

# Corporate Finance

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Introduction to Corporate Finance

# Literature

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## Basic Literature

■ **Ross/Westerfield/Jordan:** *Fundamentals of Corporate Finance*, 6<sup>th</sup>ed., Irwin McGraw-Hill

## Additional Literature

■ **Arnold:** *Corporate Financial Management*, 2<sup>nd</sup>ed., Prentice Hall

■ **Günther/Schittenhelm:** *Investition und Finanzierung*, Schaeffer-Poeschel

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## Introduction to Corporate Finance

1. Introduction
2. Financial Planning
3. Investment Criteria
4. Project Analysis and Evaluation
5. Sources of Finance - Equity
6. Sources of Finance - Debt

## 2. Introduction to Corporate Finance

### Learning Target Corporate Finance

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**The learning target of this chapter is to understand**

- ✓ **the goals of financial management,**
- ✓ **the essentials of financial planning,**
- ✓ **how to apply different investment criteria,**
- ✓ **different sources of equity financing,**
- ✓ **different sources of debt financing.**

## 2. Introduction to Corporate Finance

### 2.1. Introduction

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A young man asked an old rich man how he made his money.

The old guy fingered his worsted wool vest and said, "Well, son, it was 1932. The depth of the Great Depression. I was down to my last nickel."

"I invested that nickel in an apple. I spent the entire day polishing the apple and, at the end of the day, I sold the apple for ten cents."

"The next morning, I invested those ten cents in two apples. I spent the entire day polishing them and sold them at 5:00 pm for 20 cents. I continued this system for a month, by the end of which I'd accumulated a fortune of \$1.37."

"Then my wife's father died and left us two million dollars."

## 2. Introduction to Corporate Finance

### 2.1. Introduction (2)

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#### Three equivalent goals of financial management:

- Maximize shareholder wealth
- Maximize share price
- Maximize firm value

#### Fundamental questions:

1. What long-term investments should you take on?
2. Where will you get the long-term financing to pay for your investment?
3. How to manage the everyday financial activities? Collecting from customers; paying suppliers.

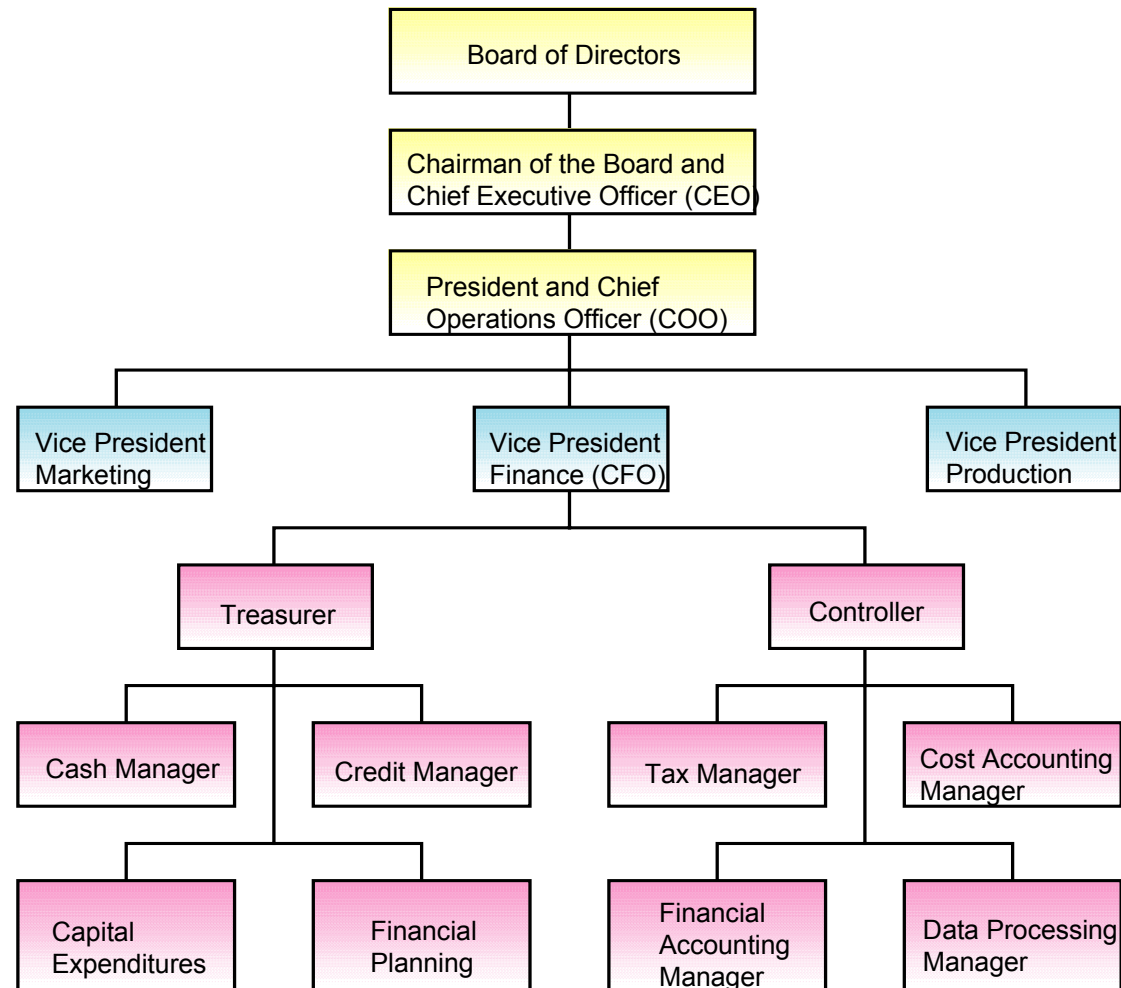
What are firm decision-makers hired to do?

“General Motors is not in the business of making automobiles. General Motors is in the business of making money.”  
Alfred P. Sloan

## 2. Introduction to Corporate Finance

### 2.1. Introduction (3)

#### Organisational chart



Source: Ross et.al., „Fundamentals of Corporate Finance“, Irwin McGraw-Hill

## 2. Introduction to Corporate Finance

### 2.1. Introduction (4)

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#### Forms of Organisation

- Sole Proprietorship
- Partnership
  - General Partnership / Limited Partnership
- Corporation
  - Limited Liability Company

#### Legal Considerations

How do owners' roles differ across organizational forms?

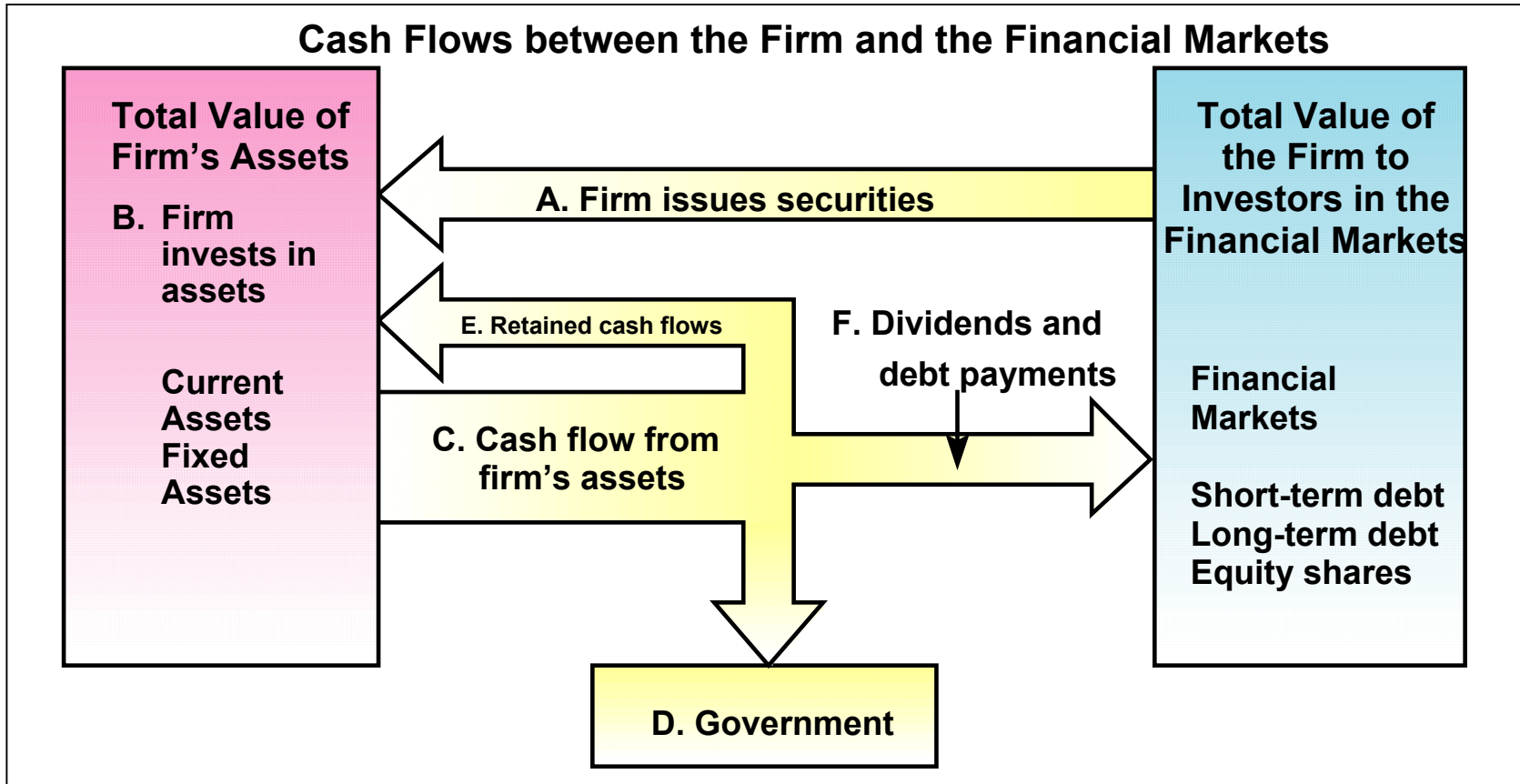
#### Economic Considerations

Why are corporations generally larger than other forms of business?

## 2. Introduction to Corporate Finance

### 2.1. Introduction (5)

#### What is the role of financial markets in corporate finance?



## 2. Introduction to Corporate Finance

### 2.2. Financial Planning

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#### **Sales Forecast**

- Drives the model

#### **Pro Forma Statements**

- The output summarizing different projections

#### **Asset Requirements**

- Investment needed to support sales growth

#### **Financial Requirements**

- Debt and dividend policies

#### **The “Plug”**

- Designated source(s) of external financing

#### **Economic Assumptions**

- State of the economy, interest rates, inflation

## 2. Introduction to Corporate Finance

### 2.2. Financial Planning (2)

#### Example

Current Financial Statements

Income Statement	
Sales	100
- Costs	- 90
Net income	10

Balance Sheet			
Assets	50	Debt	20
		Equity	30
Total	50	Total	50

#### Assume that:

1. sales are projected to rise by 25%
2. the debt/equity ratio stays at 2/3
3. costs and assets grow at the same rate as sales

## 2. Introduction to Corporate Finance

### 2.2. Financial Planning (3)

#### Example

#### Pro Forma Financial Statements

Income Statement	
Sales	125
- Costs	- 112,5
Net income	12,5

Balance Sheet			
Assets	62,5	Debt	26,25
		Equity	36,25
Total	62,5	Total	62,5

#### What's the plug?

Suppose that:

- half of net income is paid out in dividends.
- new equity sales are not feasible.

What's up with this example? These assumptions are not consistent.

## 2. Introduction to Corporate Finance

### 2.2.1. The Percentage of Sales Approach

<b>Income Statement</b>		
Projected growth 20%		
	Original	Pro forma
Sales	100.000	120.000
- Costs	60.000	72.000
Taxable Income	40.000	48.000
- Taxes (25%)	10.000	12.000
Net income	30.000	36.000
Dividends	20.000	24.000
Retained Earnings	10.000	12.000

## 2. Introduction to Corporate Finance

### 2.2.1. The Percentage of Sales Approach (2)

<b>Balance Sheet</b>					
preliminary projection					
<b>Assets</b>	<b>Original</b>	<b>Pro forma</b>	<b>Liabilities and equity</b>	<b>Original</b>	<b>Pro forma</b>
Cash	5.000	6.000	A/P	5.000	6.000
A/R	5.000	6.000	Notes payable	10.000	??
Inventory	20.000	24.000	LTD	40.000	??
Fixed Assets	70.000	84.000	Equity	10.000	??
			Retained/E	35.000	47.000
<b>Total</b>	<b>100.000</b>	<b>120.000</b>	<b>Total</b>	<b>100.000</b>	<b>53.000</b>

- Assets grow by 20.000 (financing needed)
- Internal financing: 13.000
  - ➔ external financing needed: 7.000

## 2. Introduction to Corporate Finance

### 2.2.1. The Percentage of Sales Approach (3)

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#### **Possible financing strategies**

1. Borrow short-term first
2. If needed, borrow long-term next
3. Reduce dividend payments
4. Sell equity as a last resort

#### **Possible constraints**

1. Current ratio must not fall below 2.0.
2. Total debt ratio must not rise above 0.60.

## 2. Introduction to Corporate Finance

### 2.2.1. The Percentage of Sales Approach (4)

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#### Consequences

1. Possible short-term borrowing:  
Current ratio  $> 2,0 \rightarrow$  Current Assets / Current Liabilities  $> 2,0$   
 $\rightarrow$  Current Liabilities  $< 0,5 * \text{Current Assets}$   
 $\rightarrow$  Notes payable  $< 0,5 * 36.000 - 6.000$  (Accounts payable)  
 $\rightarrow$  Notes payable  $< 12.000$  (new financing possible: 2.000)
2. Possible long-term borrowing:  
Debt ratio  $< 0,6 \rightarrow$  Liabilities / Total  $< 0,6$   
 $\rightarrow$  LTD + Current Liabilities  $< 0,6 * 120.000 = 72.000$   
 $\rightarrow$  LTD  $< 72.000 - 18.000 = 54.000$  (new financing possible: 14.000)
3. Reduction of dividend payments not necessary

## 2. Introduction to Corporate Finance

### 2.2.1. The Percentage of Sales Approach (5)

<b>Balance Sheet</b>					
preliminary projection					
<b>Assets</b>	<b>Original</b>	<b>Pro forma</b>	<b>Liabilities and equity</b>	<b>Original</b>	<b>Pro forma</b>
Cash	5.000	6.000	A/P	5.000	6.000
A/R	5.000	6.000	Notes payable	10.000	<b>10.000</b>
Inventory	20.000	24.000	LTD	40.000	<b>47.000</b>
Fixed Assets	70.000	84.000	Equity	10.000	<b>10.000</b>
			Retained/E	35.000	47.000
<b>Total</b>	<b>100.000</b>	<b>120.000</b>	<b>Total</b>	<b>100.000</b>	<b>53.000</b>

- External financing needed: 7.000
- Possible Plan: only long-term financing

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity

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#### Definition

Cash flow from assets = Cash flow to creditors + Cash flow to stockholders

**1. Cash flow from assets** = Operating cash flow  
– Net capital spending  
– Additions to net working capital (NWC)

where:

Operating cash flow = EBIT + Accruals + Depreciation – Taxes

Net capital spending = Ending NFA – Beginning NFA + Depreciation

Change in NWC = Ending NWC – Beginning NWC

**2. Cash flow to creditors** = Interest paid – Net new borrowing

**3. Cash flow to stockholders** = Dividends paid – Net new equity raised

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (2)

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#### Example

The business projection (i.e. the projection of the financial statements) of Complex Corp. led to the following result.

Determine the cash flow identity!

Remark:

- At the end of year 05 the company will be liquidated and all assets are sold.

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (3)

#### Pro forma financial statements:

<i>Balance Sheet</i>	Year 01	Year 02	Year 03	Year 04	Year 05
Assets					
Current Assets	300	900	1.450	2.000	0
Net Fixed Assets	2.000	1.500	1.000	500	0
Liabilities/Equity					
Current Liabilities	0	600	600	600	0
Long Term Debt	1.300	800	800	800	0
Common Stock / R/E	1.000	1.000	1.050	1.100	0

<i>Income Statement</i>	Year 01	Year 02	Year 03	Year 04	Year 05
Sales	0	1.300	1.900	2.500	3.000
Cost of Goods Sold	0	- 800	- 1.000	- 1.100	- 1.200
Depreciation	0	- 500	- 500	- 500	- 500
EBIT	0	0	400	900	1.300
Taxes (50%)	0	0	- 200	- 450	- 650
Net income	0	0	200	450	650
Retained Earnings	0	0	50	50	0

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (4)

#### Cash flow identity:

Cash flow from assets	Year 01	Year 02	Year 03	Year 04	Year 05
EBIT	0	0	+ 400	+ 900	+ 1.300
+ Depreciation	0	+ 500	+ 500	+ 500	+ 500
- Taxes	0	0	- 200	- 450	- 650
+ Operating cash flow	+ 0	+ 500	+ 700	+ 950	+ 1.150
- Net capital spending	- 2.000	- 0	- 0	- 0	- 0
- Change in NWC	- 300	- 0	- 550	- 550	+ 1.600
Cash flow	- 2.300	+ 500	+ 150	+ 400	+ 2.750

Cash flow to creditors	Year 0	Year 1	Year 2	Year 3	Year 4
Interest paid	0	0	0	0	0
- net new borrowing	- 1.300	+ 500	- 0	- 0	+ 1.000
Cash flow	- 1.300	+ 500	0	0	+ 1.000

Cash flow to stockholders	Year 0	Year 1	Year 2	Year 3	Year 4
Dividends paid	0	0	150	400	650
- new equity raised	- 1.000	- 0	- 0	- 0	+ 1.100
Cash flow	- 1.000	+ 0	+ 150	+ 400	+ 1.750

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (5)

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#### Example

In order to make an investment decision for a project for XY company, we prepare a set of pro forma financial statements for the project.

Assume the following background information:

1. Project life is 4 years.
2. Income statement is constant over 4 years period.
3. Sales are 100.000 € per year.
4. Variable costs are 50.000 € per year. Fixed costs are 20.000 € per year.
5. Project has no salvage value.
6. Project cost is 40.000 €. Depreciation is 10.000 € per year.
7. Net working capital is 20.000 €.
8. The firm's required return is 20%. The tax rate is 50%.

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (6)

#### Example (continued): Pro forma statements

<i>Income Statement</i>	Year 0	Year 1	Year 2	Year 3	Year 4
Sales	0	100.000	100.000	100.000	100.000
Variable Costs	0	- 50.000	- 50.000	- 50.000	- 50.000
Fixed Costs	0	- 20.000	- 20.000	- 20.000	- 20.000
Depreciation	0	- 10.000	- 10.000	- 10.000	- 10.000
EBIT	0	20.000	20.000	20.000	20.000
Taxes (50%)	0	- 10.000	- 10.000	- 10.000	- 10.000
Net income	0	10.000	10.000	10.000	10.000

<i>Balance Sheet</i>	Year 0	Year 1	Year 2	Year 3	Year 4
Assets					
Net Working Capital	20.000	20.000	20.000	20.000	0
Net Fixed Assets	40.000	30.000	20.000	10.000	0

## 2. Introduction to Corporate Finance

### 2.2.2. The Cash Flow Identity (7)

#### Example (continued): Projected cash flows – cash flow identity

Cash flow from assets	Year 0	Year 1	Year 2	Year 3	Year 4
EBIT	0	20.000	20.000	20.000	20.000
+ Depreciation	+ 0	+ 10.000	+ 10.000	+ 10.000	+ 10.000
- Taxes	- 0	- 10.000	- 10.000	- 10.000	- 10.000
+ Operating cash flow	+ 0	+ 20.000	+ 20.000	+ 20.000	+ 20.000
- Net capital spending	- 40.000	- 0	- 0	- 0	- 0
- Change in NWC	- 20.000	- 0	- 0	- 0	+ 20.000
Cash flow	- 60.000	+ 20.000	+ 20.000	+ 20.000	+ 40.000

Cash flow to creditors	Year 0	Year 1	Year 2	Year 3	Year 4
Interest paid	0	0	0	0	0
- net new borrowing	- 0	- 0	- 0	- 0	- 0
Cash flow	0	0	0	0	0

Cash flow to stockholders	Year 0	Year 1	Year 2	Year 3	Year 4
Dividends paid	0	10.000	10.000	10.000	10.000
- new equity raised	- 60.000	+ 10.000	+ 10.000	+ 10.000	+ 30.000
Cash flow	- 60.000	+ 20.000	+ 20.000	+ 20.000	+ 40.000

## 2. Introduction to Corporate Finance

### 2.3. Investment Criteria

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#### Definition

A cash flow stream describes all positive and negative cash flows that are caused by an investment or a financing.

The cash flow stream is called simple if the sign of the cash flows does not change more than once.

**notation:**  $(z_0; z_1; z_2; \dots; z_n)$

#### Example

A company plans to build a new plant. Net capital spending is 6 million € in  $t=0$  and 4 million € in  $t=1$ .

The expected profit (cash flow) for each of the following 10 years is: 1 million €.

In  $t=11$  the plant is expected to be sold for 3 million € .

**Cash flow stream:**  $(-6; -4; 1; 1; 1; 1; 1; 1; 1; 1; 1; 4)$

## 2. Introduction to Corporate Finance

### 2.3. Investment Criteria (2)

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#### Definition

The net present value (NPV) of an investment or an investment project is the discounted cash flow stream of the project.

It can be calculated by adding up the single discounted cash flows with a discount rate  $i$ .

$$NPV = \frac{z_0}{(1+i)^0} + \frac{z_1}{(1+i)^1} + \frac{z_2}{(1+i)^2} + \dots + \frac{z_n}{(1+i)^n} = \sum_{t=0}^n \frac{z_t}{(1+i)^t}$$

#### Remarks

- The discount rate  $i$  has a great impact on the NPV.
- The discount rate is determined by the investor considering aspects of risk and profit margins.
- Different discount rates are possible:  $i_1, i_2$ , etc..

## 2. Introduction to Corporate Finance

### 2.3. Investment Criteria (3)

#### Example 1

Purchase of a share.

*Cash flow stream: (-180; 3; 3; 4; 230)*

$$a) \quad i=10\% \quad NPW = \frac{-180}{(1,1)^0} + \frac{3}{(1,1)^1} + \frac{3}{(1,1)^2} + \frac{4}{(1,1)^3} + \frac{230}{(1,1)^4} = -14,7$$

$$b) \quad i=5\% \quad NPW = \frac{-180}{(1,05)^0} + \frac{3}{(1,05)^1} + \frac{3}{(1,05)^2} + \frac{4}{(1,05)^3} + \frac{230}{(1,05)^4} = 18,26$$

#### Example 2

Building of a new plant.

*Cash flow stream: (-6; -4; 1; 1; 1; 1; 1; 1; 1; 1; 4) with  $i=10\%$*

Is there a different (easier) way to calculate NPV in this case?

## 2. Introduction to Corporate Finance

### 2.3. Investment Criteria (4)

For cash flow streams of the form

$$(z_0; z_1; z_2 = z_1; z_3 = z_1; \dots; z_n = z_1) = (z_0; z_1; z_1; z_1; \dots; z_1)$$

one can calculate the NPV by using the following formula (see chapter 0):

$$\begin{aligned} NPV &= \frac{z_0}{(1+i)^0} + \frac{z_1}{(1+i)^1} + \frac{z_1}{(1+i)^2} + \dots + \frac{z_1}{(1+i)^n} \\ &= z_0 + z_1 \cdot \left[ \sum_{t=1}^n (1+i)^{-t} \right] = z_0 + z_1 \cdot \left[ \frac{(1+i)^n - 1}{i \cdot (1+i)^n} \right] \end{aligned}$$

### Example

Consider the following cash flow stream:  $(-100; 50; 50; 50; 50; 50)$

For  $i = 10\%$ :

$$NPV = \frac{-100}{(1,1)^0} + \frac{50}{(1,1)^1} + \frac{50}{(1,1)^2} + \frac{50}{(1,1)^3} + \frac{50}{(1,1)^4} + \frac{50}{(1,1)^5} = -100 + 50 \cdot \frac{1,1^5 - 1}{0,1 \cdot 1,1^5} = 89,54$$

## 2. Introduction to Corporate Finance

### 2.3.1. The NPV Criteria

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#### Method

Calculate the NPV of the cash flow stream.

#### Advantageousness

NPV greater than zero ( $\text{NPV} > 0$ ).

#### Comparison of alternatives

Choose alternative with greatest NPV.

#### Remarks

- An investment with positive NPV is absolutely advantageous.
- The investment with maximum NPV is optimal.
- The investor has to determine an appropriate discount rate.

## 2. Introduction to Corporate Finance

### 2.3.1. The NPV Criteria (2)

#### Example

Mr. Schmidt needs a new machine for his printing shop. There are two alternatives available. Machine 1 can be operated for a 5-years period but has a smaller capacity and therefore makes less profit than machine 2 which can be used for 3 years.

Mr. Schmidt expects the following cash flow streams for the two alternatives:

a) (-100; 50; 50; 50; 50; 50)

b) (-60; 60; 60; 60)

For  $i = 10\%$ :

$$NPV = \frac{-100}{(1,1)^0} + \frac{50}{(1,1)^1} + \frac{50}{(1,1)^2} + \frac{50}{(1,1)^3} + \frac{50}{(1,1)^4} + \frac{50}{(1,1)^5} = -100 + 50 \cdot \frac{1,1^5 - 1}{0,1 \cdot 1,1^5} = 89,54$$

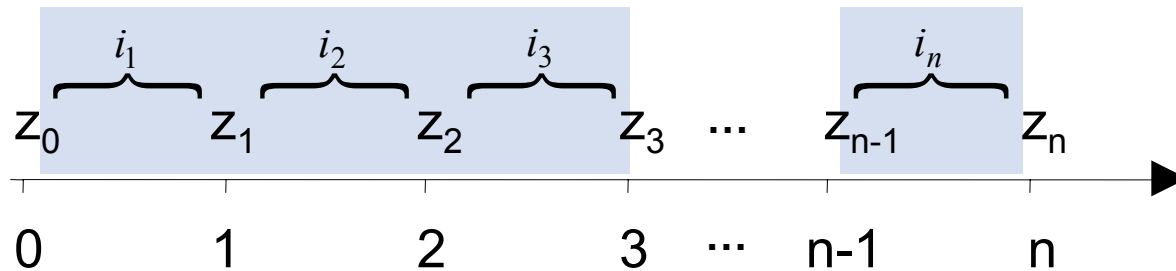
$$NPV = \frac{-60}{(1,1)^0} + \frac{60}{(1,1)^1} + \frac{60}{(1,1)^2} + \frac{60}{(1,1)^3} = -60 + 60 \cdot \frac{1,1^3 - 1}{0,1 \cdot 1,1^3} = 89,21$$

**What is your recommendation for Mr. Schmidt?**

## 2. Introduction to Corporate Finance

### 2.3.1. The NPV Criteria (3)

#### NPV Criteria with variable discount rates



$$NPV = z_0 + \frac{z_1}{(1+i_1)} + \frac{z_2}{(1+i_1)(1+i_2)} + \dots + \frac{z_n}{(1+i_1)(1+i_2)\dots(1+i_n)}$$

$$\text{with : } \prod_{\tau=1}^t (1+i_\tau)^{-1} = \frac{1}{(1+i_1)(1+i_2)\dots(1+i_t)}$$

$$NPV = \sum_{t=0}^n z_t \cdot \prod_{\tau=1}^t (1+i_\tau)^{-1}$$

## 2. Introduction to Corporate Finance

### 2.3.1. The NPV Criteria (4)

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#### NPV Criteria with variable discount rates

Different discount (interest) rates:

#### Spot Rates

- Interest rates for an entire time to maturity from  $t_0$  to  $t_n$
- Common for zero bonds
- Formula:

$$i_{0,n} = \sqrt[n]{\frac{P_n}{P_0}} - 1$$

#### Forward Rates

- Interest rates for a period in the future, for example from  $t_1$  to  $t_2$
- Formula:

$$i_{t_1,t_2} = \sqrt[t_2-t_1]{\frac{P_{t_2}}{P_{t_1}}} - 1$$

## 2. Introduction to Corporate Finance

### 2.3.1. The NPV Criteria (5)

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#### Example (NPV Criteria with variable discount rates)

You receive an offer for an investment with a cash flow stream of (-100, 50, 30, 40). To evaluate the investment you use the following discount rates:  $i_1 = 7\%$ ,  $i_2 = 8\%$  and  $i_3 = 9\%$ . Is the investment advantageous?

#### Solution

Calculation of NPV.

$$NPV = \sum_{t=0}^3 z_t \cdot \prod_{\tau=1}^t (1 + i_{\tau})^{-1} = -100 + \frac{50}{1,07} + \frac{30}{1,07 \cdot 1,08} + \frac{40}{1,07 \cdot 1,08 \cdot 1,09} = 4,45$$

Since  $NPV > 0$ , the investment is advantageous.

## 2. Introduction to Corporate Finance

### 2.3.2. The Internal Rate of Return

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#### Method

The internal rate of return (IRR) is the discount rate that makes the NPV equal to zero.

#### Advantageousness

If IRR exceeds the required return.

#### Comparison of alternatives

Choose alternative with greatest IRR (if greater than required return).

#### Necessary features of the investment:

- cash flow stream starts with cash outflow (investment)
- simple cash flow stream
- sum of cash inflows  $>$  sum of cash outflows
  - otherwise there might be no rational solution

## 2. Introduction to Corporate Finance

### 2.3.2. The Internal Rate of Return (2)

#### Calculation methods

- One or two periods → analytical calculation possible
- Otherwise
  - Approximation,
  - Iteration method, for example Newton-iteration,
  - calculation programme, for example Excel.

#### Special cases

- Zero bond → simple calculation of IRR possible

$$NPV = -P_0 + \frac{P_n}{(1+i)^n} = 0 \Rightarrow P_0 \cdot (1+i)^n = P_n \Rightarrow i = \sqrt[n]{\frac{P_n}{P_0}} - 1$$

with  $P_n$  : face value     $P_0$  : price of bond

- Bond with constant coupon and face value = price of bond → IRR = coupon

## 2. Introduction to Corporate Finance

### 2.3.3. The Annuity Method

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#### Method

Transform cash flow stream into an annuity without initial cash outflow.

#### Advantageousness

If annuity is positive.

#### Comparison of alternatives

Choose alternative with greatest annuity (if positive).

#### Determination of annuity:

Annuity A with cash flow stream  $(z_0 = 0; z_1 = A; z_2 = A; z_3 = A; \dots; z_n = A) = (0; A; \dots; A)$

$$\text{Since } NPV = \frac{A}{(1+r)^1} + \frac{A}{(1+r)^2} + \dots + \frac{A}{(1+r)^n} = A \cdot \left[ \frac{(1+r)^n - 1}{r \cdot (1+r)^n} \right]$$

$$\text{follows } A = NPV \cdot \left[ \frac{r \cdot (1+r)^n}{(1+r)^n - 1} \right]$$

## 2. Introduction to Corporate Finance

### 2.3.3. The Annuity Method (2)

#### Example

Mr. Schmidt receives a third competitive offer. The third machine can be operated for 5 years just like machine 1 but is slightly less expensive. During the first years productivity of machine 3 is even higher but reduces after year 3. Mr. Schmidt expects the following cash flow stream: c) (-93,58; 60; 60; 60; 30; 20)

Mr. Schmidt wants to make his decision based on the annuity method.

$$r = 10\%: \quad NPV = \frac{-93,58}{(1,1)^0} + \frac{60}{(1,1)^1} + \frac{60}{(1,1)^2} + \frac{60}{(1,1)^3} + \frac{30}{(1,1)^4} + \frac{20}{(1,1)^5} = -93,58 + 182,12 = 88,54$$

$$\Rightarrow A (\text{Maschine 1}) = NPV \cdot \left[ \frac{r \cdot (1+r)^n}{(1+r)^n - 1} \right] = (89,54) \cdot \left[ \frac{0,1 \cdot (1+0,1)^5}{(1+0,1)^5 - 1} \right] = 23,62$$

$$\Rightarrow A (\text{Maschine 2}) = NPV \cdot \left[ \frac{r \cdot (1+r)^n}{(1+r)^n - 1} \right] = (89,21) \cdot \left[ \frac{0,1 \cdot (1+0,1)^3}{(1+0,1)^3 - 1} \right] = 35,87$$

$$\Rightarrow A (\text{Maschine 3}) = NPV \cdot \left[ \frac{r \cdot (1+r)^n}{(1+r)^n - 1} \right] = (88,54) \cdot \left[ \frac{0,1 \cdot (1+0,1)^5}{(1+0,1)^5 - 1} \right] = 23,36$$

#### How does he decide?

## 2. Introduction to Corporate Finance

### 2.3.4. The Discounted Payback Rule

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#### Method

The discounted payback period is the length of time until the sum of the discounted cash flows of the investment is greater than zero. It is often considered a measure of the inherent risk of an investment.

#### Advantageousness

If payback period is less than some required minimum period.

#### Comparison of alternatives

Choose alternative with shortest payback period.

#### Determination of payback period:

Determine minimum period:  $\min \{ T \mid NPV(T) = -z_0 + \sum_{t=1}^T \frac{z_t}{(1+r)^t} \geq 0 \}$

## 2. Introduction to Corporate Finance

### 2.3.4. The Discounted Payback Rule (2)

#### Example

Eventually, Mr. Schmidt wants to compare the discounted payback periods of the machines 1 and 3.

Machine 1	Machine 3
NPV(T=1)= -54,55	<b>NPV(T=1)= -39,03</b>
<b>NPV(T=2)= -13,22</b>	<b>NPV(T=2)= 10,55</b>
<b>NPV(T=3)= 24,34</b>	NPV(T=3)= 55,63
NPV(T=4)= 58,49	NPV(T=4)= 76,12
NPV(T=5)= 89,54	NPV(T=5)= 88,54

**What is Mr. Schmidt's final decision?**

## 2. Introduction to Corporate Finance

### 2.3.5. Summary

---

#### Net Present Value Criteria

- Does the investment create additional value?
- Does the wealth of the investor change?

#### Internal Rate of Return

- What is the return of the invested capital?

#### Annuity Method

- To which constant cash flow (annuity) does the NPV of the investment correspond?
- Alternative description of the NPV.

#### Discounted Payback Rule

- How long does it take to pay back the investment?
- What is the risk of the investment?

## 2. Introduction to Corporate Finance

### 2.4. Project Analysis and Evaluation

---

#### Previous Example

In order to make an investment decision for a project for XY company, we prepare a set of pro forma financial statements for the project.

Assume the following background information:

1. Project life is 4 years.
2. Income statement is constant over 4 years period.
3. Sales are 100.000 € per year.
4. Variable costs are 50.000 € per year. Fixed costs are 20.000 € per year.
5. Project has no salvage value.
6. Project cost is 40.000 €. Depreciation is 10.000 € per year.
7. Net working capital is 20.000 €.
8. The firm's required return is 20%. The tax rate is 50%.

## 2. Introduction to Corporate Finance

### 2.4. Project Analysis and Evaluation (2)

#### Example (continued): NPV calculation

Cash flow from assets	Year 0	Year 1	Year 2	Year 3	Year 4
EBIT	0	20.000	20.000	20.000	20.000
+ Depreciation	+ 0	+ 10.000	+ 10.000	+ 10.000	+ 10.000
- Taxes	- 0	- 10.000	- 10.000	- 10.000	- 10.000
+ Operating cash flow	+ 0	+ 20.000	+ 20.000	+ 20.000	+ 20.000
- Net capital spending	- 40.000	- 0	- 0	- 0	- 0
- Change in NWC	- 20.000	- 0	- 0	- 0	+ 20.000
Cash flow	- 60.000	+ 20.000	+ 20.000	+ 20.000	+ 40.000

$$NPV = \sum_{t=0}^T \frac{c_t}{(1+i)^t} = -60.000 + \frac{20.000}{1,2} + \frac{20.000}{1,2^2} + \frac{20.000}{1,2^3} + \frac{40.000}{1,2^4} = 1.419,75$$

## 2. Introduction to Corporate Finance

### 2.4. Project Analysis and Evaluation (3)

---

#### Exercise

The following information about a project of Success company is given. The company wants to calculate the NPV of the project.

Prepare a set of pro forma financial statements for the project and calculate the NPV.

1. Project life is 3 years.
2. Income statement is constant over 3 years period.
3. Sales are 400.000 € per year.
4. Cost of Goods Sold are 300.000 € per year.
5. The salvage value of the project is 40.000 €.
6. Project cost is 180.000 €. Depreciation is 60.000 € per year.
7. Net working capital is 50.000 €.
8. The firm's required return is 20%. The tax rate is 50%.

## 2. Introduction to Corporate Finance

### 2.4. Project Analysis and Evaluation (4)

#### Solution

#### Pro forma statements

<i>Income Statement</i>	Year 0	Year 1	Year 2	Year 3
Sales				
Cost of Goods Sold				
Depreciation				
EBIT				
Taxes (50%)				
Net income				

<i>Balance Sheet</i>	Year 0	Year 1	Year 2	Year 3
Assets				
Net Working Capital				
Net Fixed Assets				

## 2. Introduction to Corporate Finance

### 2.4. Project Analysis and Evaluation (5)

#### Solution (continued)

Projected cash flows

After-tax salvage value:

Cash flow from assets	Year 0	Year 1	Year 2	Year 3
EBIT				
+ Depreciation				
- Taxes				
+ Operating cash flow				
- Net capital spending				
- Change in NWC				
Cash flow				

## 2. Introduction to Corporate Finance

### 2.5. Sources of Finance - Equity

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An angel appears at a faculty meeting and tells the dean that in return for his unselfish and exemplary behaviour, the Lord will reward him with his choice of infinite wealth, infinite wisdom, or infinite beauty. Without hesitating, the dean selects infinite wisdom.

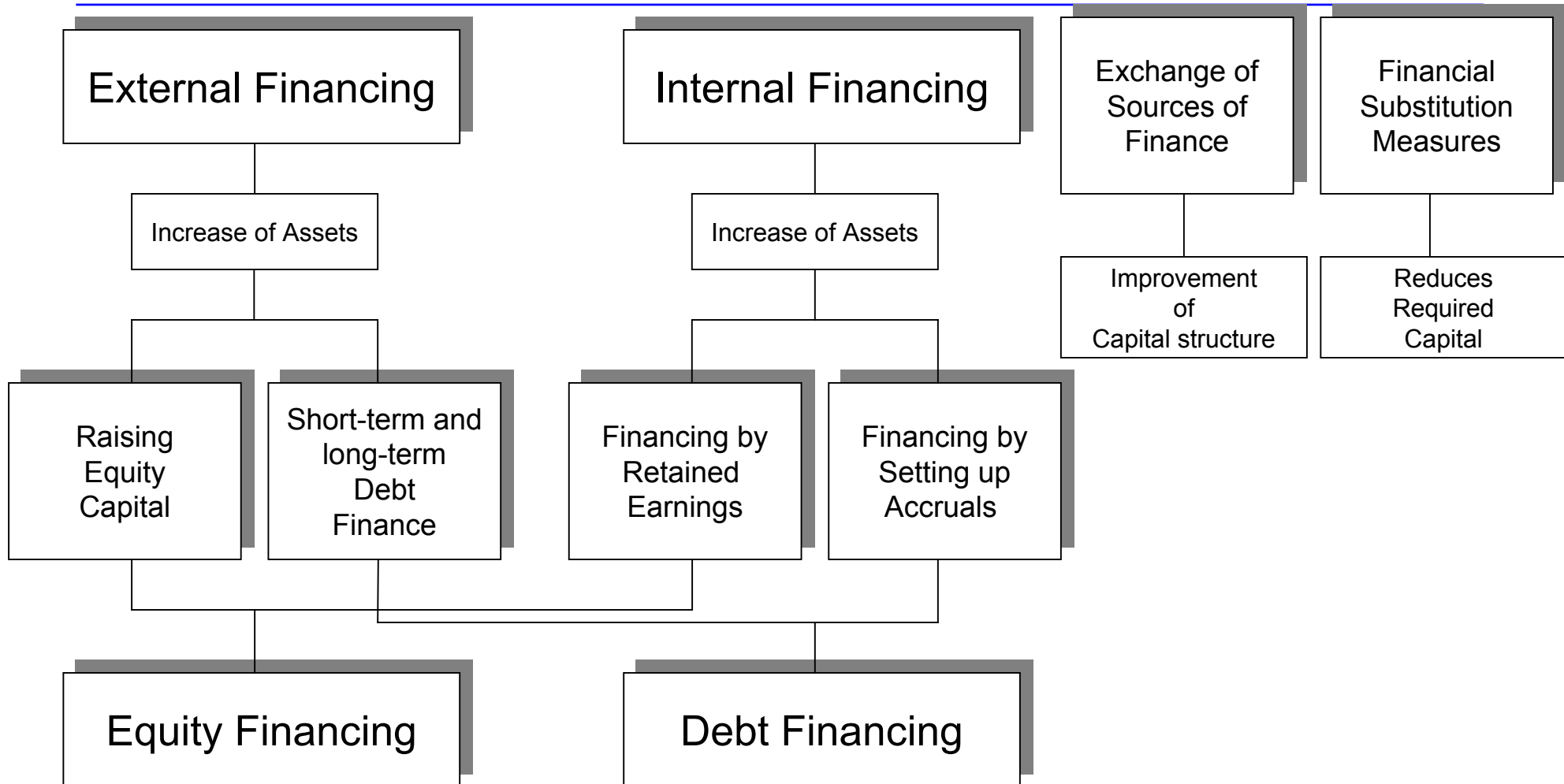
"Done!" says the angel, and disappears in a cloud of smoke and a bolt of lightning.

Now, all heads turn toward the dean, who sits surrounded by a faint halo of light. At length, one of his colleagues whispers, "Say something."

The dean sighs and says, "I should have taken the money."

## 2. Introduction to Corporate Finance

### 2.5. Sources of Finance – Equity (2)



## 2. Introduction to Corporate Finance

### 2.5. Sources of Finance – Equity (3)

---

#### Quality of Equity:

- Participation in rising prosperity of company
- Right to exercise control over the company
- Right to vote at owner (shareholder) meetings
- Approval or disapproval of major strategy
- Right to receive a share of dividends distributed, a share of the proceeds of a liquidation sale

#### Quality of Debt:

- No official control over the company
- Requires regular cash outlays (for interest and capital sum)
- Lenders might ask for securities

## 2. Introduction to Corporate Finance

### 2.5.1. Introduction

---

#### Advantages and disadvantages of equity financing:

##### For investors:

- Extremely high return possible  
*But:*
- Last in queue to have claims met

##### For the company:

- Usually no obligation to pay dividends
- Capital doesn't have to be repaid  
*But:*
- High cost: direct issuing costs and cost of equity (high expected returns)
- Loss of control over the company
- Dividends don't reduce taxable income

## 2. Introduction to Corporate Finance

### 2.5.1. Introduction (2)

---

#### Early stage financing:

- Individuals / Founders
- Retained earnings
- Bank borrowing
- Venture Capital (VC):
  - Business angels
  - Venture capital funds
  - Enterprise Investment Scheme (EIS)
  - Corporate venturing
  - Incubators: provide financing and business services
  - Government sources

## 2. Introduction to Corporate Finance

### 2.5.1. Introduction (3)

---

#### Key Considerations in Choosing a Venture Capitalist

- Financial Strength - the ability to supply additional resources
- Management Style - level of involvement in decision-making
- References - the results of previous ventures
- Contacts - ability to provide introductions
- Exit Strategy - how and under what circumstances does the venture capitalist plan to “cash out”?

## 2. Introduction to Corporate Finance

### 2.5.1. Introduction (4)

---

#### Evaluation Activities Carried Out By Venture Capitalists

“Prior to funding an investment as lead investor, how often do you engage in the following activities?”

■ Interview management team/tour facilities	100%
■ Tour facilities	100%
■ Contact former business associates/outside investors	96%
■ Contact current customers	93%
■ Have informal discussions with experts about the product	84%
■ Conduct in-depth review of pro forma financials	84%
■ Contact competitors	71%
■ Contact banker	62%
■ Contact suppliers	53%
■ Secure formal technical study of product	36%
■ Secure formal market research study	31%

Source: ‘Toward a Model of Venture Capital Investment Decision-Making’ by Fried and Hirsch, 1994.

## 2. Introduction to Corporate Finance

### 2.5.2. Stock Markets

---

#### Definition:

The stock market consists of a

- **primary market**

*The market in which securities are originally sold to investors*

and a

- **secondary market**

*The market in which securities are traded among investors*

- Dealers: An agent who buys and sells securities from inventory

- Broker: An agent who arranges security transactions among investors

## 2. Introduction to Corporate Finance

### 2.5.2. Stock Markets (2)



## 2. Introduction to Corporate Finance

### 2.5.2.1. Selling Securities to the Market

---

#### Procedure

- Obtain Approval from the Board of Directors
- File Registration Statement with SEC
- 20-Day Waiting Period
  - Provide Preliminary Prospectus
  - Place Tombstone Ad
  - File Price Amendment with SEC
- Sell Securities to the Public

#### Costs of new issues

- Administrative and transaction cost
- Equity cost of capital
- Market pricing costs: due to underpricing of new issues

## 2. Introduction to Corporate Finance

### 2.5.2.1. Selling Securities to the Market (2)

#### Methods of new issues

Method	Description
Introduction	<p>Shares are already quoted (e.g. on another stock exchange) and are permitted to be traded on a new (different) market</p> <p>→ no underwriting costs</p> <p>→ Small advertising expenditures</p>
Placing (Direct Placement)	<p>Shares are directly sold to investors (usually financial institutions such as pension funds or insurance companies)</p> <p>→ Small advertising expenditures</p> <p>Applicable also for companies that are not listed</p>

## 2. Introduction to Corporate Finance

### 2.5.2.1. Selling Securities to the Market (3)

---

#### Methods of new issues

Method	Description
Offer for Sale  (Negotiated Cash Offer)	<p>Company negotiates agreement with investment banker to underwrite and distribute the new stocks.</p> <p>Investment bankers sell as much as possible at the agreed-upon price. No guarantee as to how much cash will be raised.</p> <p>Book-building: Financial advisors receive bids for the shares from major institutional investors. The data is used to fix a price for the issue</p>

## 2. Introduction to Corporate Finance

### 2.5.2.1. Selling Securities to the Market (4)

---

#### Underwriters

Investment firms that act as intermediaries between a company selling securities and the investing public. Underwriters help to find the adequate issuing method, price and sell the new securities.

#### Types of underwriting

- Firm commitment underwriting
  - Issuer sells entire issue to underwriter
  - Gross spread determines the fee for underwriter for service and risk bearing
- Best efforts underwriting
  - Underwriter does not guarantee any amount of money
- Green shoe provision
  - Underwriter's option to buy additional shares from the issuer at the offering price
- Lockup agreements
  - Determines how long insiders are not allowed to sell their shares

## 2. Introduction to Corporate Finance

### 2.5.2.2. Initial Public Offering (IPO)

#### INTICOM SYSTEMS AG INHABER-AKTIE O.N.

WKN: 587484 dt. Symbol: IS7 ISIN: DE0005874846  
Sektor: Diverse Branche: Sonstige Branchen Land: Deutschland

Aktualisierte Daten			Daten zum Börsengang			Einfügen in
<b>Kurse</b>	<b>News</b>	<b>Fundamental</b>	<b>Unternehmen</b>	<b>Kennzahlen</b>	<b>Umfeld</b>	<b>Entwicklung</b>
Snapshot	Zum Unternehmen	Bilanz	Tätigkeit/Mitarbeiter	Kapitalstruktur	Marktsituation	Künftige Entwicklung
Börsen	Zum Wettbewerb	GuV	Chancen/Risiken		Wettbewerb	Kapitalverwendung
	Statements	Profil	Bewertung			Historie
						» Watchlist
						» Depot
						» MyMarket

#### Kursdaten zum Börsengang (in EUR)

Handel per Erscheinen	Emissionspreis	erster Börsenkurs
min. n.a.	n.a.	18,00
max. n.a.	18,00	18,00

#### Aktuelle Kursdaten (in EUR)

Börse	Datum Uhrzeit	aktueller Börsenkurs	Zeichnungs-gewinn	Perf. seit Emission	Perf. seit Erstnotiz
München	20.08.09	26,44	+2,22%	+48,61%	+45,38%

> zum Aktiensnapshot

Intraday 1 Monat 3 Monate 6 Monate 1 Jahr 3 Jahre 5 Jahre 10 Jahre



Bei Kursen vor dem 08.11.04 (Datum Erstnotiz) handelt es sich um außerbörslichen Handel Lang & Schwarz.

#### Emissionsprofil

Zeichnungsfrist	von	28.10.04
	bis	03.11.04
Erstnotiz		08.11.04
Preisbildung		Bookbuilding
Bookbuildingspanne	von	EUR 16,50
	bis	EUR 20,00
Emissionsvolumen	Stück	535.000
	Wert	EUR 9.630.000
	davon Altaktionäre	0,00%
	davon Kapitalerhöhung	100,00%
Gesamter Greenshoe		60.000
Ausgeübter Greenshoe		n.a.
Überzeichnung		n.a.

#### Emissionsbanken

Konsortialführer	Konsortium
Concord Effecten	

## 2. Introduction to Corporate Finance

### 2.5.2.2. Initial Public Offering (2)

Proceeds (\$ millions)	Number of issues	Gross spread	Other direct expenses	Total direct cost	Underpricing
2 - 9.99	337	9.05%	7.91%	16.96%	16.36%
10 - 19.99	389	7.24%	4.39%	11.63%	9.65
20 - 39.99	533	7.01%	2.69%	9.70%	12.48
40 - 59.99	215	6.96%	1.76%	8.72%	13.65
60 - 79.99	79	6.74%	1.46%	8.20%	11.31
80 - 99.99	51	6.47%	1.44%	7.91%	8.91
100 - 199.99	106	6.03%	1.03%	7.06%	7.16
200 - 499.99	47	5.67%	0.86%	6.53%	5.70
500 - up	10	5.21%	0.51%	5.72%	7.53
Total	1767	7.31%	3.69%	11.00%	12.05%

Source: Inmoo Lee, Scott Lochhead, Jay Ritter, and Quanshi Zhao, "The Costs of Raising Capital" *Journal of Financial Research* (Spring 1986).

## 2. Introduction to Corporate Finance

### 2.5.2.2. Initial Public Offering (3)

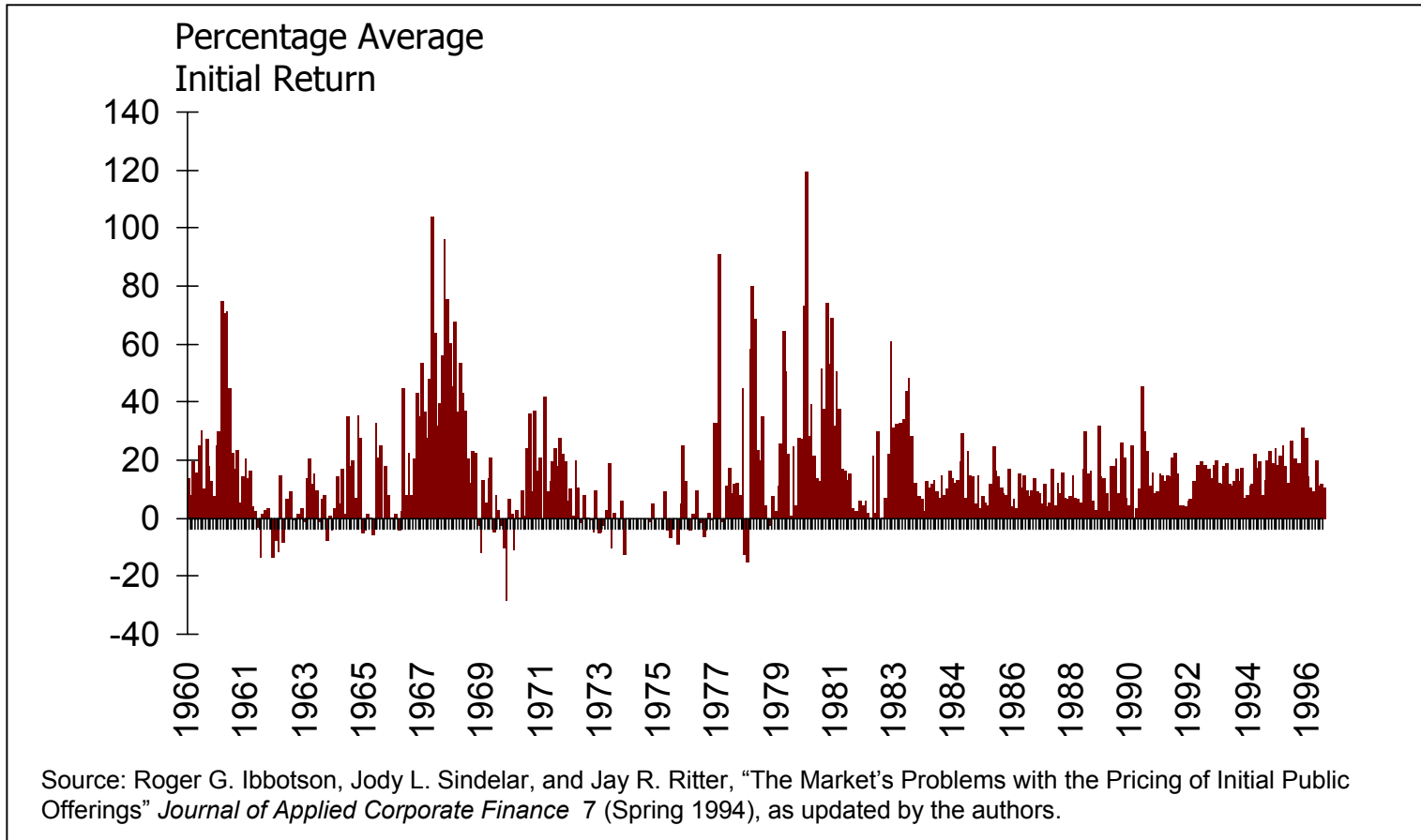
#### The Ten Largest U.S. Corporate IPOs

Issuer	Offering Size	Date
Lucent Technologies	\$3.0 billion	April, 1996
Allstate	\$2.1 billion	June, 1993
Conrail	\$1.6 billion	March, 1987
PacTel	\$1.4 billion	December, 1993
Henly Group	\$1.3 billion	May, 1986
Lyondell Petrochemical	\$1.2 billion	January, 1989
Coca-Cola Enterprises	\$1.2 billion	November, 1986
Nabisco Holdings Corp.	\$1.1 billion	January, 1995
TIG Holding Corp.	\$1.0 billion	April, 1993
First Data Corp.	\$960 million	April, 1992

## 2. Introduction to Corporate Finance

### 2.5.2.2. Initial Public Offering (4)

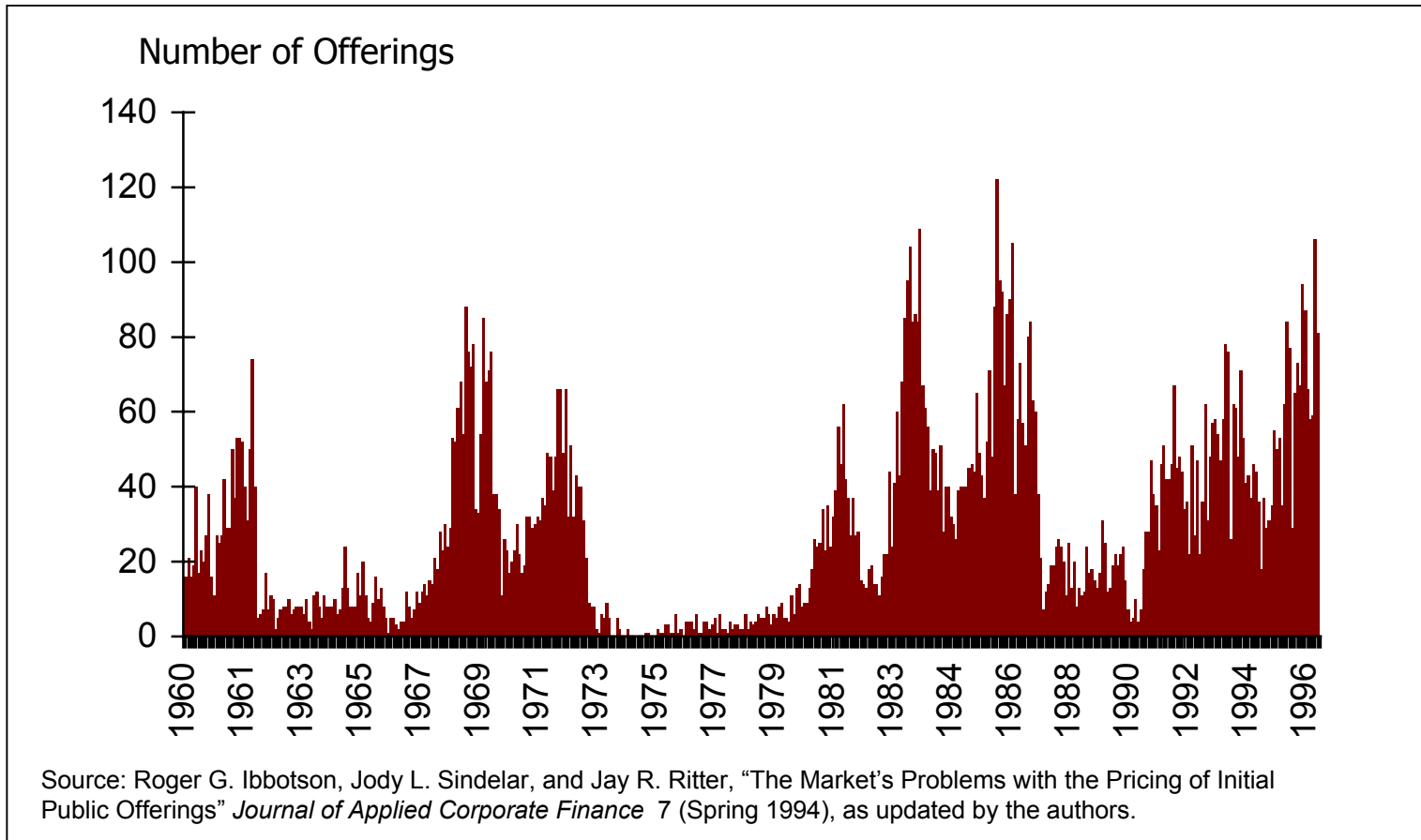
#### Average Initial Returns by Month for SEC-Registered IPOs: 1960-1996



## 2. Introduction to Corporate Finance

### 2.5.2.2. Initial Public Offering (5)

#### Number of Offerings by Month for SEC-Registered IPOs: 1960-1996



## 2. Introduction to Corporate Finance

### 2.5.3. Rights

---

#### Definition:

A **rights issue** is an invitation to existing shareholders to purchase additional shares. Reasons for issuing rights are:

1. Dilution - loss in existing shareholders' value
2. Dilution of proportionate ownership
3. Dilution of earnings per share (EPS)

#### Global View

US: not very common  
Germany: mandatory

## 2. Introduction to Corporate Finance

### 2.5.3. Rights (2)

---

The value of a right equals the difference in the price of the issuer's outstanding shares before and after the rights offering, and is determined by three factors:

- the total amount of money to be raised,
- the subscription price of the new shares, and
- the number of existing shares.

Number of rights needed to buy one share equals =  $\frac{\text{number of old shares}}{\text{number of new shares}}$

New share price equals =  $\frac{\# \text{ old shares} \cdot \text{share price} + \# \text{ new shares} \cdot \text{subscription price}}{\text{total number of shares outstanding}}$

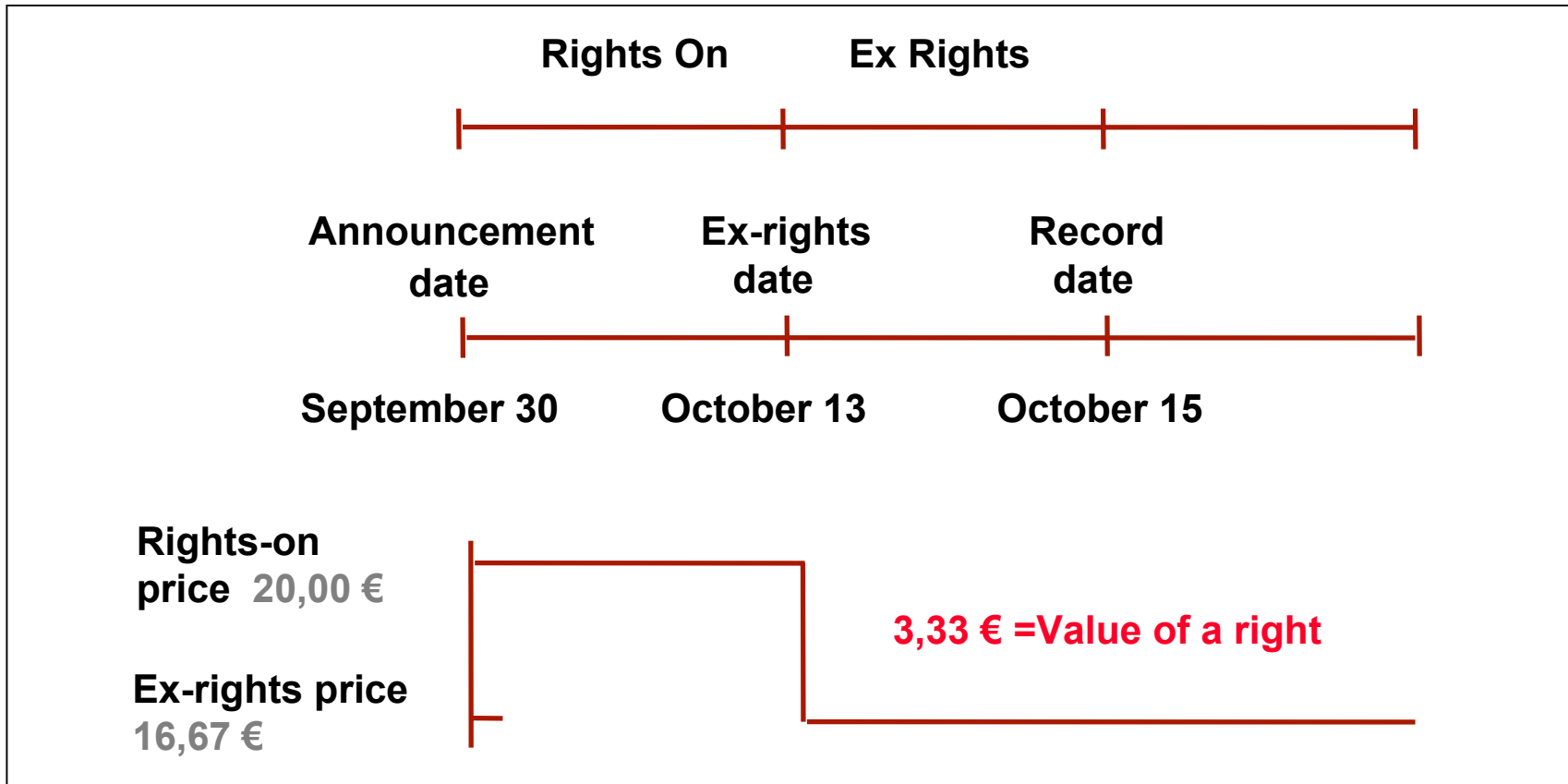
Value of the right equals =  $\text{old share price} - \text{new share price}$

---

## 2. Introduction to Corporate Finance

### 2.5.3. Rights (3)

#### Ex-rights stock prices



## 2. Introduction to Corporate Finance

### 2.5.3. Rights (4)

---

#### Example

The Schmidt AG has 500.000 shares outstanding with a face value of 1 Euro per share. The current share price is 50 Euro per share. The company decides to offer additional 100.000 shares (face value 1 Euro) at 40 Euro (subscription price) each to cover a capital requirement of 4.000.000 Euro.

- a) How many rights are associated with one new share? Calculate the ex-rights price and the value of a right.
- b) Mr. Mayer owns 50.000 shares. How much does he have to invest in order to keep his proportionate ownership?
- c) Mr. Müller owns 10.000 shares. How many new shares can he acquire if he doesn't intend to invest additional cash?

## 2. Introduction to Corporate Finance

### 2.5.3. Rights (5)

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#### Example Solution

- a) There are 5 rights associated with one new share  
Ex-rights price =  $(50 \text{ €} * 500.000 + 40 \text{ €} * 100.000) / 600.000 = 48,33 \text{ €}$   
Value of a right =  $(48,33 - 40) \text{ €} / 5 = 1,67 \text{ €} = (50 - 48,33) \text{ €}$
- b) Mr. Mayer owns 50.000 shares (= 50.000 rights).  
New investment = 10.000 new shares \* 40 € (subscription price) = 400.000 €
- c) Mr. Müller owns 10.000 shares (= 10.000 rights).  
Value of 10.000 rights =  $10.000 * 1,67 \text{ €} = 16.700 \text{ €}$   
Suppose all rights are sold and new shares are bought at ex-rights price:  
 $16.700 \text{ €} / 48,33 \text{ €} = 345,54$   
→ Mr. Müller acquires 345 new shares (which requires  $345 * 5 = 1.725$  rights)  
and sells 8.275 rights for 13.819,25 €.  
For the new shares he pays  $345 * 40 \text{ €} = 13.800 \text{ €}$ .

## 2. Introduction to Corporate Finance

### 2.5.3. Rights (6)

---

#### Exercise

The XYZ AG has 1.000.000 shares outstanding with a face value of 1 € per share. The current share price is 50 €. Additional 500.000 shares have been offered and the ex-rights price results to 44 €.

- a) How many rights are associated with one new share? Calculate the subscription price and the value of a right.
- b) Mr. Klein owns 40.000 shares. How many new shares can he acquire if he doesn't want to invest more than 200.000 €?

## 2. Introduction to Corporate Finance

### 2.5.3. Rights (7)

---

#### Exercise Solution

## 2. Introduction to Corporate Finance

### 2.5.4. Dividend Policy

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#### General Ideas

- Can shareholder wealth be increased by changing the pattern of dividend payments?
- Is a steady, stable dividend growth rate preferable?

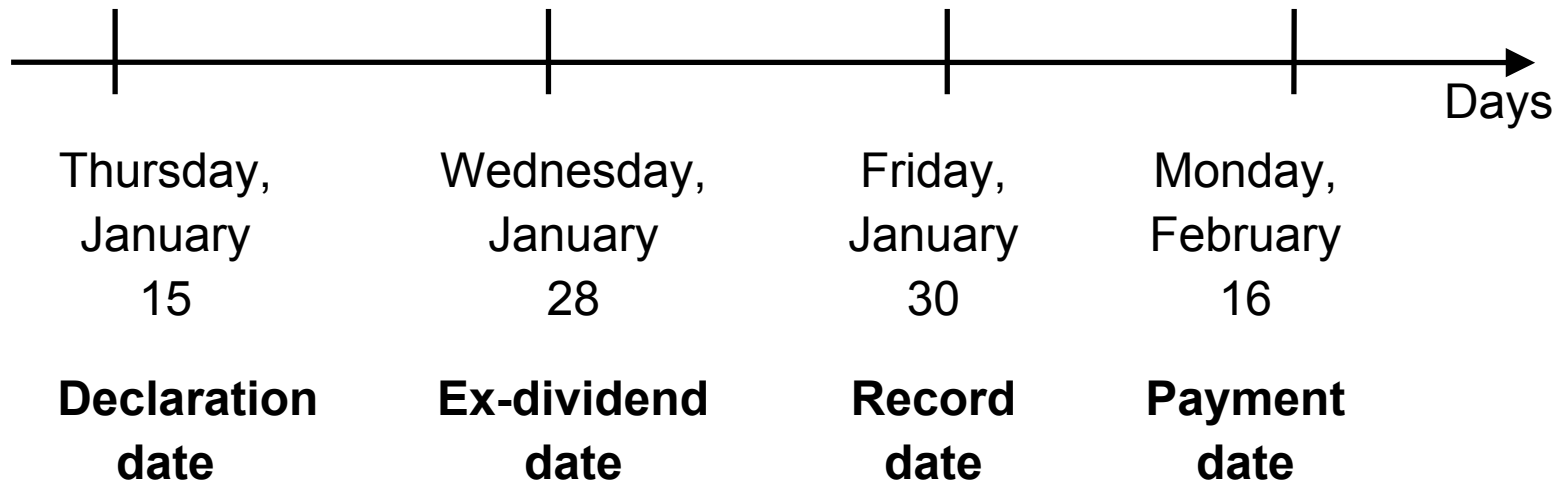
#### Types of Distributions to Shareholders

- Cash dividends
  - Regular cash dividends
  - Extra cash dividends
  - Special dividends
  - Liquidating dividends
- Stock dividends
- Stock splits

## 2. Introduction to Corporate Finance

### 2.5.4. Dividend Policy (2)

#### Example of Procedure for Dividend Payment



## 2. Introduction to Corporate Finance

### 2.5.4. Dividend Policy (3)

---

#### Example of Procedure for Dividend Payment

- Declaration date:  
The board of directors declares a payment of dividends.
- Ex-dividend date:  
A share of stock goes ex dividend on the date the seller is entitled to keep the dividend; under NYSE rules, shares are traded ex dividend on and after the second business day before the record date.
- Record date:  
The declared dividends are payable to the shareholders of record on a specific date.
- Payment date:  
The dividend checks are mailed to the shareholders of record.

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition

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#### **Modigliani and Miller (1961):**

Dividend policy is irrelevant to share value under certain assumptions:

- There are no taxes.
- There are no transaction costs, e.g. for investors when buying and selling shares.
- All investors can borrow and lend at the same interest rate.
- All investors have free access to all relevant information.

The proposition bases on the idea of 'homemade dividends'. Every amount of dividend can be created by the investor by selling or buying shares.

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (2)

#### Example:

An all-equity company is creating 1.000.000 € cash flow every year forever which is paid entirely as dividends. If we assume 20% cost of equity we can calculate the value of the company by applying the dividend valuation model:

$$P_0 = \frac{1.000.000}{1,2^0} + \frac{1.000.000}{1,2^1} + \frac{1.000.000}{1,2^2} + \dots = 1.000.000 + \frac{1.000.000}{0,2} = 6.000.000$$

Suppose the company decides to retain the 1.000.000 € to invest it in an other project that is also generating 20% return on investment (i.e. 200.000 €) forever. The new value of the company becomes:

$$P_0 = \frac{0}{1,2^0} + \frac{1.200.000}{1,2^1} + \frac{1.200.000}{1,2^2} + \dots = \frac{1.200.000}{0,2} = 6.000.000$$

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (3)

#### Example:

#### Homemade dividends:

Suppose an investor who owns 10% of the company and therefore is enhanced to receive 100.000 € each year. He can create both cash flows by himself:

**Case 1:** Company accepts the project but he wants to keep the old cash flow:

→ Sell 1/6 of old shares equal to 100.000 €

$$P_0 = \frac{100.000}{1,2^0} + \frac{120.000 \cdot \frac{5}{6}}{1,2^1} + \frac{120.000 \cdot \frac{5}{6}}{1,2^2} + \dots = 100.000 + \frac{100.000}{0,2} = 600.000$$

**Case 2:** Company doesn't accept the project but he'd like to create cash flow:

→ Buy new shares for 100.000 € creating future dividends (20% ROI)

$$P_0 = \frac{0}{1,2^0} + \frac{120.000}{1,2^1} + \frac{120.000}{1,2^2} + \dots = \frac{120.000}{0,2} = 600.000$$

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (4)

#### Effects in the real world:

<b>Fluctuating dividends</b>	<b>Stable dividends</b>
<ul style="list-style-type: none"> <li>■ Dividends as a residual: positive NPV projects</li> </ul>	<ul style="list-style-type: none"> <li>■ Clientele preferences</li> <li>■ Signalling</li> <li>■ Owner control</li> <li>■ Stability can raise credit standing</li> </ul>
<b>High dividend payout</b>	<b>Low dividend payout</b>
<ul style="list-style-type: none"> <li>■ Taxes</li> <li>■ Clientele: need for current income</li> <li>■ Positive information conveyor</li> <li>■ Uncertainty - the “bird-in-hand” argument</li> <li>■ Owner control</li> </ul>	<ul style="list-style-type: none"> <li>■ Tax system</li> <li>■ Clientele</li> <li>■ Flotation costs</li> <li>■ Indenture restrictions</li> </ul>

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (5)

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#### **Residual dividend policy**

- Avoid rejecting positive NPV projects
- Maintain target debt/equity ratio

#### **Dividend stability**

#### **Compromise dividend policy**

- Avoid rejecting positive NPV projects
- Avoid cutting dividends
- Avoid issuing new equity
- Maintain target debt/equity ratio
- Maintain a target dividend payout ratio

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (6)

---

#### Example

1. Company follows a strict residual dividend approach
2. Net income (projected) = 50.000.000 €
3. Target debt-equity ratio = 3/1 (Equity-ratio = 25%; Debt-ratio = 75%)
4. Planned Capital budget for (positive NPV) - projects = 180.000.000 €

#### Solution

1. Maximum capital spending with no outside equity:  
$$50.000.000 \text{ €} + 3 * 50.000.000 < 200.000.000 \text{ €}$$

→ A dividend will be paid
2. New equity needed = 25% \* 180.000.000 € = 45.000.000 €  
New debt needed = 75% \* 180.000.000 € = 135.000.000 €
3. Dividend = 50.000.000 – 45.000.000 € = 5.000.000 €

## 2. Introduction to Corporate Finance

### 2.5.4.1. The Dividend Irrelevancy Proposition (7)

---

#### Exercise

Res Corporation follows a strict residual dividend policy. Its debt-to-equity ratio is 4. Projected earnings for the year are 250.000, what is the maximum amount of capital spending possible with no new equity?

If planned investment outlays for the coming year are 1.800.000 €, will Res Corp. pay a dividend? Does the company maintain a constant dividend payout?

#### Solution

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase

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#### Example

America West Airlines announced today that its Board of Directors has authorized the purchase of up to 2.5 million shares of its Class B common stock on the open market as circumstances warrant over the next two years. . . .

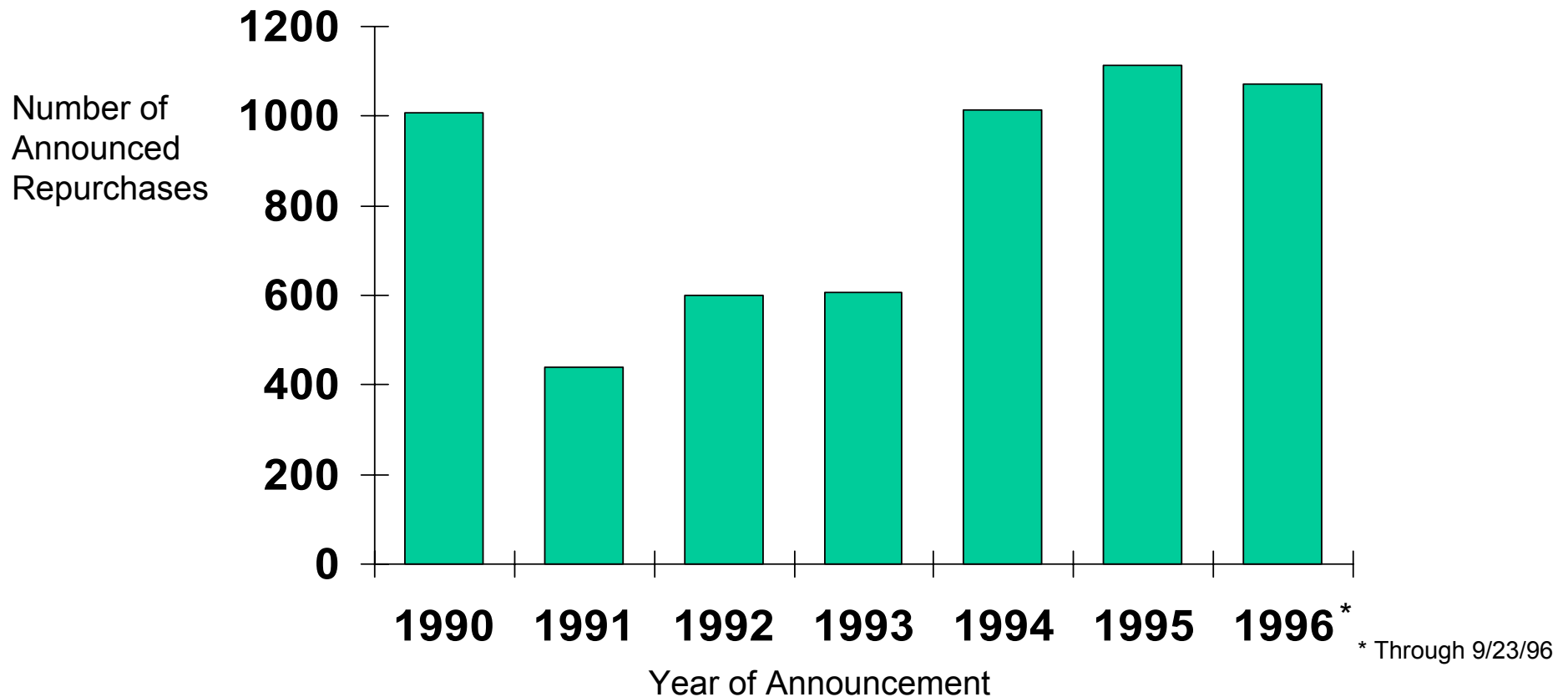
Following the approval of the stock repurchase program by the company's Board of Directors earlier today, W.A. Franke, chairman and chief officer said 'The stock repurchase program reflects our belief that America West stock may be an attractive investment opportunity for the Company, and it underscores our commitment to enhancing long-term shareholder value.'

The shares will be repurchased with cash on hand, but only if and to the extent the Company holds unrestricted cash in excess of \$200 million to ensure that an adequate level of cash and cash equivalents is maintained."

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (2)

#### The Number of Announced Share Repurchases 1990-1996:



## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (3)

#### The Effects of a Cash Dividend versus a Share Repurchase

- Assume no taxes, commissions, or other market imperfections
- Consider a firm with 50,000 shares outstanding; price per share is 20 €
- Net income is 100,000 €, so EPS = 2.00 €. The P/E ratio is 10
- The firm is considering: paying a 1 € per share cash dividend or repurchasing 2,500 shares at 20 € a share

Initial market balance sheet		Balance sheet after cash dividend		Balance sheet after share repurchase	
Cash	100.000	Cash	50.000	Cash	50.000
Other Assets	900.000	Other Assets	900.000	Other Assets	900.000
Equity	1.000.000	Equity	950.000	Equity	950.000

- Price per share is 19 €  
(= 950,000 € / 50,000)
- EPS = 2.00 €
- P/E ratio becomes 9.5

- Price per share remains 20 €  
(= 950,000 € / 47,500)
- EPS = 2.10 €
- P/E ratio is 9.5

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (4)

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#### Example

Dividi Corporation is evaluating an extra dividend versus a share repurchase. In either case, 1.500 € would be spent. Current earnings are 0,1 € per share, and the stock currently sells for 30 € per share. There are 150 shares outstanding.

Ignore taxes and other imperfections in answering the first two questions.

- a) Evaluate the two alternatives in terms of the effects on the price per share of the stock and on shareholder wealth.
- b) What will be the effects on Dividi's EPS and P/E ratio under the two different scenarios?
- c) Which of these actions would you recommend? Why?

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (5)

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#### Solution

- a) Cash dividend:  $DPS = 1,500 \text{ €} / 150 \text{ shares} = 10 \text{ €}$ ;  $P = 30 \text{ €} - 10 \text{ €} = 20 \text{ €}$   
Wealth of a shareholder = one share + cash dividend =  $20 \text{ €} + 10 \text{ €} = 30 \text{ €}$

Repurchase:  $1,500 \text{ €} / 30 \text{ €} = 50 \text{ shares}$  will be repurchased.

If you let your shares be repurchased, you have 30 € in cash; if you keep your shares, they're still worth 30 €.

- b) Cash Dividend:  $EPS = 0,1 \text{ €}$ ;  $P/E = 20 \text{ €} / 0,1 \text{ €} = 200$   
Repurchase:  $EPS = 0,1 \text{ €} (150) / 100 = 0,15 \text{ €}$ ;  $P/E = 30 \text{ €} / 0,15 \text{ €} = 200$

- c) A share repurchase would seem to be the preferred course of action. Only shareholders who wish to sell will do so, giving the shareholder a tax timing option that s/he doesn't get with a dividend payment.

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (6)

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#### Exercise

Current earnings of HI Corporation are 6.000.000 €.

The company is considering spending 3.000.000 € either for paying a 3 € per share cash dividend or for repurchasing 100.000 shares at 30 € a share.

Ignore taxes and other imperfections.

What will be the effects on the price per share of the stock and on HI's EPS and P/E ratio under the two different scenarios?

## 2. Introduction to Corporate Finance

### 2.5.4.2. Share Repurchase (7)

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#### **Solution**

## 2. Introduction to Corporate Finance

### 2.5.4.3. Stock Dividends and Stock Splits

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#### **Stock dividend:**

Dividend is paid out in shares of stock

No cash payments are made

→ Since there are more shares outstanding each is worth less

#### **Stock split:**

Split is expressed as a ratio

Nominal (par) value and market value of share decrease

#### **Reverse split:**

Stock split in which number of shares outstanding is reduced

## 2. Introduction to Corporate Finance

### 2.5.4.3. Stock Dividends and Stock Splits (2)

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#### Do they matter?

Suppose market value of a company is 1.000.000 €; 100.000 shares outstanding

→ Share price 10 €

1) 25% stock dividend → 125.000 shares outstanding; share price  $\left(\frac{1.000.000}{125.000}\right) = 8 \text{ €}$

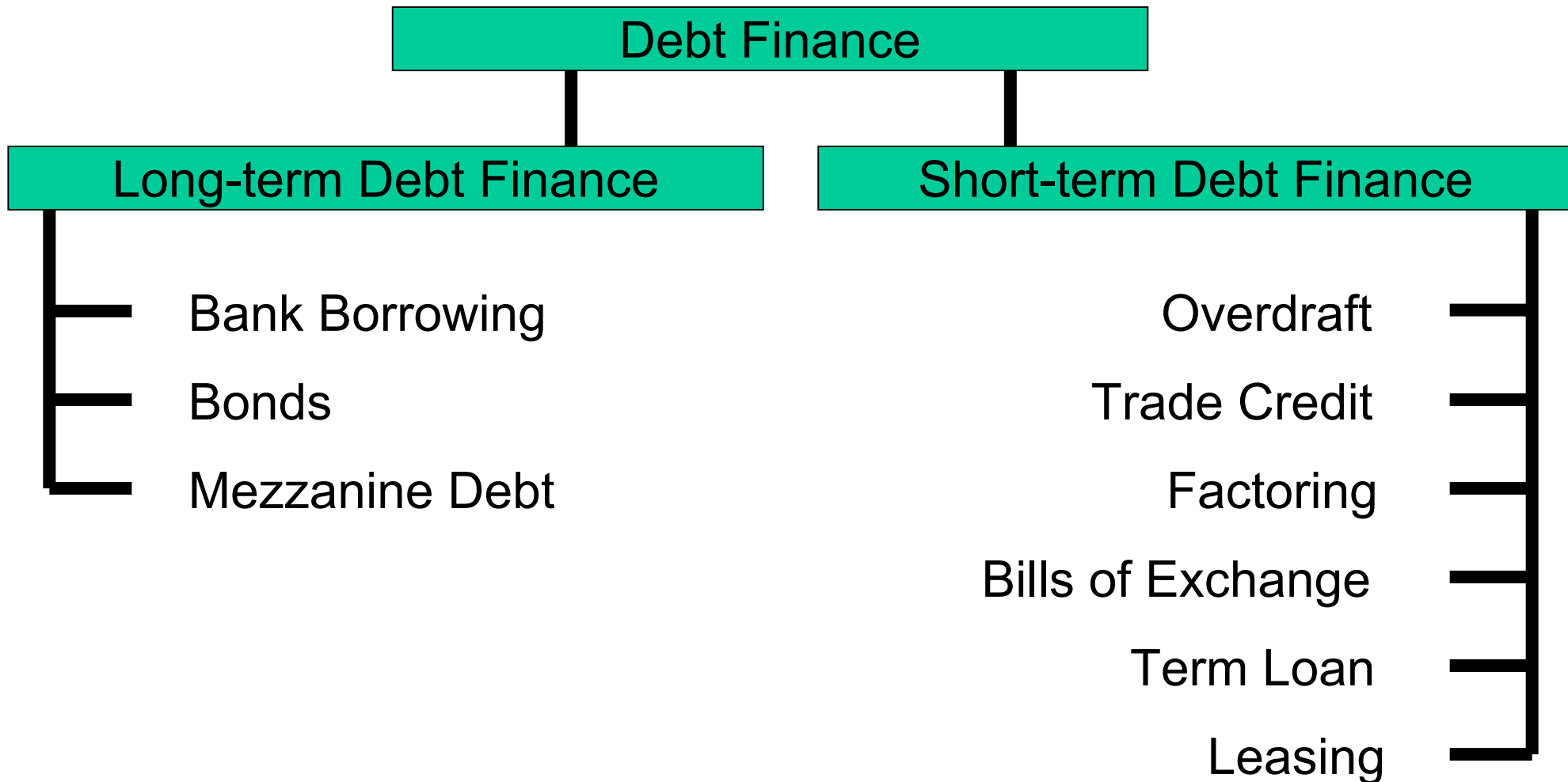
2) two-for-one stock split → 200.000 shares outstanding; share price  $\left(\frac{1.000.000}{200.000}\right) = 5 \text{ €}$

But:

- “Popular trading range” argument
- Liquidity/ownership base
- Cosmetic effects
- Information effects

## 2. Introduction to Corporate Finance

### 2.6. Sources of Finance - Debt



## 2. Introduction to Corporate Finance

### 2.6. Sources of Finance – Debt (2)

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#### Forms of debt financing

- Bank Borrowing and Term Loan:
  - Advantages: low administrative and legal costs, quick, flexible, for small companies
  - To consider: security, repayment schedules, Basel II
- Mezzanine Debt: hybrid finance, high return with high risk
- Overdraft: permit to overdraw on an account up to a stated limit
- Trade Credit: goods and services are paid later
- Factoring: immediate transfer of cash
- Bills of Exchange: a document which sets out a commitment to pay a sum of money at a specified point in time. Seller might sell it to a bank.
- Leasing: lessor (equipment owner) conveys the right to use the equipment in return for regular rental payments by the lessee over an agreed period of time.

## 2. Introduction to Corporate Finance

### 2.6. Sources of Finance – Debt (3)

#### Working Capital management

<b>Balance Sheet</b>			
Cash	9.600	Accounts payable	8.000
Accounts receivable	20.400	Notes payable	10.000
Inventory	16.000	Long term debt	20.000
Net fixed assets	44.000	Common stock	50.000
		Retained Earnings	2.000
Total assets	90.000	Total equity and liabilities	90.000

- Working Capital = Current Assets – Current Liabilities

#### Leverage effect

- What is a suitable capital structure for a company?

## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management

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#### General Question:

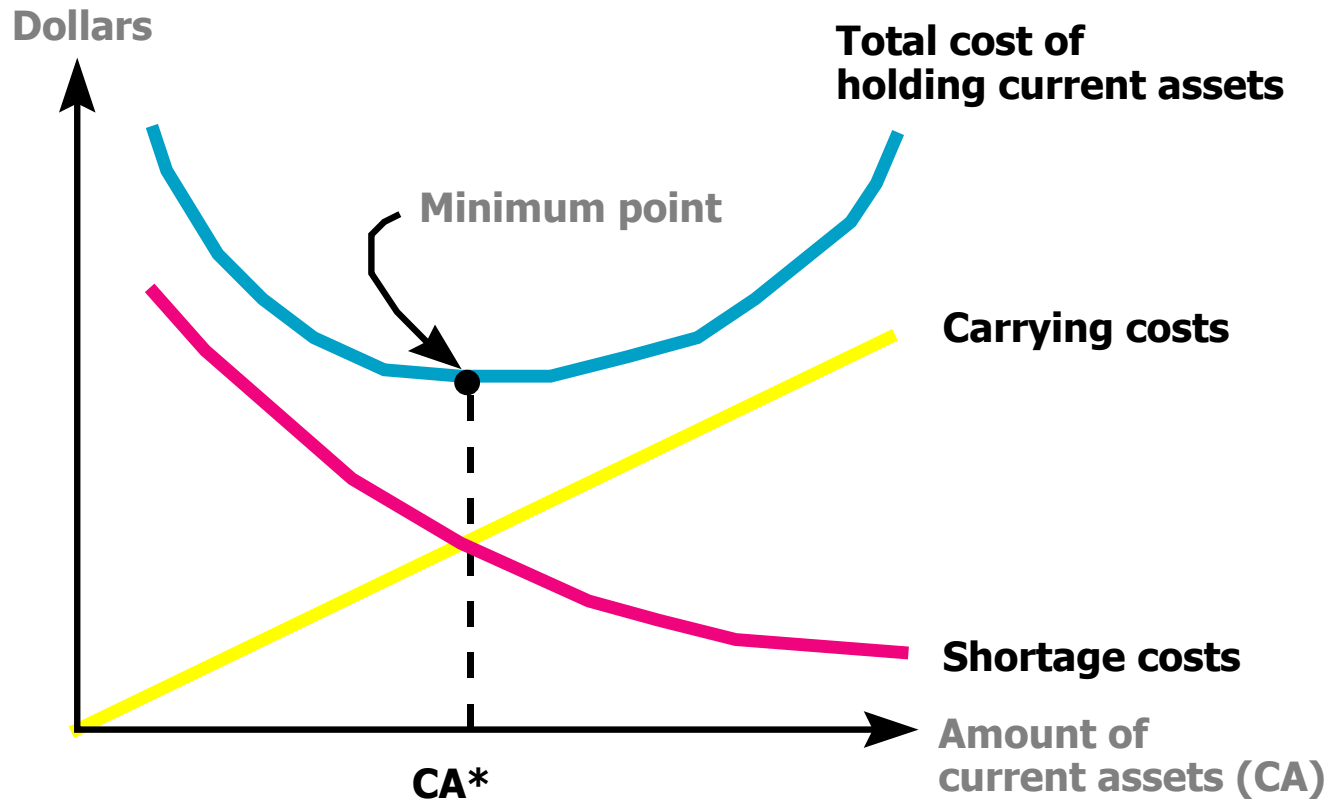
- What is the optimal investment in current assets (short-term financial policy)?

#### To consider:

- **Carrying Cost:**  
Carrying costs increase with the level of investment in current assets. They include the costs of maintaining economic value and opportunity costs.  
→ mainly opportunity costs
- **Shortage Cost:**  
Shortage costs decrease with increases in the level of investment in current assets. They include trading costs and the costs related to being short of the current asset (for example, sales lost as a result of a shortage of finished goods inventory).  
→ order costs; costs related to lack of safety reserves

## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management (2)

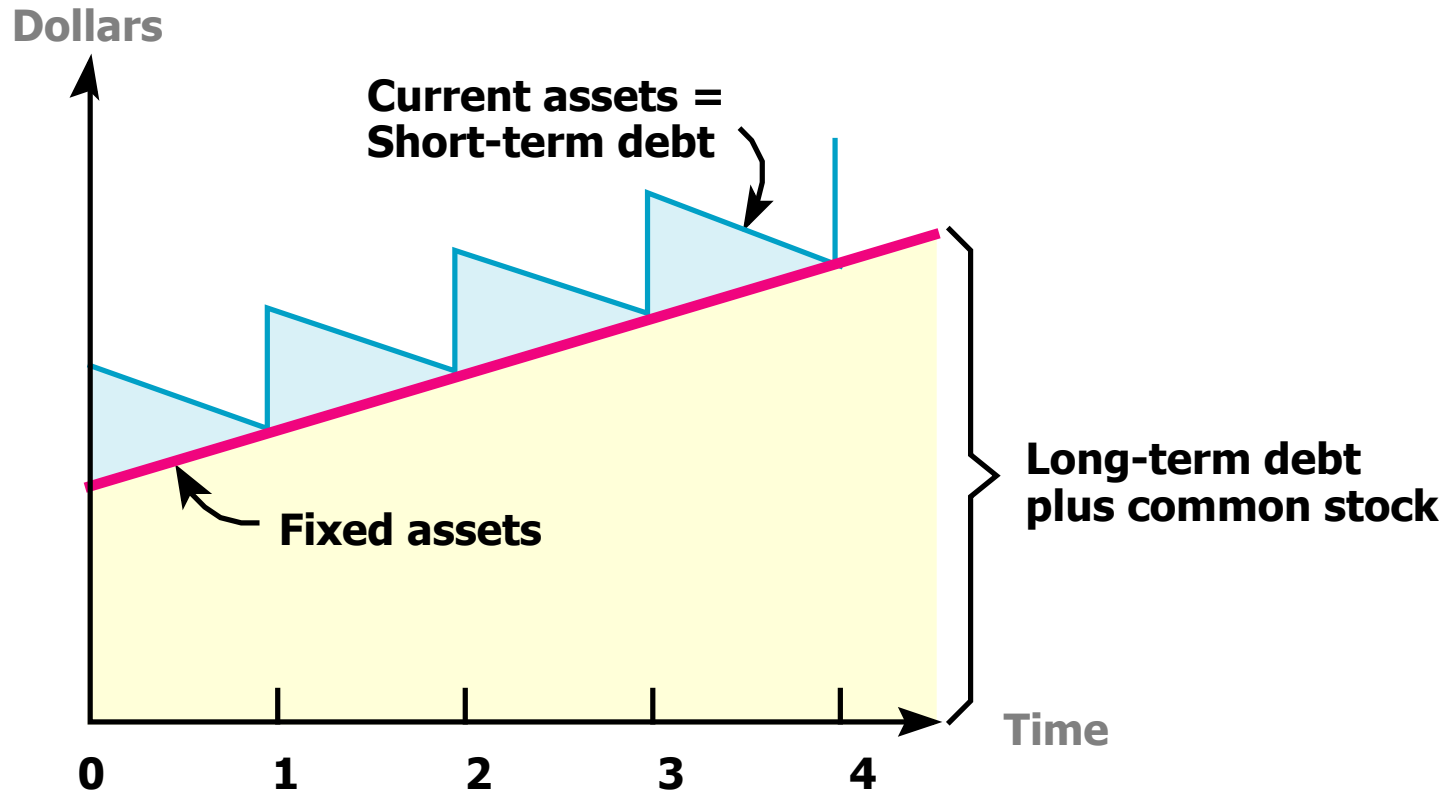


The optimal amount of current assets. This point minimizes total costs.

## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management (3)

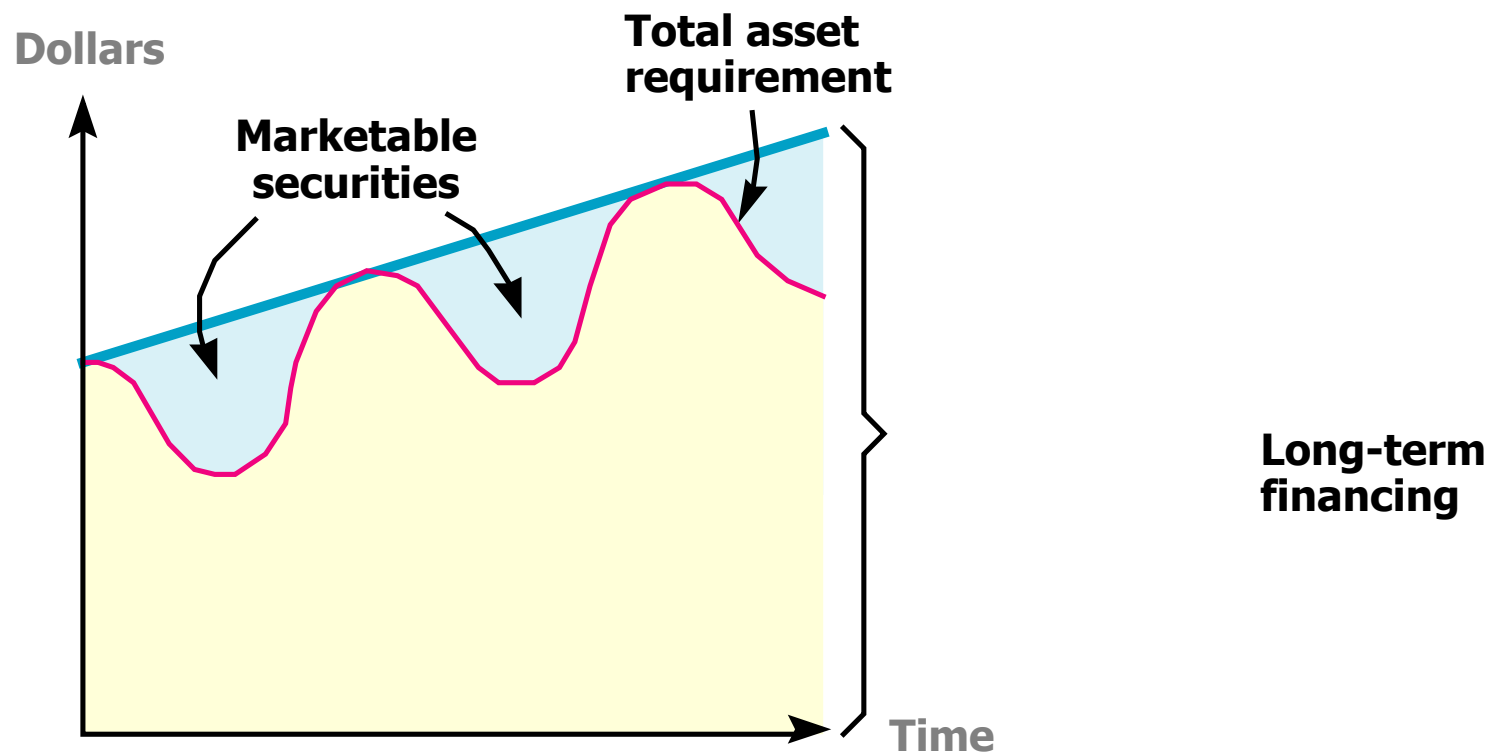
In an ideal world, net working capital is always zero because short-term assets are financed by short-term debt.



## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management (4)

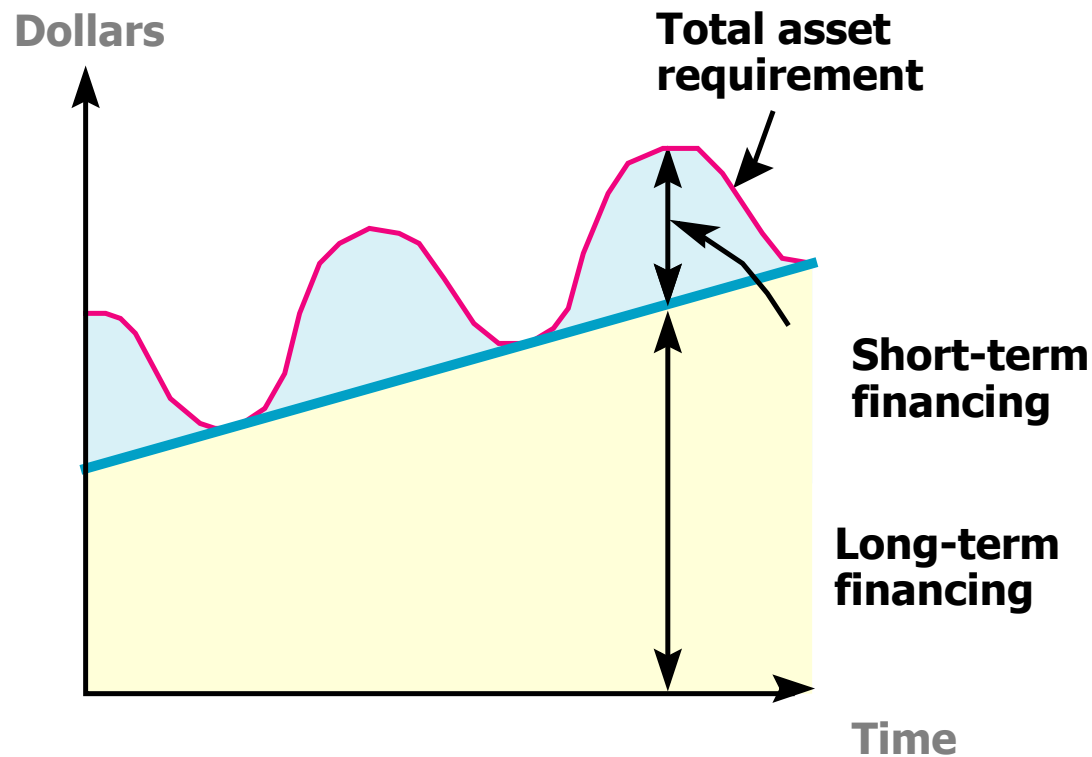
A **flexible** policy is most appropriate when carrying costs are low relative to shortage costs. It always implies a short-term cash surplus and a large investment in cash and marketable securities.



## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management (5)

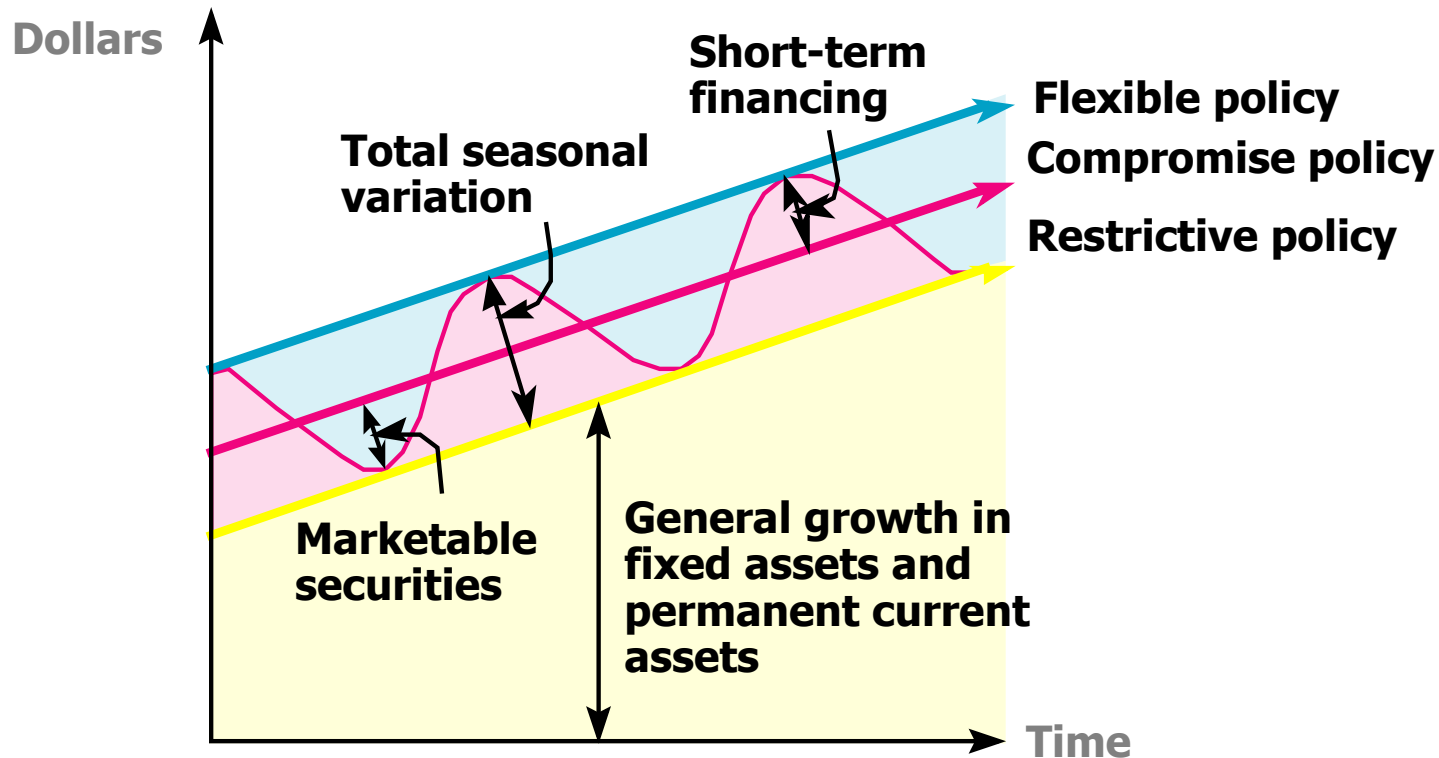
A **restrictive** policy is most appropriate when carrying costs are high relative to shortage costs. It uses long-term financing for permanent asset requirements only and short-term borrowing for seasonal variations.



## 2. Introduction to Corporate Finance

### 2.6.1. Working Capital Management (6)

With a **compromise policy**, the firm keeps a reserve of liquidity which it uses to initially finance seasonal variations in current asset needs. Short-term borrowing is used when the reserve is exhausted.



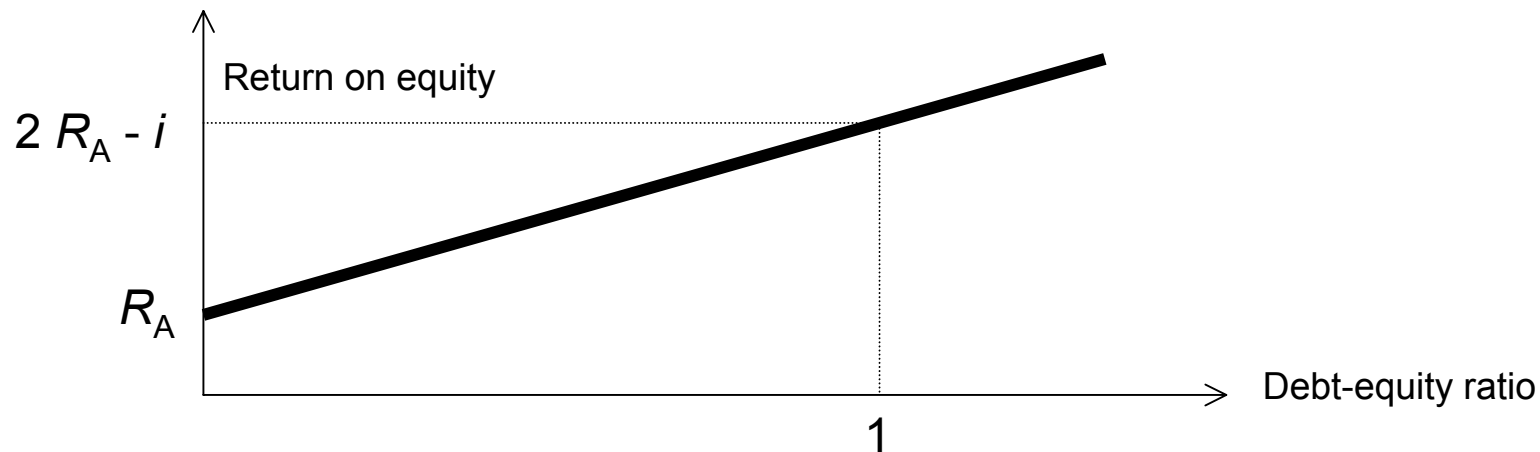
## 2. Introduction to Corporate Finance

### 2.6.2. Leverage Effect

#### What is the relationship between capital structure and firm value?

- $v = \text{debt} / \text{equity}$  (= debt-equity ratio);  $i = \text{return on debt}$
- $R_A = \text{return on assets}$
- Return on equity for a given debt-equity ratio  $v$ :

$$\begin{aligned}
 R_V &= [ \text{total assets} * R_A - \text{debt} * i ] / \text{equity} \\
 &= [ (\text{equity} + \text{debt}) * R_A - \text{debt} * i ] / \text{equity} \\
 &= 1 * R_A + v * R_A - v * i \\
 &= R_A + (R_A - i) * v
 \end{aligned}$$



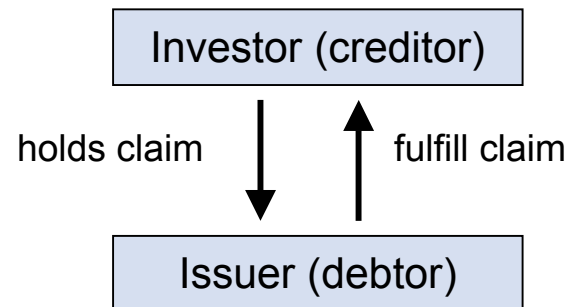
## 2. Introduction to Corporate Finance

### 2.6.3. Bonds

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#### Definition

A **bond** is an evidence of debt issued by a corporation or a governmental body. A bond represents a *loan* made by investors to the *issuer*. In return for his/her money, the investor receives a legal claim on future cash flows of the borrower.



- The issuer promises to:
    - make regular coupon payments every period until the bond matures, and
    - pay the face/par/maturity value of the bond when it matures.
  - Default - since the abovementioned promises are contractual obligations, an issuer who fails to keep them is subject to legal action on behalf of the lenders (bondholders).
-

## 2. Introduction to Corporate Finance

### 2.6.3. Bonds (2)

#### BUNDESREP.DEUTSCHLAND ANL.V.2003(2013)

WKN: 113521 | ISIN: DE0001135218 | Typ: Anleihe, Fest | Nominal: 0,01 | Wahrung: EUR | Falligkeit: 04.01.2013

Aktueller Kurs (Stuttgart, 22.03.05, 11:10:10)

Kurs		Volumen (Nominal)		Ø Volumen (Nominal) pro Tag				
↑ 106,62	+0,15%	letzendes	gesamt	1 Woche	4 Wochen	52 Wochen		
	+0,16	106,46	106,38	2.147.483	2.149.483	0	691.218	756.275

#### 1 Jahr



#### Realtime-Kurs 22.03., 17:09:50

	Kurs €	Volumen
Geld	106,67	100.000 Nominal
Brief	106,80	100.000 Nominal

#### Stammdaten

WKN / ISIN	113521 / DE0001135218
Emittent	Bundesrepublik Deutschland
Emittententyp	offentlich
Sitz des Emittenten	Deutschland
Bond-Typ	Anleihe
Nominal	0,01
Falligkeit	04.01.2013

#### Kupondaten

Kupon	4,500%
Kupon-Typ	Fest
Nachster Kupon-Termin	04.01.06
Kupon-Periode	Jahr

#### Emissionsdaten

Kurs	105,09
Datum	04.01.2003
Volumen	24.000.000.000,00
Wahrung	EUR

#### Kennzahlen

Rendite (nach ISMA)	3,49%
laufende Verzinsung	4,22
Stuckzinsen	0,91
Duration	6,74
Modified Duration	6,51%
Konvexitat	56,71
Zinselastizitat	0,23
Basis Point Value	0,07
Restlaufzeit	7,79
Berechnet mit Kurs	106,74
Datum der Berechnung	19.03.2005

URL: <http://renten.onvista.de/snapshot.html?ISIN=DE0001135218&PRINT=1>

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds

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#### Example of a May Department Stores Bond

##### Terms

Amount of issue \$125 million

Date of issue 2/28/86

Maturity 3/1/16

Annual coupon 9.25

Offer price 100

##### Explanations

The company will issue \$125 million worth of bonds.

The bonds were sold on 2/28/86.

The principal will be paid in 30 years.

The denomination of the bonds is \$1,000. Each bondholder will receive \$92.50 per bond per year (9.25% of the face value).

The offer price will be 100% of the \$1,000 face value per bond.

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (2)

Terms		Explanations
Coupon payment dates	3/1, 9/31	Coupons of $\$92.50/2 = \$46.25$ will be paid on these dates.
Security	None	The bonds are debentures.
Sinking fund	Annual,	The firm will make annual payments beginning 3/1/97 toward the sinking fund.
Call provision	Not callable	The bonds have a deferred call feature. before 2/28/93
Call price	106.48 initially,	After 2/28/93, the company can buy declining to 100 back the bonds for \$1,064.80 per bond, declining to \$1,000 on 2/28/05.
Rating	Moody's A2	This is one of Moody's higher ratings. The bonds have a low probability of default.

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (3)

- If a bond has five years to maturity, an 8 € annual coupon, and a 100 € face value, its cash flows would look like this:

Time	0	1	2	3	4	5
Coupons		8 €	8 €	8 €	8 €	8 €
Face Value						100 €
Total $c_t$		8 €	8 €	8 €	8 €	108 €

- How much is this bond worth? It depends on the level of current market interest rates. If the going rate on bonds like this one is 10%, then this bond is worth 92,42 €.

- $$92,42 = \sum_{t=1}^5 \frac{c_t}{1,1^t} = \frac{8}{1,1} + \frac{8}{1,1^2} + \frac{8}{1,1^3} + \frac{8}{1,1^4} + \frac{108}{1,1^5}$$

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (4)

---

Suppose a bond currently sells for 93,29 €. It pays an annual coupon of 7 €, and it matures in 10 years. It has a face value of 100 €. What are its coupon rate, current yield, and yield to maturity (YTM)?

- The coupon rate (or just "coupon") is the annual coupon expressed as a percentage of the face value:  
Coupon rate =  $7 \text{ €} / 100 \text{ €} = 7\%$
- The current yield is the annual coupon divided by the current market price of the bond:  
Current yield =  $7 \text{ €} / 93,29 \text{ €} = 7.5\%$
- The yield to maturity (or "YTM") is the rate that makes the price of the bond just equal to the present value of its future cash flows.  
 $93,29 \text{ €} = 7 \text{ €} \times [1 - 1/(1 + 8\%)^{10}]/r + \$1000 / (1 + 8\%)^{10}$

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (5)

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#### Exercise

Assume you have the following information. DeFi, Inc. bonds have a 100 € face value with an annual coupon of 10 €. The bonds mature in 10 years.

The market's required return on similar bonds is

- a) 10 %
- b) 12 %
- c) 8 %

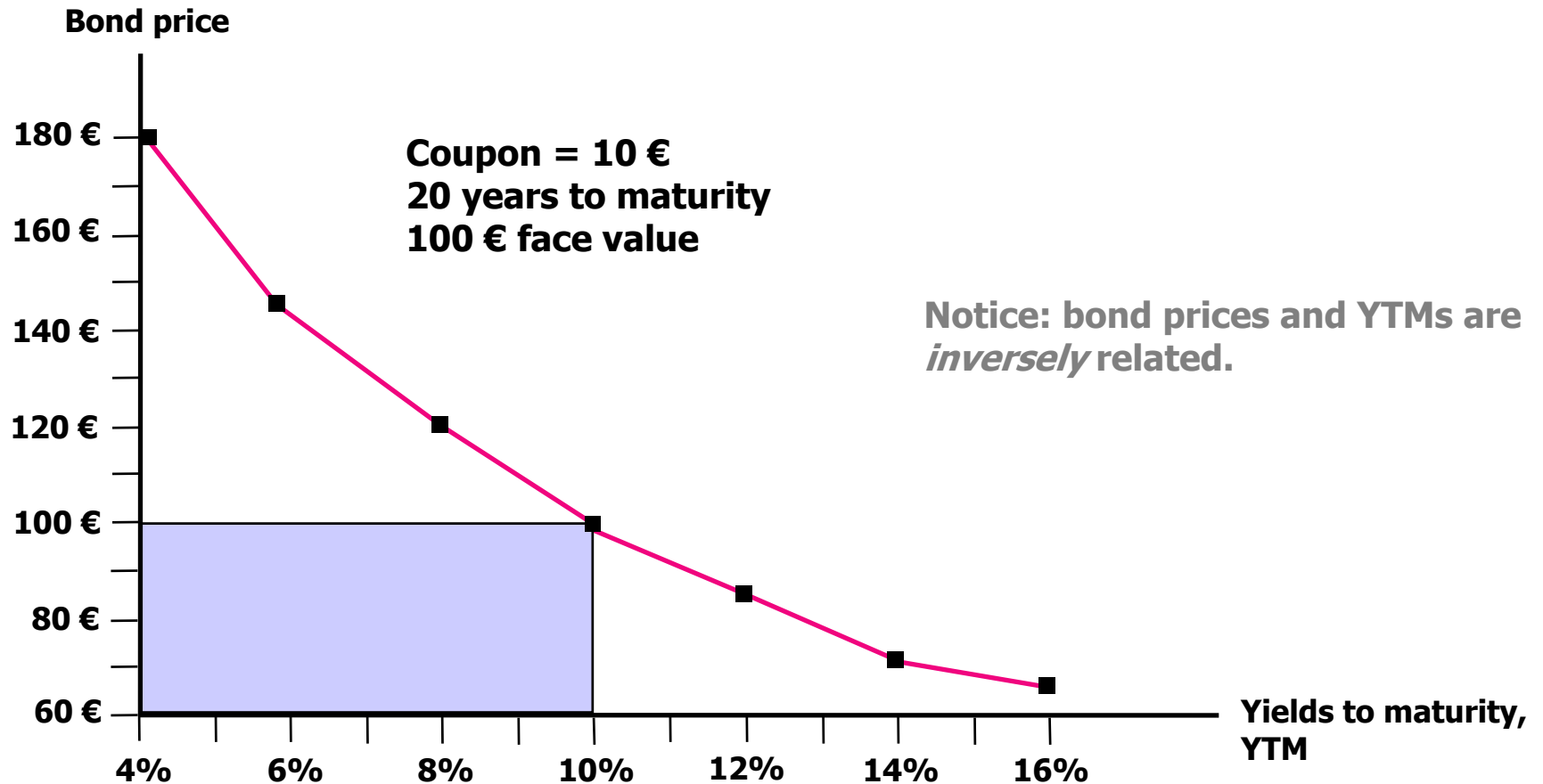
Calculate the current price of the bonds for each of the three cases.

Solution

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (6)

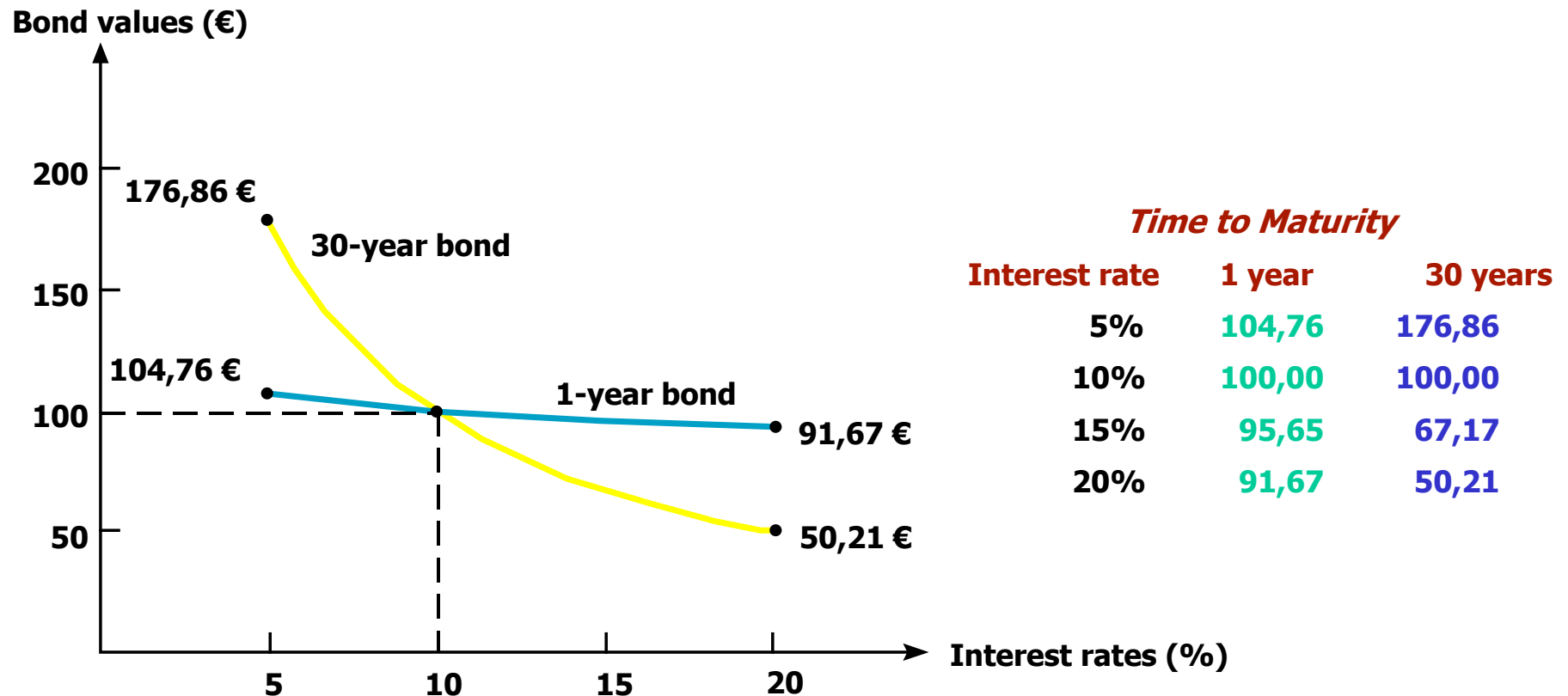
#### Bond Price Sensitivity to YTM :



## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (7)

#### Interest Rate Risk and Time to Maturity:



**Value of a Bond with a 10% Coupon Rate for Different Interest Rates and Maturities**

## 2. Introduction to Corporate Finance

### 2.6.3.1. Features of a Bonds (8)

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#### **The following statements about bond pricing are always true.**

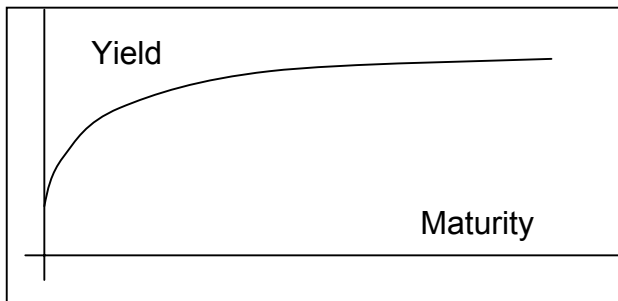
- Bond prices and market interest rates move in opposite directions.
- When a bond's coupon rate is (greater than / equal to / less than) the market's required return, the bond's market value will be (greater than / equal to / less than) its par value.
- Given two bonds identical but for maturity, the price of the longer-term bond will change more than that of the shorter-term bond, for a given change in market interest rates.
- Given two bonds identical but for coupon, the price of the lower-coupon bond will change more than that of the higher-coupon bond, for a given change in market interest rates.

## 2. Introduction to Corporate Finance

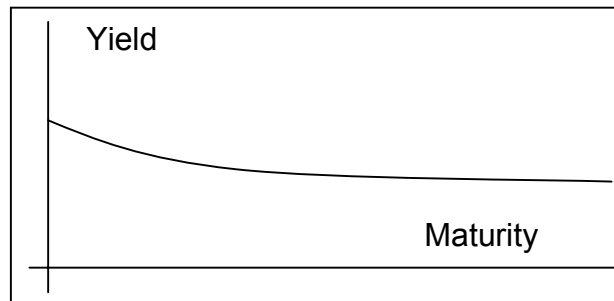
### 2.6.3.2. Real World Factors

#### Term structure of interest rates:

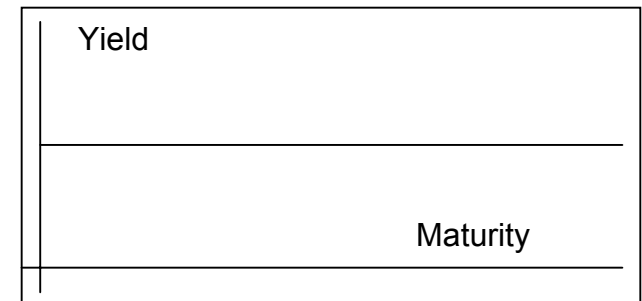
- **Upward-sloping (normal) yield curve:** Higher interest rate for longer maturities
- **Downward-sloping (inverse) yield curve:** Higher interest rate for shorter maturities
- **Flat yield curve:** Interest rate for every maturity is the same.



"Normal" Yield Curve



Inverse Yield Curve



Flat Yield Curve

## 2. Introduction to Corporate Finance

### 2.6.3.2. Real World Factors (2)

#### Rating of Bonds with Rating Symbols

Credit risk has an effect on the valuation of bonds.

Financial Strength	Rating Symbol	
	Moody's	S&P
<b>Excellent quality Bonds:</b> Best quality, lowest risk of default High quality, slightly higher risk of default	Aaa Aa1, Aa2, Aa3	AAA AA+, AA, AA-
<b>Good quality Bonds:</b> Good quality, but elements which can have negative effects if economic development isn't good	A1, A2, A3	A+, A, A-
<b>Fair quality Bonds:</b> Middle quality, but lack of protection against negative economic development.	Baa1, Baa2, Baa3	BBB+, BBB, BBB-
<b>Speculative Bonds:</b> Speculative quality, only poor coverage of interest and amortization.	Ba1, Ba2, Ba3 B1, B2, B3	BB+, BB, BB- B+, B, B-
<b>Junk Bonds:</b> Poorest quality. In Insolvency or about to.	Caa, Ca, C	CCC, CC, C

## 2. Introduction to Corporate Finance

### 2.6.3.2. Real World Factors (3)

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#### Summary:

Factors affecting bond yields

- Real rate of interest
- Expected future inflation
- Interest rate risk
- Default risk premium
- Taxability premium
- Liquidity premium