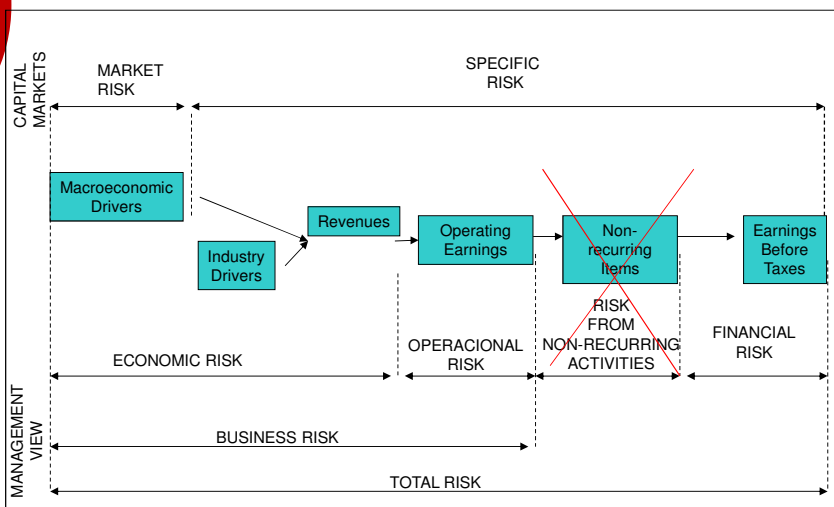


Corporate Finance: Risk Analysis using Income Statement

João Carvalho das Neves
Professor of Finance, ISEG
icneves@iseg.ulisboa.pt
2018-2019


Risk analysis





Cost definitions

- Operating Costs
 - are expenses associated to a particular activity or business on a day-to-day basis.
- Financial Expenses
 - Are associated with securing funds for a project or business arrangement. It may include interest payments, financing fees charged by intermediary financial institution, and fees or salaries of any personnel required to complete the financing process.
- Recurring Items
 - Recurring item is an ongoing costs (losses) or revenues (or gain)
- Non-recurring items
 - are unusual or infrequent items that are reported separately as part of income from continuing operations. Examples are gains or losses arising from i) Discontinued operations and the disposal of a portion of a business segment; ii) Extraordinary items; iii) Unusual or infrequent items; iv) Asset impairments

- 
- Fixed Cost (FC)
 - That cost which does not vary based on production volume. Includes building, insurance, fixed overhead (e.g. Engineering staff), equipment recovery cost, information systems, etc.
 - Variable Cost (VC)
 - that cost which varies (assumption: proportionally) as production volume varies. Includes direct labour, materials, warranty, utilities (power consumption), marketing, etc.

Análise subjectiva do balancete analítico

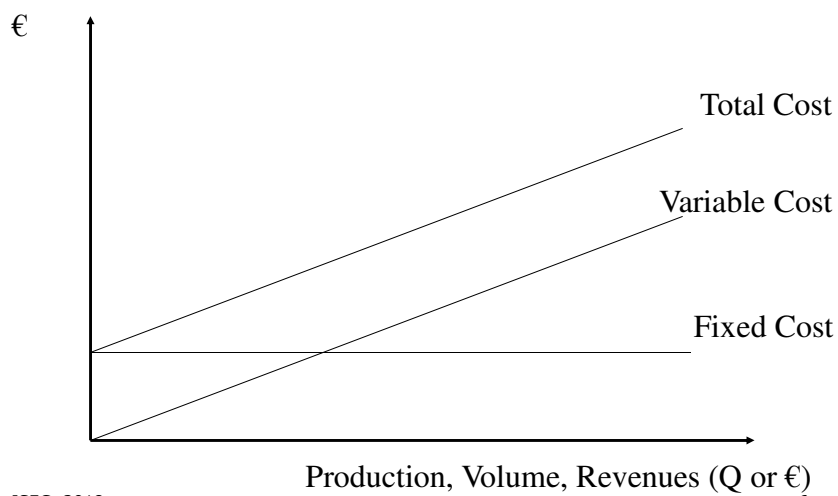
- É o método mais vulgarizado nas empresas para estimar os custos fixos e variáveis
- Exige posição subjectiva do analista
- Um vez feita a classificação:
 - O total dos custos variáveis é dividido pelo nível de actividade para obter o custo unitário ou pelo volume de negócios para obter o rácio dos custos variáveis.
 - Os custos classificados como fixos são somados para dar a estimativa dos custos fixos.

Ver: [Problema Troia Hotels](#)

©JCNeves, ISEG, 2018

5

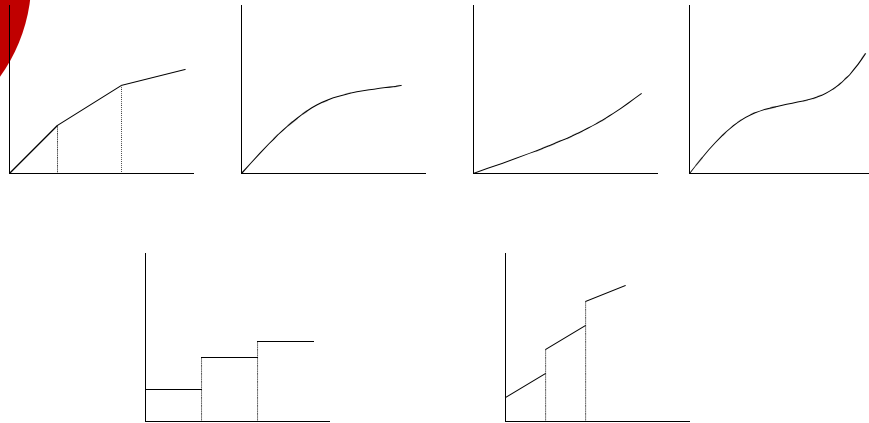
Behaviour of costs



©JCNeves, ISEG, 2018

6

Potential behaviour of costs



©JCNeves, ISEG, 2018

7

The relevance range

- The relevance range is the level of activity for which the assumed behavior of cost is valid
- Models always have their limitations. In this case the assumptions:
 - Linear relationship for variable costs
 - Fixed cost remains constant
- Above or below the relevance range the behavior of costs can vary differently from the assumptions
- Within the relevance range the assumptions of cost behavior are a good approximation to the real costs behaviour

©JCNeves, ISEG, 2018

8

Break-even point analysis or Cost-Volume-Profit Analysis

In-Class Exercise

You are an entrepreneur planning to enter the gourmet organic burger market. Your marketing consultant believes you can sell 150,000 burgers at €1.99 each.

Fixed costs for the business are expected to total €140,000. In addition, variable costs will total about €0.97 per burger.

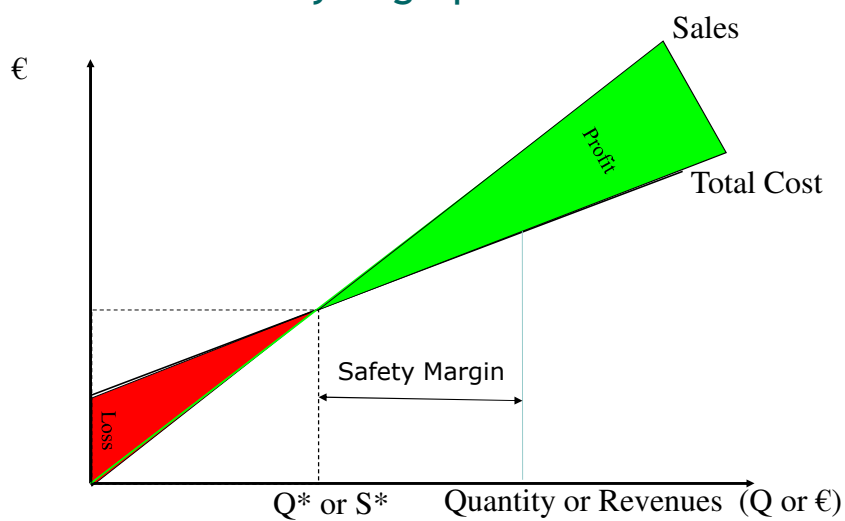
How many burgers must you sell to break even?

What if the price is €2.79? How many must you sell to break even?

©JCNeves, ISEG, 2018

9

Break-even analysis graph



©JCNeves, ISEG, 2018

* Means the revenues or quantity to break-even 10

Formulas: Operating Break Even & Operating Safety Margin

OPERATING BREAK-EVEN IN UNITS:

$$Q_{Op}^* = \frac{FC}{P - v}$$

IN EUROS:

$$S_{Op}^* = \frac{FC}{\frac{S - VC}{S}}$$

OPERATING SAFETY MARGIN

$$SM_{Op} = \frac{S - S^*}{S}$$

FC – Operating fixed costs
 P – Selling price per unit
 v – Variable cost per unit
 m – Contribution margin/Revenues
 S – Revenues
 S_{Op}^{*} - Operating break even in euros
 Q_{Op}^{*} - Operating break even in units

©JCNeves, ISEG, 2018

11

Formulas: Break Even & Safety Margin

BREAK-EVEN IN QUANTITY:

$$Q^* = \frac{FC + FExp}{P - v}$$

EM VALOR:

$$S^* = \frac{FC + FExp}{\frac{S - VC}{S}}$$

OPERATING SAFETY MARGIN

$$SM = \frac{S - S^*}{S}$$

FC – Operating fixed costs
 P – Selling price per unit
 v – Variable cost per unit
 m – Contribution margin/Revenues
 S – Revenues
 S_{Op}^{*} - Operating break even in euros
 Q_{Op}^{*} - Operating break even in units

©JCNeves, ISEG, 2018

12

Using the model to attain a certain goal of Recurring Earnings

In Units:
$$Q^* = \frac{FC + FExp + x}{m}$$

In Euros:
$$S^* = \frac{FC + FExp + x}{\frac{S - VC}{S}} = \frac{FC + FExp + x}{m}$$

x = objective to achieve a specific amount of Recurring Earnings

Multi-product Break-even of Revenues

- The formula in Euros
- And:
 - If the contribution margin ratio used is the same as previous year, then it is assumed the profitability of each product is similar of previous year and the same for the product-mix
 - If it is expected a change of product mix and or margin of all or some of the products than the contribution margin ratio must be recalculated:

$$m\% = m_1 \cdot w_1 + m_2 \cdot w_2 + \dots + m_n \cdot w_n$$

m_i – the contribution margin ratio of product i

w_i - weight of product i in the total revenues of the company



Goal seek and What-if analysis

- When a financial modeling is developed with the drivers of net profit (selling prices, product-mix, unit costs, operating fixed costs, financing costs, income tax rate) the management can do sensitivity analysis using : “goal seek” e “What If analyses” of Excel.
- This analysis is based on the observation of the output from specific potential action. For example:
 - What is the impact in the net profit (or the ROE) if the fixed cost increases X euros and the variable unit cost reduces in Y euros?
 - What is the net profit (or the ROE) if the selling price declines $\lambda\%$ and demand increases $s\%$?



Resources might have a constrain

- If there is a constrain to a specific resource the optimization of profit is not the contribution margin per unit but the contribution margin of the scarce resource
- Another more advanced model to optimize the process is using linear programming (Use the Excel: Tools, Solver)

Questions

- Does the company have enough business to generate enough profits?
- What are the business risks and financial risks that can affect the company profitability?
- What can the company do to improve the profitability and reduce risk?

Case Study: Impulse Robotics and Malvey Aerospace

	<u>Impulse Robotics</u>	<u>Malvey Aerospace</u>
Revenues	\$1,000,000	\$1,000,000
Operating costs	<u>700,000</u>	<u>750,000</u>
Operating income	\$300,000	\$250,000
Financing expense	<u>100,000</u>	<u>50,000</u>
Net income	\$200,000	\$200,000

	<u>Impulse Robotics</u>	<u>Malvey Aerospace</u>
Number of units produced and sold	100,000	100,000
Sales price per unit	\$10	\$10
Variable cost per unit	\$2	\$6
Fixed operating cost	\$500,000	\$150,000
Fixed financing expense	\$100,000	\$50,000

Risk Analysis using the Degree of Leverage

Degree of Combined Leverage (DCL)

- Degree of Operational Leverage (DOL)

$$\frac{\text{Contribution Margin}}{\text{Operating Earnings}}$$

- Degree of Financial Leverage (DFL)

$$\frac{\text{Operating Earnings}}{\text{Recurring Earnings}}$$

- Degree of Combined Leverage (DCL)

$$\text{DCL} = \frac{\text{Contribution Margin}}{\text{Operating Earnings}} \times \frac{\text{Operating Earnings}}{\text{Recurring Earnings}}$$