positive NPV, those that add the most value.

In this example, would accept S if mutually exclusive (NPV_S > NPV_L), and would accept both if independent.

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Internal Rate of Return (IRR)

IRR is the discount rate that forces PV of inflows equal to cost, and the NPV = 0:

$$0 = \sum_{t=0}^n \frac{CF_t}{(1 + IRR)^t}$$

Solving for IRR with a financial calculator:

Enter CFs in CFLO register.

Press IRR; $IRR_L = 18.13\%$ and $IRR_S = 23.56\%$.

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Rationale for the IRR method

If $IRR > WACC$, the project's rate of return is greater than its costs. There is some return left over to boost stockholders' returns.

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IRR Acceptance Criteria

If $IRR > k$, accept project.

If $IRR < k$, reject project.

If projects are independent, accept both projects, as both $IRR > k = 10\%$.

If projects are mutually exclusive, accept S, because $IRR_S > IRR_L$.

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Reinvestment rate assumptions

NPV method assumes CFs are reinvested at k , the opportunity cost of capital.

IRR method assumes CFs are reinvested at IRR.

Assuming CFs are reinvested at the opportunity cost of capital is more realistic, so NPV method is the best. NPV method should be used to choose between mutually exclusive projects.

Perhaps a hybrid of the IRR that assumes cost of capital reinvestment is needed.

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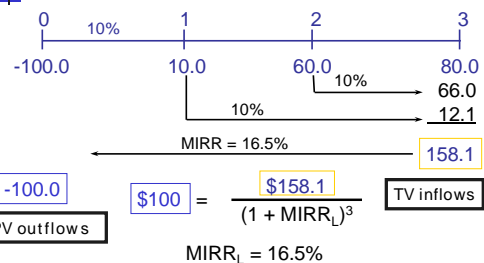
Since managers prefer the IRR to the NPV method, is there a better IRR measure?

Yes, MIRR is the discount rate that causes the PV of a project's terminal value (TV) to equal the PV of costs. TV is found by compounding inflows at WACC.

MIRR assumes cash flows are reinvested at the WACC.

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Calculating MIRR



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Why use MIRR versus IRR?

- MIRR correctly assumes reinvestment at opportunity cost = WACC.
- Managers like rate of return comparisons, and MIRR is better for this than IRR.

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