



Capital Budgeting: Project Analysis

Gestão Financeira I
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Corporate Finance I
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Licenciatura
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Outline

- It is crucial to do certain robustness checks to better characterize the project.
- Besides estimating the most likely cash flow and discount rate, we also perform:
 - Sensitivity Analysis;
 - Scenario Analysis;
 - Break-even Analysis.

Example

- Projected annual sales: 1,750 ton
- Price: 6 per ton
- Variable costs: 4 per ton
- Fixed costs: 1,000 per year
- Initial investment (fixed assets) of 6,000 with life of 3 years and salvage value of 0
- No investment in working capital
- Inflation: 0%
- Discount rate: 7%
- Tax rate: 35% (losses can be offset elsewhere in firm).

Example

Cash Flows					
	Year 0	Year 1	Year 2	Year 3	
Sales revenues		10.500	10.500	10.500	
Variable costs		7.000	7.000	7.000	
Fixed costs		1.000	1.000	1.000	
Depreciation		2.000	2.000	2.000	
EBIT		500	500	500	
Taxes		175	175	175	
Unlevered Net Income		325	325	325	
+ Depreciation	0	2.000	2.000	2.000	
- Capital Expend	6.000	0	0	0	
- Increase in NWC	0	0	0	0	
= Free Cash Flow	-6.000	2.325	2.325	2.325	
NPV	102				
IRR	7,92%				



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Sensitivity Analysis

- Calculate NPV (or IRR) with one input varied, while keeping all other inputs constant, and check if project “survives”. Use excel’s “Data”, “What if Analysis”, “Data Table”.
- **Example:** Compute NPV for new values

Annual sales		102
	1.400	-1.093
	1.500	-751
	1.800	272
	2.000	954

Variable Costs		102
	3,5	1.594
	4,0	102
	4,5	-1.391
	5,0	-2884

Price		102
	5,0	-2.884
	5,5	-1.391
	6,0	102
	6,5	1594



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Sensitivity Analysis

- You can also do it for 2 variables changing simultaneously.
- **Example:**

		Variable cost				
	102	3,5	4	4,5	5	
Price	5	-1.391	-2.884	-4.376	-5869	
	5,5	102	-1.391	-2.884	-4376	
	6	1.594	102	-1.391	-2884	
	6,5	3087	1594	102	-1391	
	7	4579	3087	1594	102	



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Scenario Analysis

- You can examine different scenarios in which many inputs may change. At least look at a more optimistic and a more pessimistic scenario. Compute NPV (and/or IRR) for each scenario. Use excel's "Data", "What if Analysis", "Scenario Manager".
- Example:**

Inputs:	Expected	Optimistic	Pessimistic
Sales (ton)	1.750	1900	1500
Price per ton	6	6,5	5
Variable cost per ton	4	3,5	4,5
Fixed cost	1.000	1000	1000
CAPEX	6.000	6000	6000
Life	3	3	3
Tax rate	35%	35%	35%
Discount rate	7%	7%	7%

Scenario Analysis

Scenario Summary				
		Expected	Pessimistic	Optimistic
Changing Cells:				
	Sales	1.750	1.500	1.900
	Price	6	5	6,5
	Variable_cost	4	4,5	3,5
Result Cells:				
	NPV	102	-4.589	3.854
	IRR	7,92%	-45,06%	39,56%



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Break-even Analysis

- Can also check for what minimum (or maximum) values of certain inputs the project would be acceptable (with $NPV \geq 0$).
 - Note: IRR is the break-even value for the discount rate.
 - **Example:** What's the minimum level of sales that makes NPV non-negative?
 - You can use Excel's "Data", "What if Analysis", "Goal Seek", and compute.
 - In the example, if Sales=1,720 tons , then $NPV=0$.
 - The Break-even value of sales (everything else constant) is 1,720 tons.



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Break-even Analysis

- We may also compute an accounting break-even concept. For example, we may compute the EBIT break-even for sales:

$$\text{Units Sold} \times (\text{Sales Price} - \text{Cost per Unit}) - SG \& A - \text{Depreciation} = 0$$

$$\text{Units Sold} = \frac{SG \& A + \text{Depreciation}}{\text{Sales Price} - \text{Cost per Unit}}$$

- For the previous example:

$$\text{Units Sold} = \frac{SG \& A + \text{Depreciation}}{\text{Sales Price} - \text{Cost per Unit}} = \frac{1000 + 2000}{6 - 4} = 1500$$

Summary

- These additional robustness checks may be subjective, but help understanding better the risks and potential gains of the projects.