LIUC
Università Cattaneo
Universita Cattaneo

THE OPTIMAL CAPITAL STRUCTURE
THE COST OF CAPITAL:
COST OF DEBT AND COST OF EQUITY, WACC

Lesson 4

Corporate Finance

Castellanza, 1st October 2018

Lesson 4 - Summary

- Financial structure and shareholders' return
- Capital structure theories:
  - Traditional Theory
  - Modigliani & Miller's Theory
  - Trade-off Theory
  - Pecking order Theory
- Key factors influencing financial decisions: Risk, Return, Time
- The capital asset pricing model (CAPM)
- The cost of capital:
  - Cost of equity
  - Cost of debt
  - WACC

FINANCIAL STRUCTURE AND SHAREHOLDERS' RETURN

- The optimal financial structure for shareholders is the one that maximizes their profits.
- The indicator to calculate such profits is ROE (return on equity), which indicates the relationship between company's net profits and equity. A financial leverage variation corresponds to a ROE variation (due to the cost of debt variation, which affects the net profits and to the equity variation).
- To evaluate the importance of the financial structure in determining shareholders' return, it is useful to analyze the relationship between ROE and ROI.

FINANCIAL STRUCTURE & RETURN: SUMMARY

Relationship between ROI and ROE

$$ROE = ROI + (ROI - i)\,[D/E]$$

FINANCIAL STRUCTURE AND SHAREHOLDERS' RETURN

- The main remark it is possible to draw from the above formula is that, if a positive spread between ROI and i exists, recurring to the financial leverage implies that the shareholders' return increases. In fact, by increasing the leverage ratio the ROE increases proportionally. This relation is called the "**leverage effect**". Obviously, it is always necessary to consider the financial risk related to a debt increase.
- Otherwise, in case of ROI < i, the best strategy would be not to use financial debt and maximize the use of equity.

FINANCIAL STRUCTURE & ENTERPRISE VALUE

- The analysis of the financial structure in a medium-long term perspective should not consider only financial ratios (such as ROE), but also other factors.
- All these factors can be summarized within a single concept: the **optimal financial leverage ratio** (or at least the most suitable) is the one that **maximizes the whole company's value**. The value maximization implies the minimization of the cost of capital (which includes, as we will see, both cost of debt and cost of equity).
- Therefore, the optimal financial structure is the one that better respond to the industry, the strategy and the goals of the company.

OPTIMAL D/E RATIO

Optimal D/E ratio

Minimization of cost of capital

Maximization of company's value

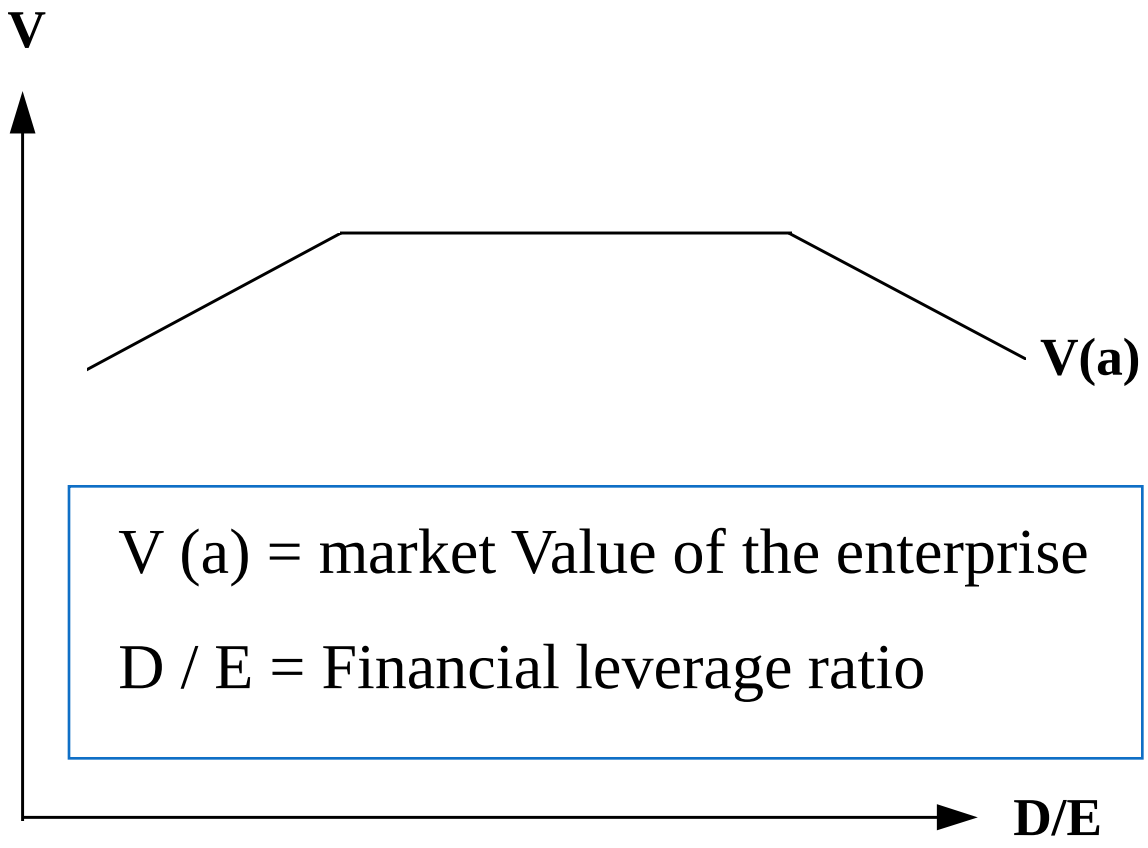
THEORIES

- **Traditional Theory**
- **Modigliani & Miller's Theory**
- **Trade-off Theory**
- **Pecking order Theory**

TRADITIONAL THEORY

- The traditional theory states that there is an optimal financial structure that maximizes the enterprise value of a company by the use of debt and the leverage it offers. This enables the company to minimize the cost of capital.
- Debt is cheaper than equity, so a moderate increase in debt will help to reduce the cost of capital.
- However, any increase in debt also increases the risk for shareholders. Therefore, according to the traditional theory, a certain level of debt rises up to a very high risk of bankruptcy. That risk increases also the cost of debt.

TRADITIONAL THEORY



V (a) = market Value of the enterprise

D / E = Financial leverage ratio

MODIGLIANI & MILLERS' THEORY

- According to the traditional theory, the optimal capital structure of a company is where benefits and costs of debt are best balanced.
- In 1958, Modigliani and Miller formulated a theory that totally contradicts the traditional wisdom, assuming that in perfect markets, barring any distortions, there is *no* optimal capital structure.

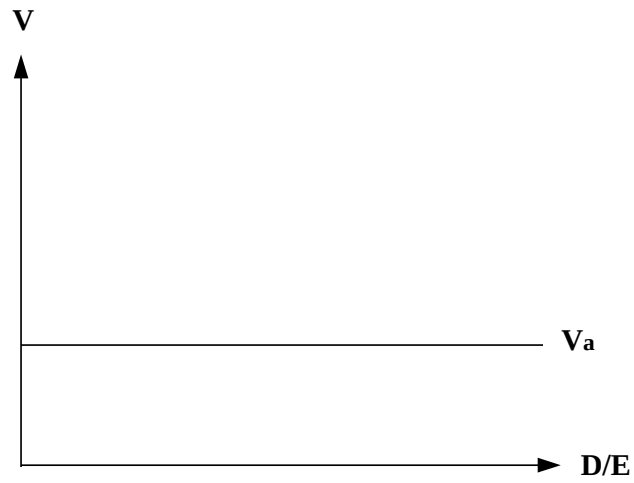
MODIGLIANI & MILLERS' THEORY

Hypothesis: *Efficient Markets*

- perfectly transparent markets and no asymmetric information
- no agency costs
- companies and investors borrow at the same interest rate
- no bankruptcy costs
- no taxes for companies and investors
- homogeneous investor expectations of companies' future incomes
- perfectly rational investors

MODIGLIANI & MILLERS' THEORY

- **1st Proposition**: The Value of company is not affected by its D/E ratio. Company's cost of capital does not depend on its financial structure.
- The theorem states that, in the absence of taxation and in perfect financial markets, the value of a levered company is exactly the same as an unlevered company.



$$V_l = V_u$$

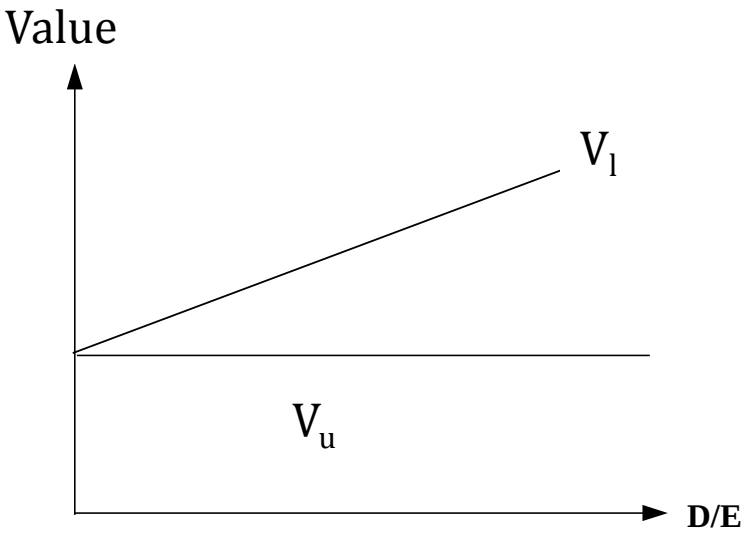
where:

V_u = Value of an unlevered company

V_l = Value of a levered company

MODIGLIANI & MILLERS' THEORY

- HP: Efficient markets but with taxes on companies' profits.
- **2nd Proposition**: The Value of company is affected by its D/E ratio. Thanks to tax benefits resulting from the deductibility of passive interests, a company increases its value by increasing its D/E ratio. In case of inclusion of corporate tax, debt financing becomes an attractive option.



$$V_l = V_u + V_{afb}$$

where:
V_u = Value of an unlevered company
V_l = Value of a levered company
V_{afb} = Actual Value of fiscal benefits

TRADE-OFF THEORY

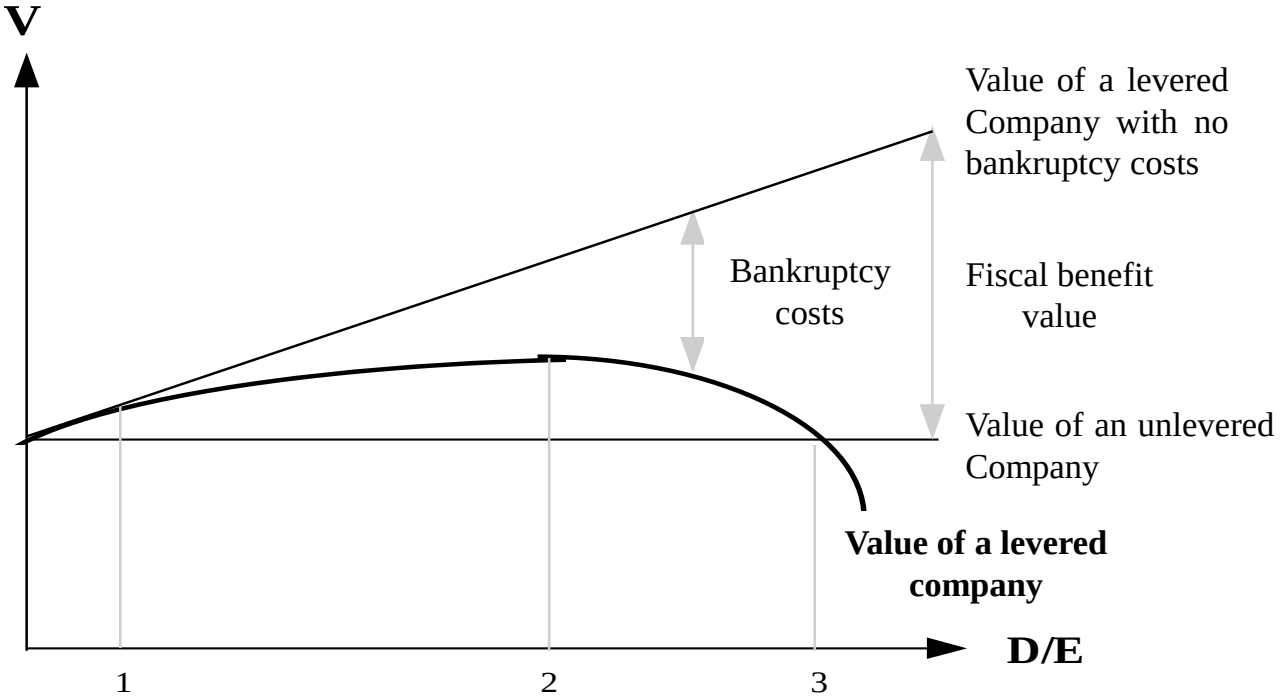
- According to the trade off theory, the higher the debt, the greater the risk that a company will not be able to meet its commitments and get bankrupt.
- When a company is in financial distress, its tax advantage disappears, since it no longer generates sufficient profits.
- Moreover, the high debt level may lead to restructuring costs and lost investment opportunities if financing is no longer available.

TRADE-OFF THEORY

- According to the trade-off theory the optimal debt ratio appears to be when the present value of the tax savings arising on additional borrowing is offset by an increase in the present value of financial distress and bankruptcy costs.

TRADE-OFF THEORY

- Hypothesis: Efficient markets but with taxes on companies' profits and bankruptcy costs



$$V_l = V_u + V_{afb} - V_{abc}$$

where V_{abc} represents the value of Bankruptcy costs

PECKING ORDER THEORY

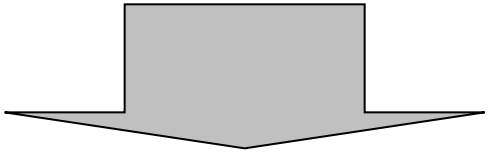
Sources of financing ⇒ internal

⇒ external

1. Self Financing

2. Financial debt

3. Equity increase



Profitability ⇔ D/E Ratio

KEY FACTORS INFLUENCING FINANCIAL DECISIONS

- There are many factors that contribute to the investor's or manager's decision of investing in a project.
- The effective return from the investment may differ from the expected return, mainly due to risk and time, that is the moment in which the effective return will be generated.

RETURN

- The return on investment is the **sum of the cash flows that the project can generate in the future.**
- Cash flows can refer to different management areas, depending on the investment.
- Low levels of uncertainty (low risk) are usually associated with low potential returns, whereas high levels of uncertainty (high risk) are associated with high potential returns.

Risk

- In the valuation process of a company's investment opportunities, it is necessary to forecast the future trend of some factors. The forecasts may be correct or not and the effective result can differ from the expectations.
- The risk of the project consists in the **possibility that effective return can deviate from expected return**.
- **Risk means uncertainty today over the return on a project tomorrow**. The future is unpredictable and therefore there are difficulties in calculation of expected return.

TIME

- Also **TIME has a value** due to the fact that money's value changes with time.
- Every transfer of asset has a cost/return depending if you are investing or raising money.
- The financial value of time is a cost in case of discounting: the money you get in the future could be invested today; the cost is equal to the loss you face not investing the money. On the contrary, it is a return in case of capitalization.
- The discount rate considers time and risk.

Risk and Return

RETURN

$$r = r_f + \text{Expected Risk Premium}$$

Where:

"r_f" = Free Risk Return

"Expected Risk Premium" = expected extra return required by investors for taking on risk

THE RISK/RETURN RELATIONSHIP

HOW TO ESTIMATE FREE RISK RETURN (r_f) AND EXPECTED RISK PREMIUM?

- $\mathbf{r_f}$ = the free risk rate is conventionally the **return on treasury bills**: it is considered unaffected by what happens to the market.
- It is more difficult to calculate the Expected Risk Premium, that is the premium that should persuade the investor to choose one option instead of another. All the factors related to the specific investment must be considered.

THE RISK/RETURN RELATIONSHIP

- Obviously, the aim of every person who is taking the decision is to have high returns and, at the same time, to lower the level of risk as much as possible.
- Assuming that rational investors are risk adverse, the theory developed by **Markowitz (CAPM)** attempts to minimize risk for a given level of expected return. The theory is a formulation of the concept of **diversification in investing**, with the aim of selecting a collection of individual stocks that has collectively lower risk than any individual stock.

THE THEORY OF DIVERSIFICATION

RISK

Possibility that expected return differs from effective return

DIVERSIFICATION

Combination of assets that allows to reduce the whole portfolio risk

(*Markowitz* Theory)

Unique Risk and Market Risk

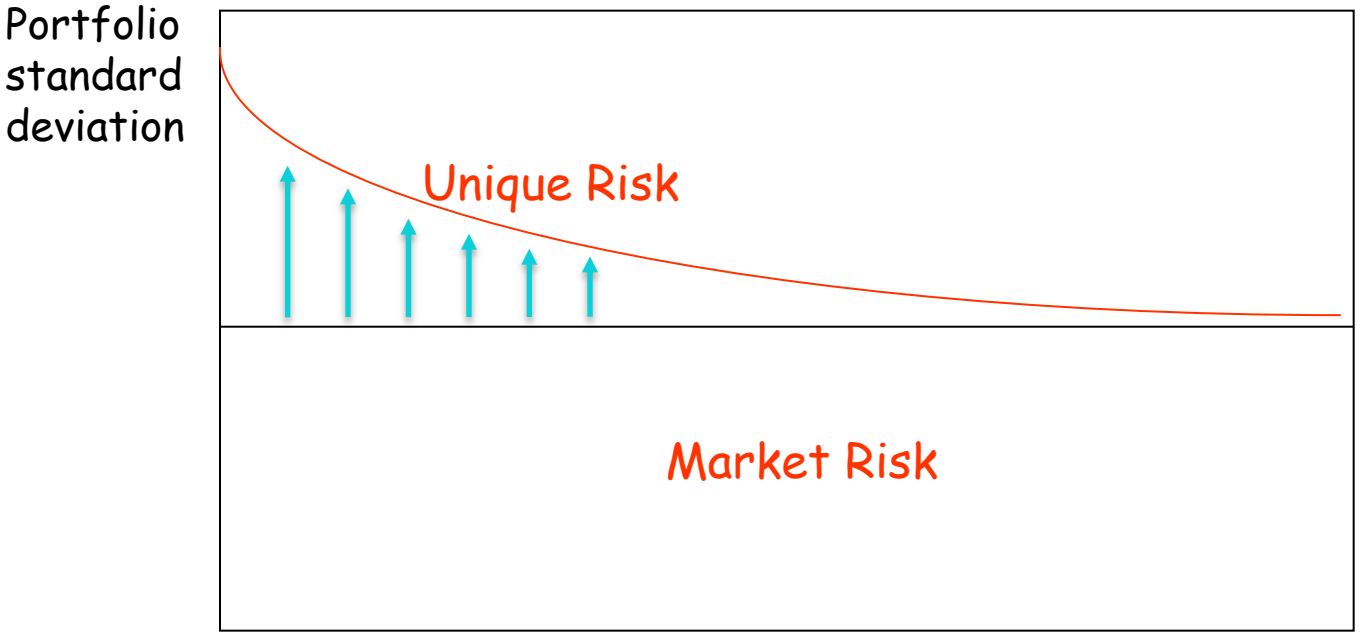
- Diversification allows to reduce portfolios' risk because values of different stocks do not move exactly together.
- It is impossible to totally eliminate risk, because it is impossible to have stock values perfectly uncorrelated; there are common components to all stocks.
- Diversification reduces risk rapidly at first, than more slowly, until the point in which the effect on standard deviation (one way to measure risk) is equal to zero.

UNIQUE RISK AND MARKET RISK

UNIQUE (or SPECIFIC) RISK	PECULIAR TO ONE STOCK	Can be ELIMINATED with diversification
MARKET (or SYSTEMATIC) RISK	RELATED TO ECONOMYWIDE RISKS	Can NOT be ELIMINATED – impossible to avoid.

Unique Risk and Market Risk

What diversification does



THE RISK/RETURN RELATIONSHIP

- The Capital Asset Pricing Model (CAPM) is a theory that allows to determine the relationship between risk and return.
- Considering both market risk and unique risk, the CAPM states that in a competitive market the expected risk premium on each investment is proportional to its SENSITIVITY to market fluctuations ⟶ Beta (β).

CAPITAL ASSET PRICING MODEL (CAPM)

$r = r_f$ + Expected risk premium

Expected risk premium = $\beta \cdot (r_m - r_f)$

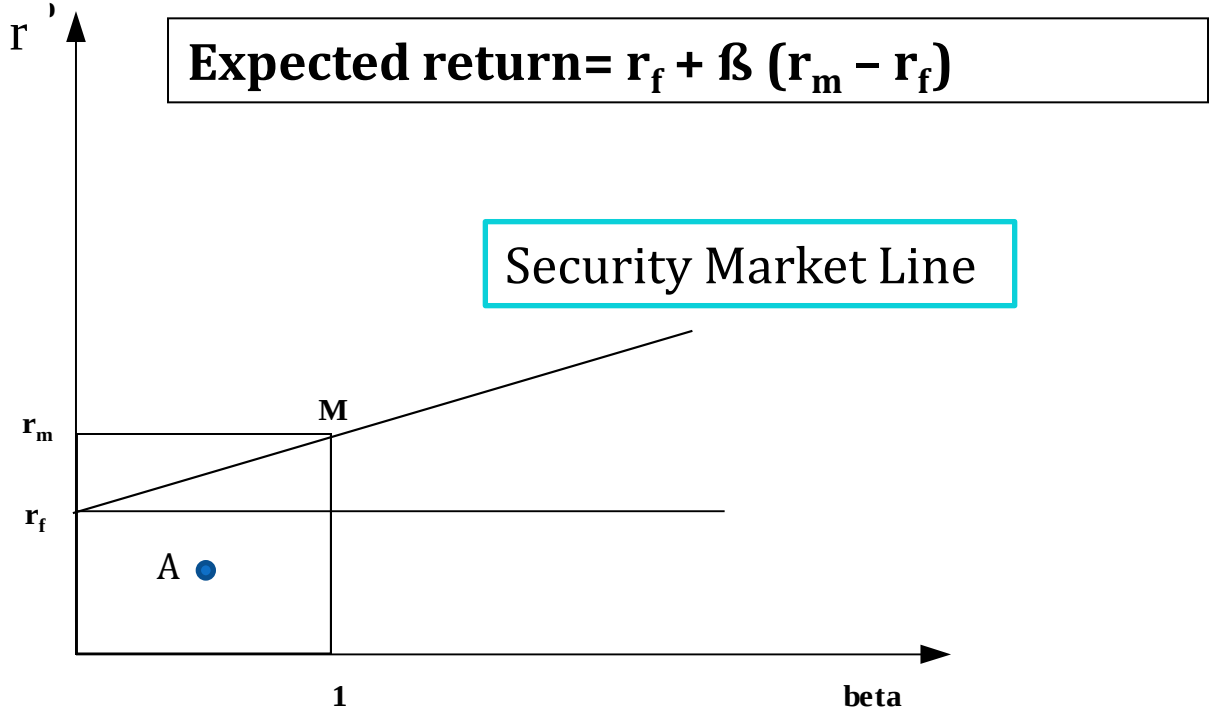
It considers both market risk and unique risk.

Expected return (r) = $r_f + \beta \cdot (r_m - r_f)$

Where:

- r_f is the interest rate free risk, conventionally the return on Treasury Bills
- r_m is the Market Risk Premium, that is higher than the return on Treasury Bills while it includes the risk taken by investors that have choosen a market portfolio.
- $r_m - r_f$ = Market risk premium.

CAPITAL ASSET PRICING MODEL (CAPM)



While expected risk premium varies in proportion to β, all investments plot along the sloping line, known as SECURITY MARKET LINE.

Capital Asset Pricing Model (CAPM)

- **β = 0** – β of risk free assets;
- **β = 1** – β of the market portfolio (all stocks);
- **β > 1** = the portfolio tends to amplify the overall movements of the market;
- **0< β <1** = the portfolio tends to move in the same direction as the market, but with lower intensity – portfolio less affected by market fluctuations.

LIMITS OF CAPM

- Assumption that markets are perfect
- Expected Return
- Risk free

THE COST OF CAPITAL

DEFINITION:

- The company's cost of capital is "the expected return on portfolio of all the company's existing net assets".
- That portfolio is usually financed by DEBT and EQUITY.

ASSUMPTIONS:

- Every company's financial source has a cost.
- The returns to sourcers vary according to the risk they have taken.

↑ RISK = ↑ COST OF CAPITAL

THE COST OF EQUITY CAPITAL (K_E)

- In general terms, in order to estimate "K_e" it is necessary to consider the OPPORTUNITY COST, defined as "the expected return on other securities with the same degree of risk".
- It means that:

  A potential shareholder will invest in a company's capital only if the expected return is at least equal to the return that can be earned in the capital market on securities of comparable risk.

THE COST OF EQUITY CAPITAL (K_E)

- K_e can be estimated through the application of several methods. The most frequently used are:

1. The Capital Asset Pricing Model (CAPM), so that

$$\mathbf{K_e = r = r_f + Risk\ Premium}$$

2. K_e based on Current Market Prices. When it is possible to estimate the enterprise market value, the correct ratio to calculate K_e is:

$$\mathbf{K_e = EPS / P^*}$$

Where: EPS = Earning per Share; P*= Market Value per Share.

The cost of Debt (K_D)

- The cost of debt is the effective interest rate that a company pays on its current debt.

$$K_d = i\,(1-t)$$

Where:

i = Interest Rate on Debt

(1-t) = Fiscal Effect due to interest tax shield

The Weighted-Average Cost of Capital (WACC)

- A company can decide to finance itself with either debt or equity.
- The WACC is the average rate of return demanded by investors in the company's debt and equity securities:

$$\mathbf{WACC = [K_e * E / (E + D)] + [K_d * D / (E + D)]}$$

Where:

E = Equity

D = Debt

$K_e > WACC > K_d$

1st EXERCISE - CALCULATE WACC

Profit & Loss	2012
Revenues	13.418
Ebitda	1.197
Depreciation tang & int assets	(565)
Ebit	632
Financial expenses & income	(570)
Taxes	(124)
Net income / (Loss)	(62)

k(e)	8%
k(d)	4%

Balance Sheet			
Assets	2012	Liabilities	2012
Intangible assets	1.412	Short term debts	5.561
Tangible assets	9.874	Long term debts	5.875
Financial assets	42	Accounts payable	2.202
Inventories	8.151	Others payable	750
Accounts receivable	1.507	ETP fund	572
Others receivable	600	Equity & reserves	6.811
Cash & cash equivalents	123	Profit	(62)
Total	21.709	Total	21.709

1st EXERCISE - SOLUTION

Equity + Profit	6.749
K(e)	8%
Debt + Equity + Profit	18.185
	0,0297
Debt	11.436
k(d)	4%
Debt + Equity + Profit	18.185
	0,0252
Total	0,0548
WACC	5,5%

2nd EXERCISE - CALCULATE WACC

Profit & Loss	
	2011
Revenues	29.508
Operating Costs	25.199
Ebitda	4.309
Deprec. Technical assets	(1.057,5)
Ebit	3.251
Financial expenses	(527,1)
EBT	2.724
Taxes	(980,5)
Net income	1.744

k(e)=7%
k(d)=4%

Balance sheet			
Assets	2011	**Liabilities**	2011
Technical assets	6.967	Long term financial loan	7.147
Accounts receivable	13.819	Accounts payable	6.871
Inventories	5.542	ETP fund	1.472
Cash&cash equivalents	1.104	Equity	10.198
		Profit	1.744
Total	27.432	Total	27.432

2nd EXERCISE - SOLUTION

Equity + Profit	11.942
K(e)	7%
Debt + Equity + Profit	19.089
	0,044
Debt	7.147
k(d)	4%
Debt + Equity + Profit	19.089
	0,015
Total	0,059
WACC	5,9%