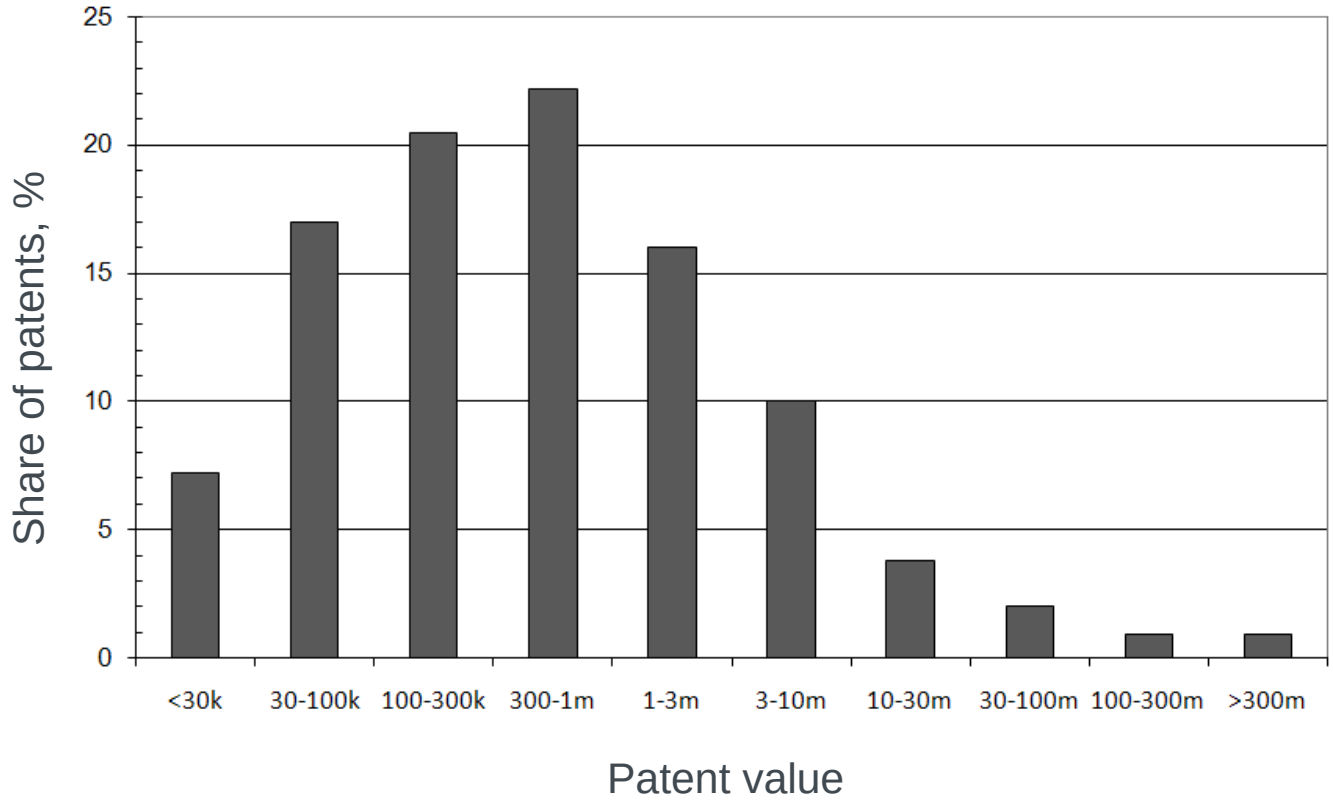
Alma Mater Studiorum - University of Bologna

Cost-based method and discounted cash flow method to estimate the value of patents

Kharkov, Ukraine, 8 September 2011

Value of European patents



✓ Survey of more than 9 000 inventors of patents applied for at the European Patent Office in the 1990s. Inventors were asked in 2004.
✓ Average value: approximately EUR 6 million.
✓ Median of the distribution: approximately 300.000 € - typical value?

Source: EPO Patent teaching kit

Evaluation: preliminary remarks

Value of a patent / technology:

- ✓ Depends on context, time, objective, money, parties involved, ….
- ✓ Different point of view:
  - Legal: how much the IP protecting rights are “sure”?
  - Economic: benefits that the owner can be able to obtain using the patent / technology

5 main questions

What

- Patent or technology?
- Single patent or patents portfolio?

When

- Level of development
- Patent life
- Uncertainty and risk

How

- Cost Base, DCF and many others
- Quantitative
- Mathematical

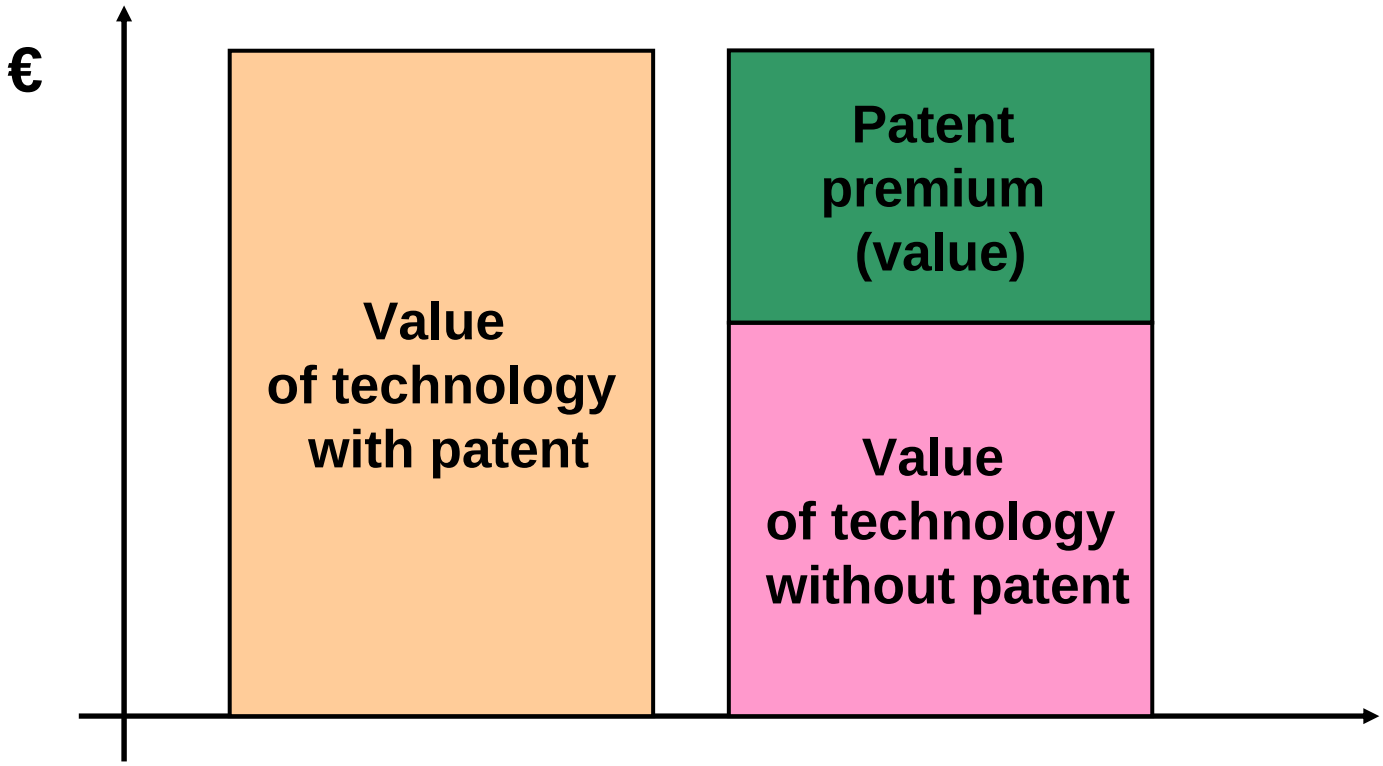
Why

- Internal management
- Licensing/assignment
- Legal litigation

Who

- Seller or buyer?
- Different skills and point of views

Patent premium



Cost-based method

Basic idea

Past costs indicate expectations on value

- ✓ Costs of the inputs spent on making particular intellectual property is equivalent to the value derived from the same
- ✓ Low cost and time needed but low reliability
- ✓ Use accountability as source of data
- ✓ Considering the cost incurred to develop and patent the technology:
  - R&D costs
  - Costs for file, extension and prosecution of the patent

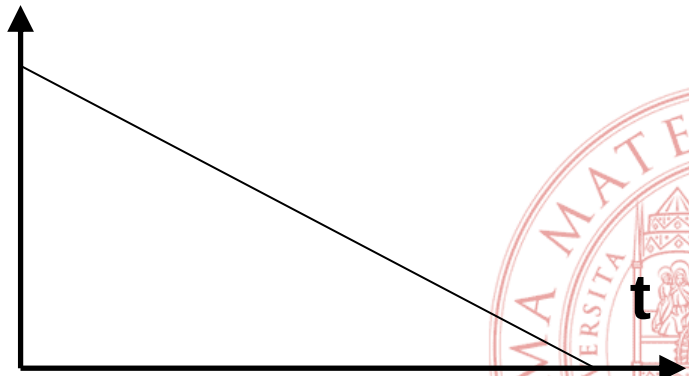
Principle of substitution

Value of an asset is estimated on the basis of cost to obtain a similar asset (a substitute asset of equal utility).

The cost to obtain a similar asset is commensurate with the economic value of the service that the property can provide during its life

Obsolescence

The passage of time depreciates the value of property



Cost-based method

Example

Costs incurred to obtain the patent:

- ✓ R&D costs: 50.000€ for 5 years = 250.000€ (personnel, equipment, space,…)
- ✓ Cost for patenting: 35.000€ (filing, PCT, national phases)

Technology life = patent's duration = 20 years

Assuming patent life = 3 years

Obsolescence rate = 17 / 20 = 0,85

Patent evaluation = 285.000 € x 0,85 = 242.250€

Cost-based method

Limits

- ✓ It’s easy to overestimate the value
- ✓ It can underestimate: small investment, great value (Post-it…)
- ✓ Difficult to determine all historical development costs

Pro

- ✓ Indication of an order of magnitude / minimum request
- ✓ Based on objective data

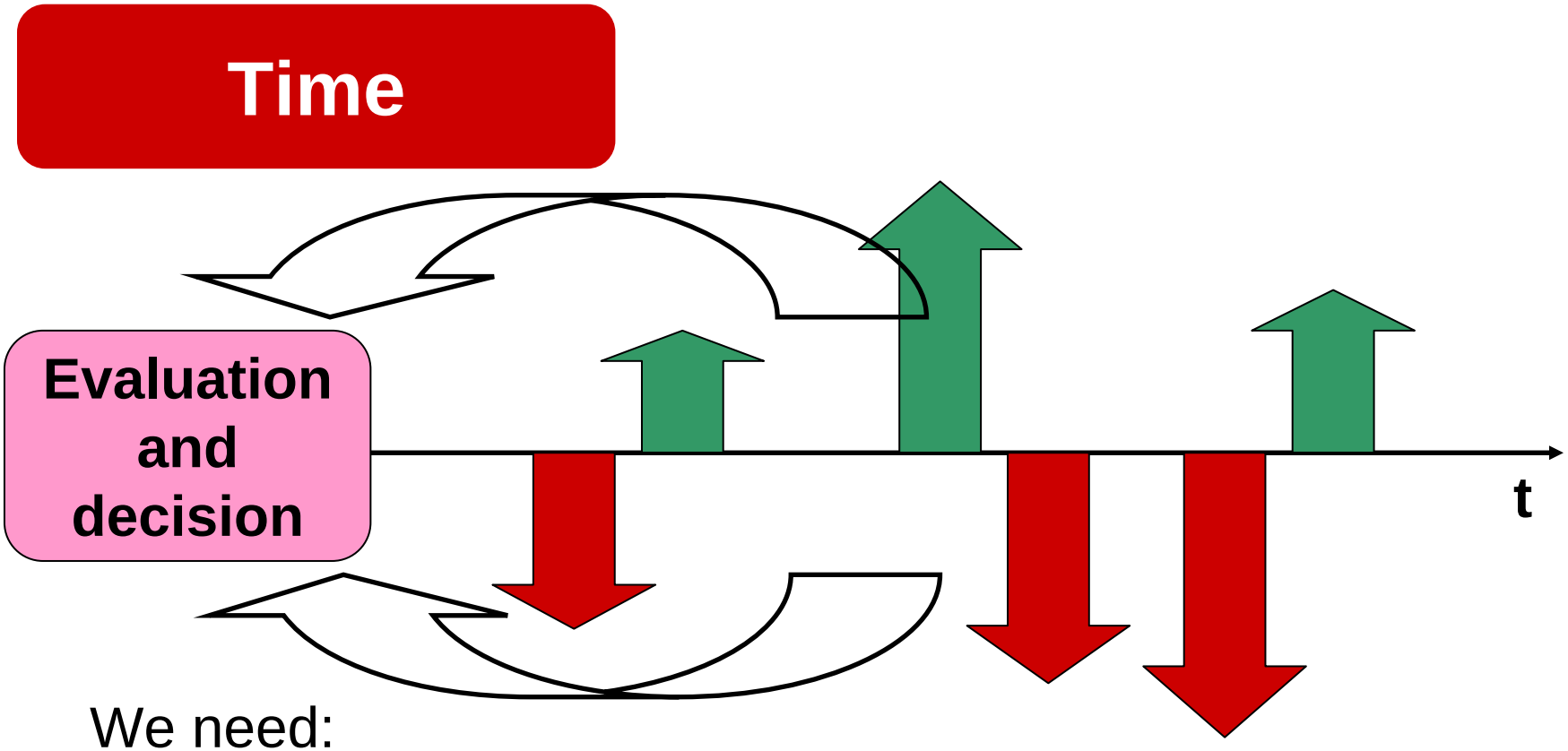
Discounted Cash Flow (DFC) method

Basic idea

In the business world, something is worth what it can generate in cash over its life

- ✓ expected future benefits indicate current value
- ✓ forecasting the future value of operating profits and cash flows
- ✓ the buyer is paying to enjoy a stream of future positive cash inflows that could not be otherwise experienced

Discounted Cash Flow (DFC) method

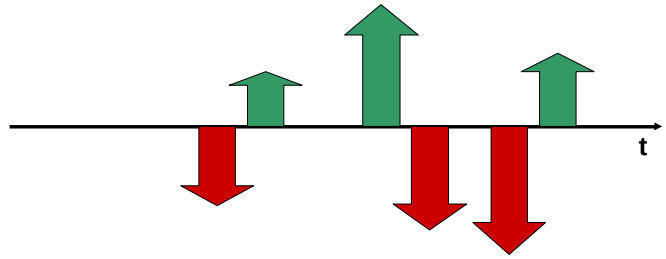


We need:

- a prediction of all the future positive and negative cash flows (earnings and expenses)
- a present conversion of these future flows (Present Value)

Discounted Cash Flow (DFC) method

Cash flows



Differential cash flows = difference in cash flows that can be obtained by developing and using the patented technology to manufacture and sell new products / services versus not doing this.

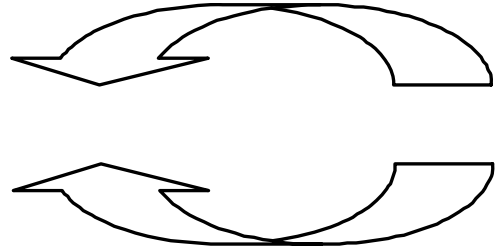
These cash flow differences may take the form of higher revenues, lower costs or a combination of higher revenues and lower costs.

DFC method is tied to reasonable assumption about tomorrow.

DFC method is not “wrong” because its prediction did not come true.

Discounted Cash Flow (DFC) method

Present Value



We need to convert future cash flows into their present equivalent, taking into account the time when payments would be made and the risk associated with their being paid.

1 today's Euro has more value than 1 tomorrow's Euro

1 secure Euro has more value than 1 risky Euro

DFC method: Present Value

I lend 100 € and I'm expected a rate of return of 3%

After 1 year I'm expected to receive:

100€ + (0,03 x 100€) = 103€ => A + (k x A)

After 2 years I'm expected to receive:

103€ + (0,03 x 103€) = 106,9 => B

=> A + (k x A) + (k x (A + (k x A)))

$$B = A \times (1 + k)^2$$

A = money invested at the beginning = 100 €

B = money received after 2 years = 106,9

k = expected annual rate of return = 0,03 (3%)

DFC method: Present Value (cont)

After 2 years: $B = A \times (1 + k)^2$

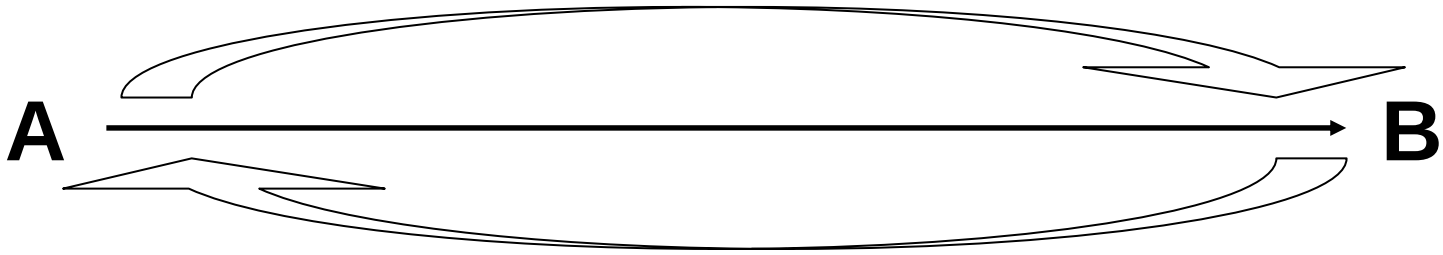
After 3 years: $B = A \times (1 + k)^3$

After 4 years: $B = A \times (1 + k)^4$

…

After n years:

$$B = A \times (1 + k)^n$$



B = money at the end of year n = future value

A = Present Value of that money

K = risk factor

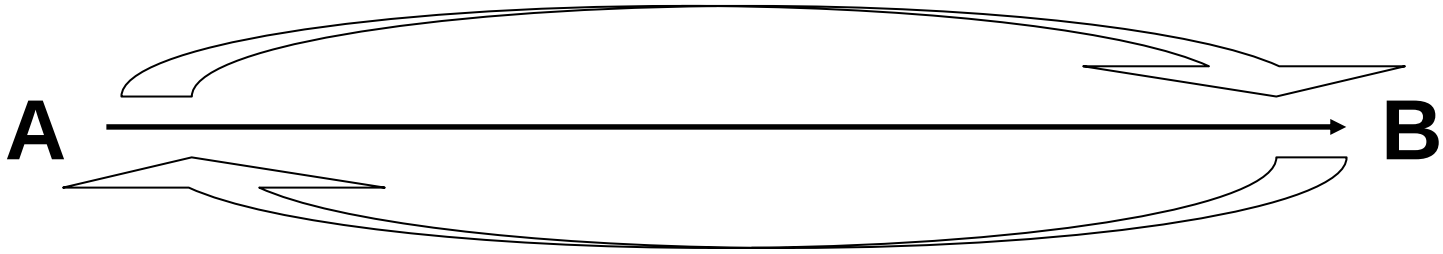
$$A = \frac{B}{(1 + k)^n}$$

DFC method: Present Value (cont)

Supposing k = 3%

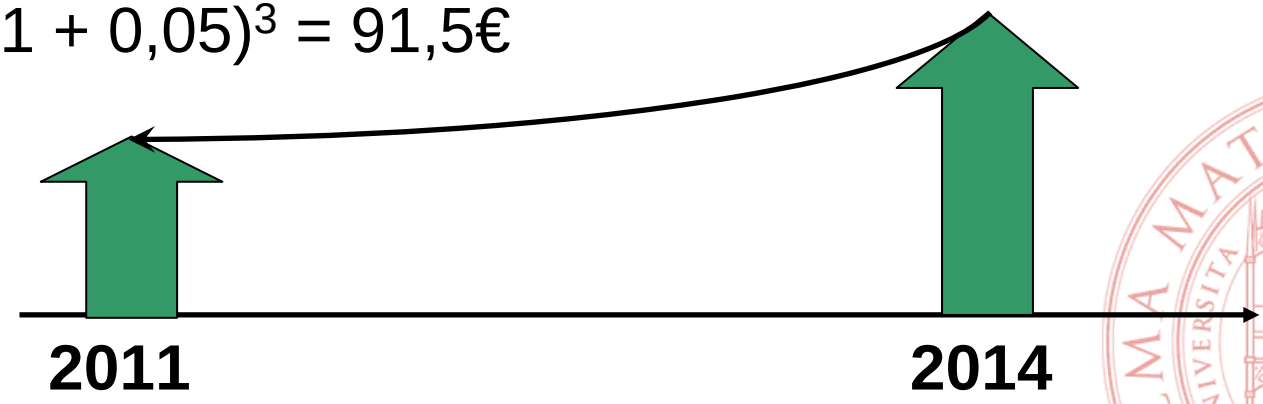
100€ today… after 3 years:

$B = 100€ \times (1 + 0{,}03)^3 = 109{,}2€$

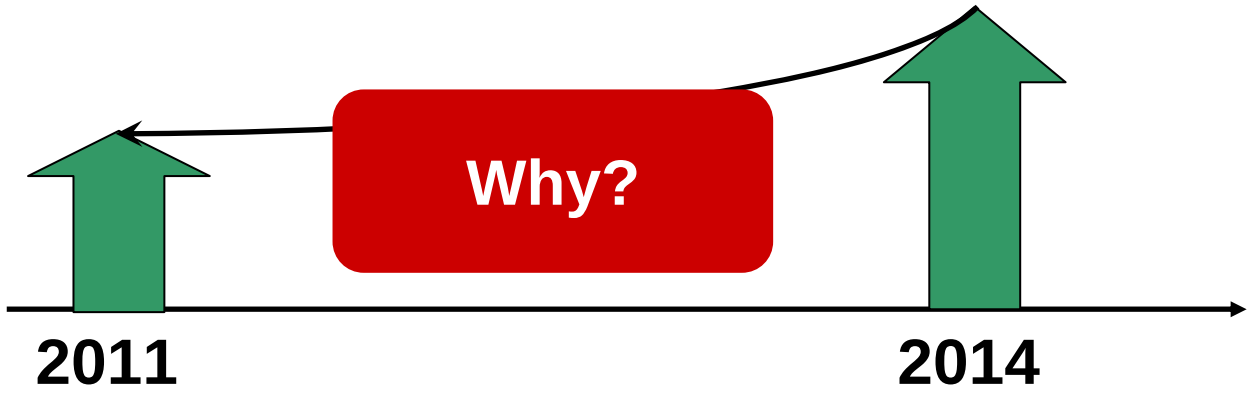


100€ 3 years from now… today:

$A = 100€ / (1 + 0{,}05)^3 = 91{,}5€$



DFC method: Present Value (cont)



The present value of 100€ 3 years from now is lower than 100€ (for example 91,5€).

Inflation

Opportunity cost

k

K and inflation

- ✓ Money in all countries of the world suffers from inflation
- ✓ Inflation simply means that it will take more Euros to buy in the future what less Euros could buy today

Assuming an inflation of = 3%

- ✓ one promising to pay me 100€ 3 years from now is really promising 91,5 € in terms of value in today's Euros
- ✓ receiving 91,5 € today is equivalent to receive 100€ 3 years from today
- ✓ 91,5 € is the Present Value of 100 € 3 years from now

K and opportunity cost

But people don't keep money under their mattress…

…in business world, there are numerous investment opportunities that provide greater-than-inflation returns

"Treasury Bill" => k = 5% (risk free)

$A = 100 € / (1 + 0,05)^3 = 86,3 €$

"Corporate Bonds" => k = 15% (more risky)

$A = 100 € / (1 + 0,15)^3 = 65,7 €$

K in R&D activities

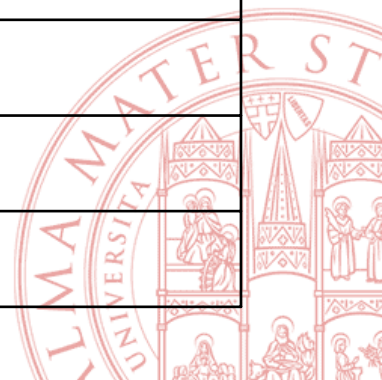
"Corporate Bonds" => k = 15% => many different kinds of projects, with different level of risk and return

In a single project, the risk of the project is normally higher than the overall risk and return of the corporation

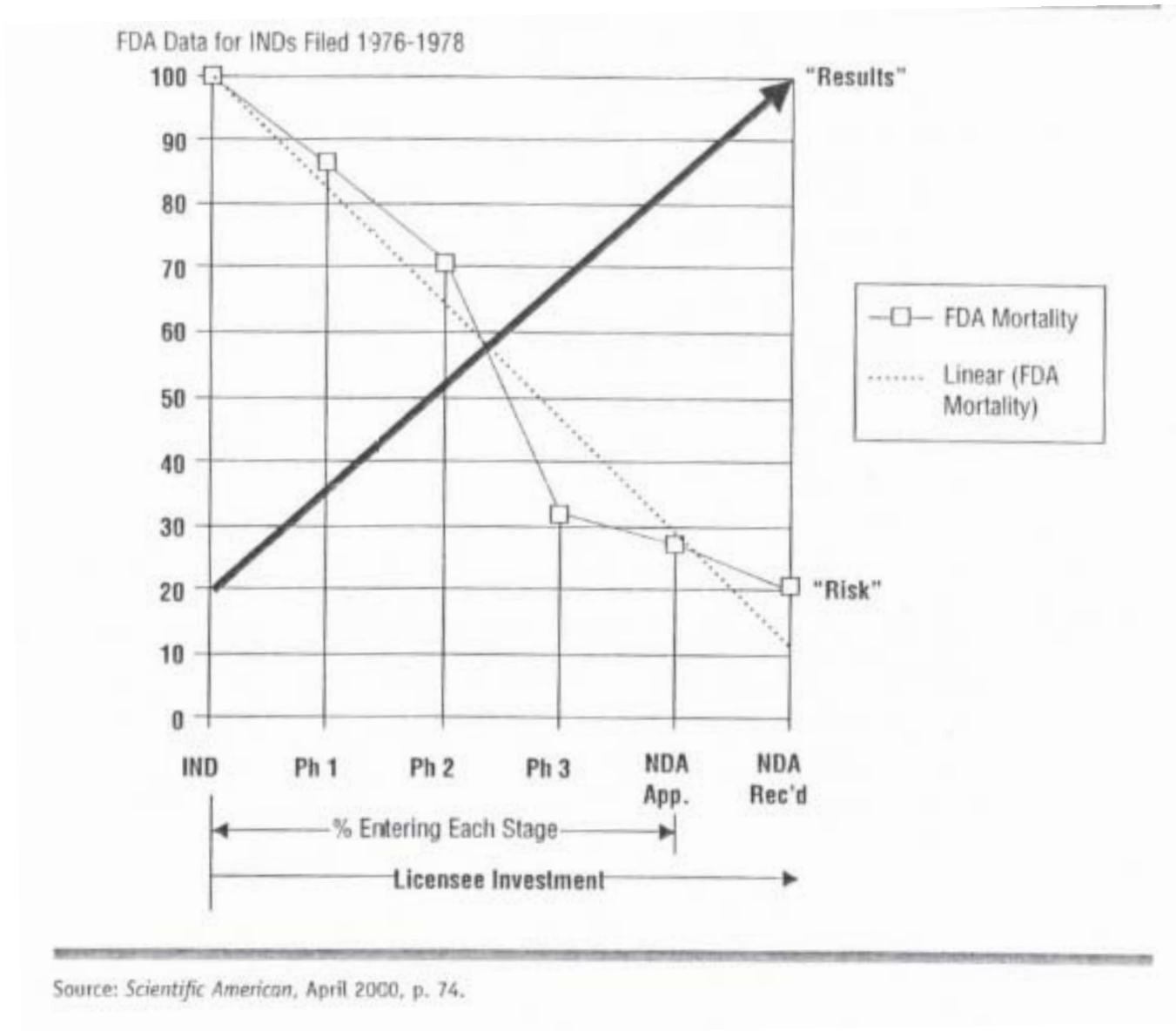
Ex: investment in a R&D project: rate of return = 30%

$A = 100 € / (1 + 0{,}30)^3 = 45{,}5 €$

Point of view (risk level)	**K**	**Today**	**3 years later**
Only Inflation	3%	91,5 €	100 €
Treasury Bill	5%	86,3 €	100 €
Corporate Bonds	15%	65,7 €	100 €
R&D project	30%	45,5 €	100 €



K as a dynamic rate



Source: R. Razgaitis, 2003

K values

Characterization of Risk	Approximate RAHR (k value)
0. "Risk-free," such as building a duplicate plant to make more of a currently made and sold product in response to presently high demand.	Approximates the corporate rate of borrowing, which can be in the range of 10–18%
IA. Very low risk, such as incremental improvements with a well-understood technology into making a product presently made and sold in response to existing demand.	15–20%; discernibly above the corporation's goals for return on investment to its shareholders
IB. Low risk, such as making a product with new features using well-understood technology into a presently served and understood customer segment with evidence of demand for such features.	20–30%
II. Moderate risk, such as making a new product using well-understood technology to a customer segment presently served by other products made by the corporation and with evidence of demand for such a new product.	25–35%
III. High risk, such as making a new product using a not well-understood technology and marketing it to an existing segment or a well-understood technology to a new market segment.	30–40%
IV. Very high risk, such as making a new product with new technology to a new segment.	35–45%
V. Extremely high risk (sometimes known as "wildcatting," borrowing an expression from the oil exploration industry), such as creating a startup company to go into the business of making a product not presently sold or even known to exist using unproven technologies.	50–70% or even higher

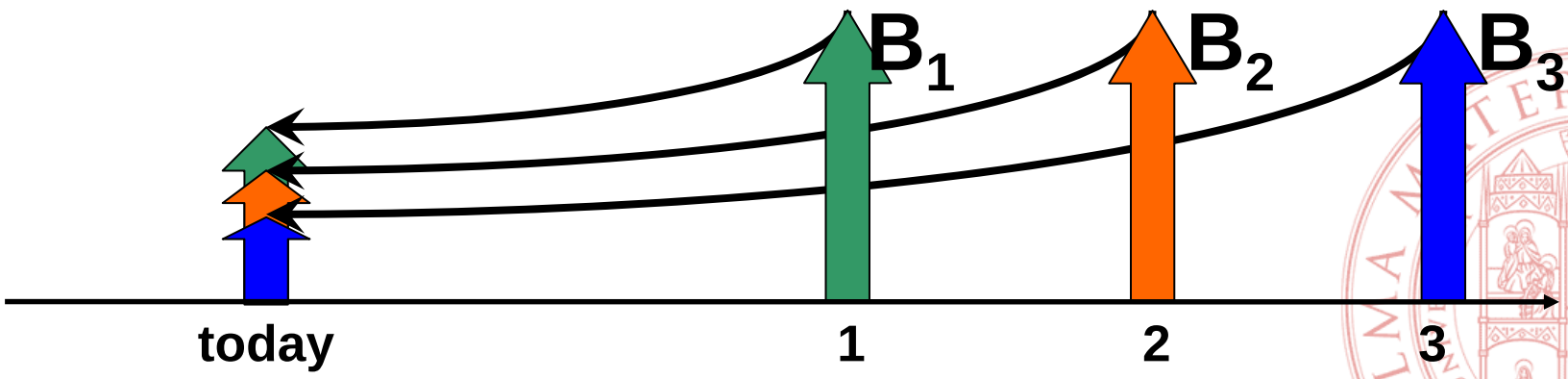
Source: R. Razgaitis, 2003

Discounted Cash Flow Formula

If we consider more payments (cash flows) in the future, in different periods, each of this payment can be discounted to the present, each of this payment has its Present Value / Discounted Cash Flow (DCF).

The sum of all DCF is the Net Present Value of the future cash flows.

$$NPV = \frac{B_1}{(1+k)^1} + \frac{B_2}{(1+k)^2} + \frac{B_3}{(1+k)^3} + \dots$$



DCF Method and technology transfer

Technology transfer transaction:

- ✓ The Seller transfers “patented” technology to a Buyer
- ✓ The Buyer will experience positive / negative cash flows over a period of years, hoping to enjoy commercial benefits
- ✓ DFC method “converts” the Buyer benefits in terms of willingness to pay a lump sum / royalties today
- ✓ The critical point is understanding and assessing the risk associated with transforming the technology rights transferred into a stream of profits. These profits can justify the payment that the Seller is requesting for the transaction

DFC method should be applied by both Buyer and Seller

Final remarks

Is 300.000 € the typical value?

Probably, the best answer is…

The value of a patent is the value that the market is disposed to appreciate

We will see later…

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Thanks for your attention!

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Research and Technology Transfer Administrative Department

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