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ACCELERATING SELF-SUFFICIENCY & PROSPERITY

Financial Management of Development Projects
17 May 2019

PROJECT APPRAISAL

Session Introduction

Session Aim

- Examine the need for project financial appraisal and discuss various appraisal methods

Session Learning Objectives – by the end of this course, you will be able to:

- Distinguish between economic and financial project appraisal
- Explain the need for financial appraisal
- Understand and use the key basic and discounted cash-flow appraisal methods

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Session Agenda

Our Learning Journey – how we will achieve our objectives:

1. Financial vs economic appraisals
2. Basic appraisal methods
3. Discounted cash-flow methods
4. Using Excel for present value calculations
5. Exercise – project appraisal
6. Session close

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Evaluating project feasibility

Projects need to be appraised

- The expected economic contribution to growth of the economy should be measured
  - based on the best practice social economic principles applied and the relevant appraisal assumptions
- An assessment of the project's ability to attain the national the socio-economic objectives in a cost-effective manner

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Financial analysis vs Economic analysis

- Financial analysis helps to determine the financial viability and sustainability of the project
- Integrated project analysis begins with the financial analysis followed by the economic analysis
- In the financial analysis the project profile is provided by financial cash flows
- In the economic appraisal the project profile is provided by the flow of net economic benefits generated by the investment

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Financial analysis of public sector projects

- Financial appraisal of a project should be equally of interest to public sector (as it is to the private sector)
- Public sector projects utilise public funds
  - therefore analysis is primarily concerned with the project's impact on national economic welfare
- From the country prospective, a project should be undertaken if it generates a positive net economic benefit
  - A project that yields negative net economic benefits should not be undertaken as it will lower the economic welfare of society as a whole
- To determine the net economic benefits produced by a project the appraisal of such projects needs to incorporate an economic analysis

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Financial analysis of public sector projects

Why conduct a financial appraisal for a public sector project?

- To ensure the availability of funds to finance the project through its investment and operating phases
  - While an expected positive economic return is a necessary condition for recommending that a project be undertaken it is not a sufficient reason for a successful outcome
  - A project with a high expected economic return may fail if there are not enough funds to finance the operations of the project
- Several development projects with expected high economic returns have failed due to financial difficulties

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Financial analysis of public sector projects

- In some instances government has to approach a project from a private sector perspective to determine its financial profitability
- E.g. where private participation in the project is being contemplated
  - it would be important to determine the profitability of a project and to estimate the value that a private investor would be willing to pay for the opportunity to participate
  - Encourage private sector investment

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Financial analysis of public sector projects

Establishing the true net gain to stakeholders

- E.g. the difference between the financial price an individual pays for a liter of water (from the *financial cash flow statement*) and the gross economic benefit he derives from consuming the water (from the *economic resource flow statement*) reflects a net gain to the consumer
- Such gains and losses of this nature will be difficult to establish on the basis of economic analysis alone

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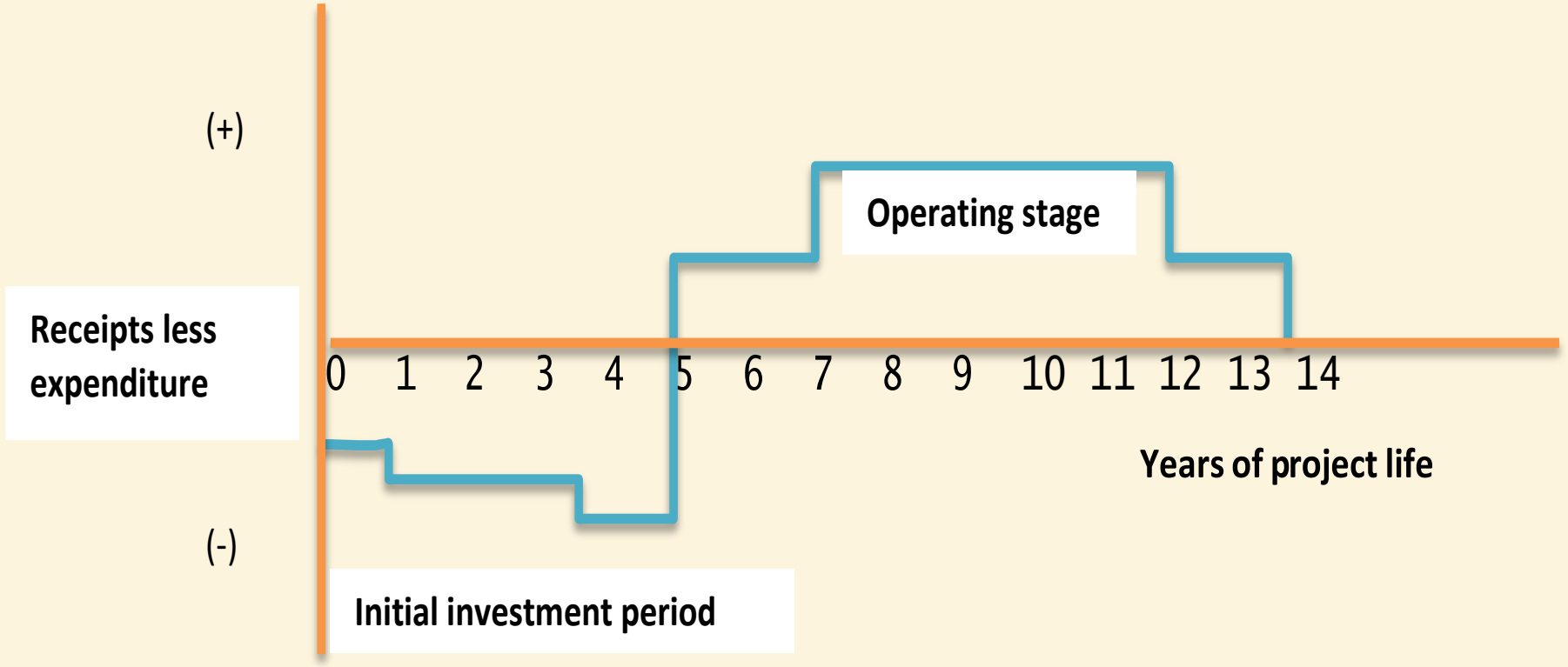
Financial cash flows

Net receipts / expenditures plotted against the sequence of years making up the project life



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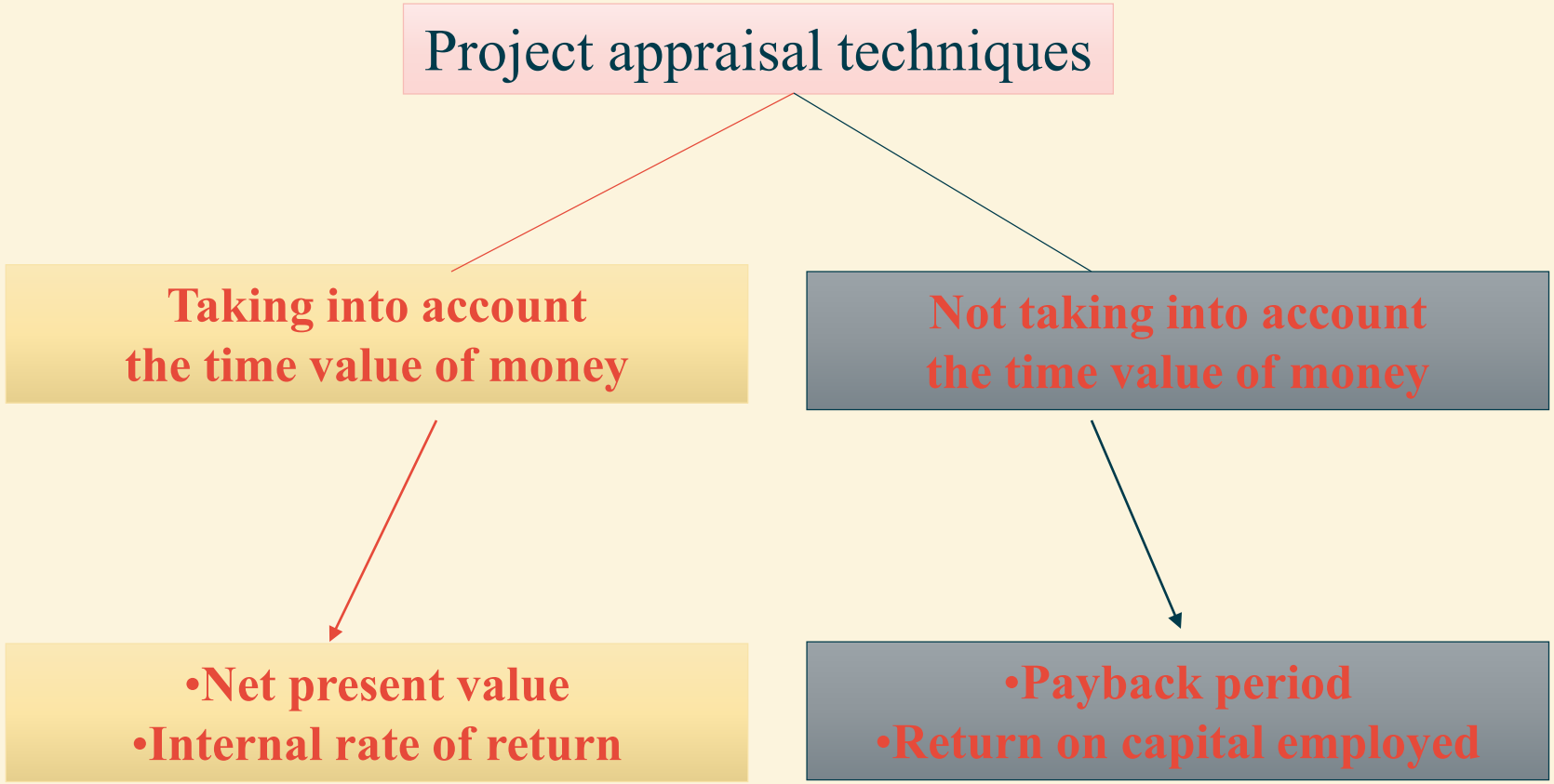
Project appraisal techniques



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Basic project appraisal techniques

Two basic appraisal techniques

- Return on Capital Employed (ROCE)
- Payback Period

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Return on capital employed/

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Return on capital employed (ROCE)

ROCE is also known accounting rate of return (ARR)

There are several ways in which ARR is computed

$$\frac{Profit\ for\ the\ year}{Asset\ book\ value\ at\ start\ of\ the\ year}\ \text{x}\ 100$$ Annual Basis

$$\frac{Average\ annual\ profits}{Initial\ capital\ investment}\ \text{x}\ 100$$ Total investment basis

$$\frac{Average\ annual\ profits}{Average\ capital\ investment}\ \text{x}\ 100$$ Average investment basis

$$\text{Average capital investment} = \frac{Initial\ capital\ costs}{2}$$

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XYZ Corporation - ARR

Accounting rate of return, version 2 (total investment basis)

$$\frac{\text{Average annual profit}}{\text{Initial capital invested}}$$

$$\frac{(5{,}000 + 5{,}000 + 5{,}000) / 3}{30{,}000} \times 100 = 16.67\%$$

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XYZ Corporation - ARR

Accounting rate of return, version 3 (average investment basis)

$$\frac{\text{Average annual profit}}{\text{Average capital invested}}$$

Average capital invested: 30,000 / 2 = 15,000

(at time 0 the machinery has a value of £30,000, three years later it has a value of zero)

$$\text{ARR} = \frac{(5{,}000 + 5{,}000 + 5{,}000) / 3}{£15{,}000} \times 100 = 33.33\%$$

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Return on capital employed (ROCE) / ARR

Decision rule

- If the ROCE / ARR for the investment is greater than the hurdle rate decided by management then the project should be accepted

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Accounting rate of return (ARR)

Drawbacks of ARR

- There are several alternative ways in which the ARR is computed. which means managers could use a legitimate variation to justify a favourite project
  - The extensive options for selecting profit and asset definitions is a major weakness of ARR
  - This flexibility may tempt decision- makers to abuse the technique to suit their purposes
- The focus of investment appraisal should be cash inflows and outflows of cash
- Profit figures, especially on an accruals basis, do not accurately reflect the accurate timing of cash-flow

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Accounting rate of return (ARR)

Drawbacks of ARR

- Another drawback of ARR is working capital
  - Required increases in inventory (e.g. raw material stocks) to support project implementation (paid for in cash) will have a significant impact on cash-flows but will not affect accounting profit calculations
  - The same issue applies to cash used to increase the level of trade debtors or the release of cash by using supplier cash to finance the business
- The most important criticism of ARR is that it does not take account of the *time value of money*
  - There is no allowance for the fact that cash received in Year 1 is more valuable than an identical sum received in Year 3

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Accounting rate of return (ARR)

Drawbacks of ARR

- The cut-off or hurdle rate is an arbitrary figure
  - It is a often a number plucked from the air
- NPV by contrast has a firm logical basis by being related to the discount rate used by the company for a project
  - It is the opportunity cost of capital

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Accounting rate of return

Advantages: why is it used in practice?

- Familiarity of accounting measure
  - Management performance is measured on this basis in several organisations
  - The financial press regularly report accounting rates of return
  - Divisional performance is often judged on a profit-to-assets employed ratio
  - Often the entire organisation firm is analysed and its management evaluated on this ratio
- Because performance is measured in this way, managers have a natural bias towards using it in appraising future projects

•ARR is rarely used as the primary appraisal technique

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Payback period/

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Payback period

Definition

- The Payback period for an investment is the length of time it takes for the accumulated forecast cash-flows to equal the initial investment

Decision rule

- If a project's payback period is less than or equal to a *pre-determined* threshold figure it is acceptable

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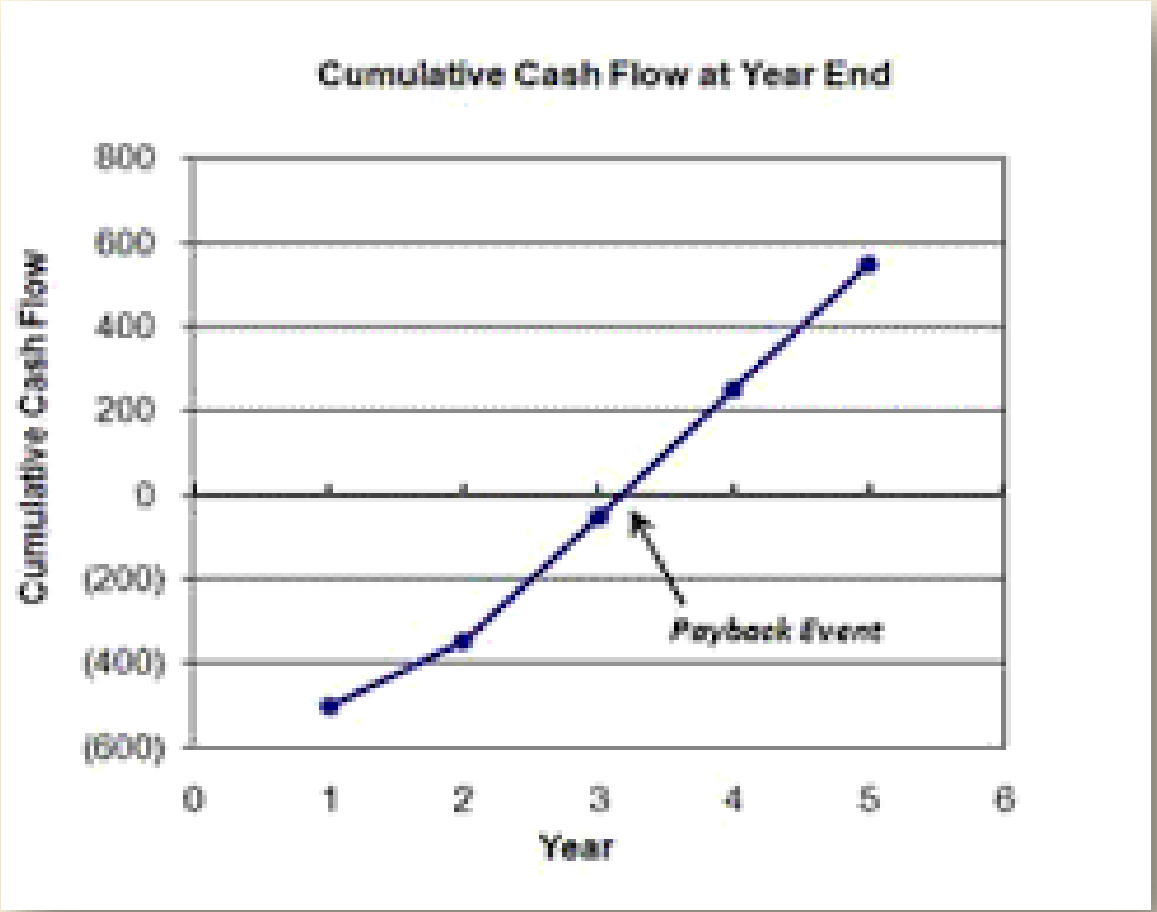
Payback period



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Payback period

Formula

$$Payback\ period \quad \frac{Initial\ investment}{Annual\ cashflows}$$

- Can be converted to days, weeks, months by multiplying by relevant number if cash flows are for less that one year

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Payback period

Example: Investment in machine

- Cost of machine = £600,000
- Annual net inflows from investment = £255,000 per annum

Payback = 36 x 600,000/765,000

= 28.23 months

Year	Net income
1	255,000
2	255,000
3	255,000

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Payback period

Drawbacks

- Takes no account of the time value of money
  - Ignores need to compare future cash flows with the initial investment after they have been discounted to their present values
- Cash-flows beyond the payback period are ignored
  - Can lead to perverse decisions
- Uses an arbitrary selection the cut-off point
  - Usually based on guess-work with no theoretical basis and therefore subject to manipulation

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Discounted cash-flow analysis

- Discounted cash-flow (DCF) analysis is most appropriate for projects with cash-flows over multiple periods
- For multi-period investments DCF provides a better basis for decision-making than other methods
  - E.g. payback period or accounting rate of return
- DCF recognizes that project cash-flows may occur throughout its expected life and that cash-flows in the early periods are likely to be more significant than later cash-flows
- It is common for many organisations to use several methods for evaluating capital investments
  - Most organisations would include the DCF approach in the mix

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Compensation for sacrifice of present consumption

- Time
- Individuals generally prefer to have £1.00 today than £1.00 in five years' time
  - The *utility* of £1.00 now is greater than £1.00 received five years from now
  - Individuals are pre-disposed towards an *impatience to consume*
    - they need an appropriate reward to save or invest (forego consumption)

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Compensation for sacrifice of present consumption

•Time

- The *rate of exchange* between certain future consumption and certain current consumption is the *pure rate of interest*
  - This is true even if there were no inflation or no risk
- In a no inflation, no risk world, if the investor is willing to sacrifice £100 of consumption for compensation of £102.50 in one year then their your *pure rate of interest* is 2.5 percent

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Compensation for sacrifice of present consumption

•Inflation

- The price of time (the required interest rate to compensate for investor time preference) exists even in the absence of inflation
  - This simply because people prefer consumption now to consumption later
- If there is inflation then investors will require additional compensation for the loss in purchasing power

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Compensation for sacrifice of present consumption

•Risk

- The promise of the investment returns several years from now generally carries with it an element of risk
  - the pay-out may not take place or the amount may be less than expected.
- Risk means that future returns has a variety of possible values (is uncertain)
- An investor would therefore expect additional compensation for this uncertainty

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Compensation for sacrifice of present consumption

Example

- Investor is considering a £1,000 one-year investment
- Requires compensation for the three elements of time value
- Time: Return of 2.5 percent for the pure time value of money (impatience to consume)
- Inflation: anticipated to be 5 percent over the year
- Required return for time and inflation
- = Risk free rate of return (RFR) = (1+0.025) x (1+0.050) = 1.07625
- RFR = 7.625%

•RFR = expected rate of return (assuming there is no uncertainty about future returns)

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Compensation for sacrifice of present consumption

Compensation for risk

- Different investment categories carry different degrees of uncertainty about their outcome of the investment
- For instance an investment on the stock market may be regarded as more risky than the purchase of government securities
- Required return = RFR + Risk premium

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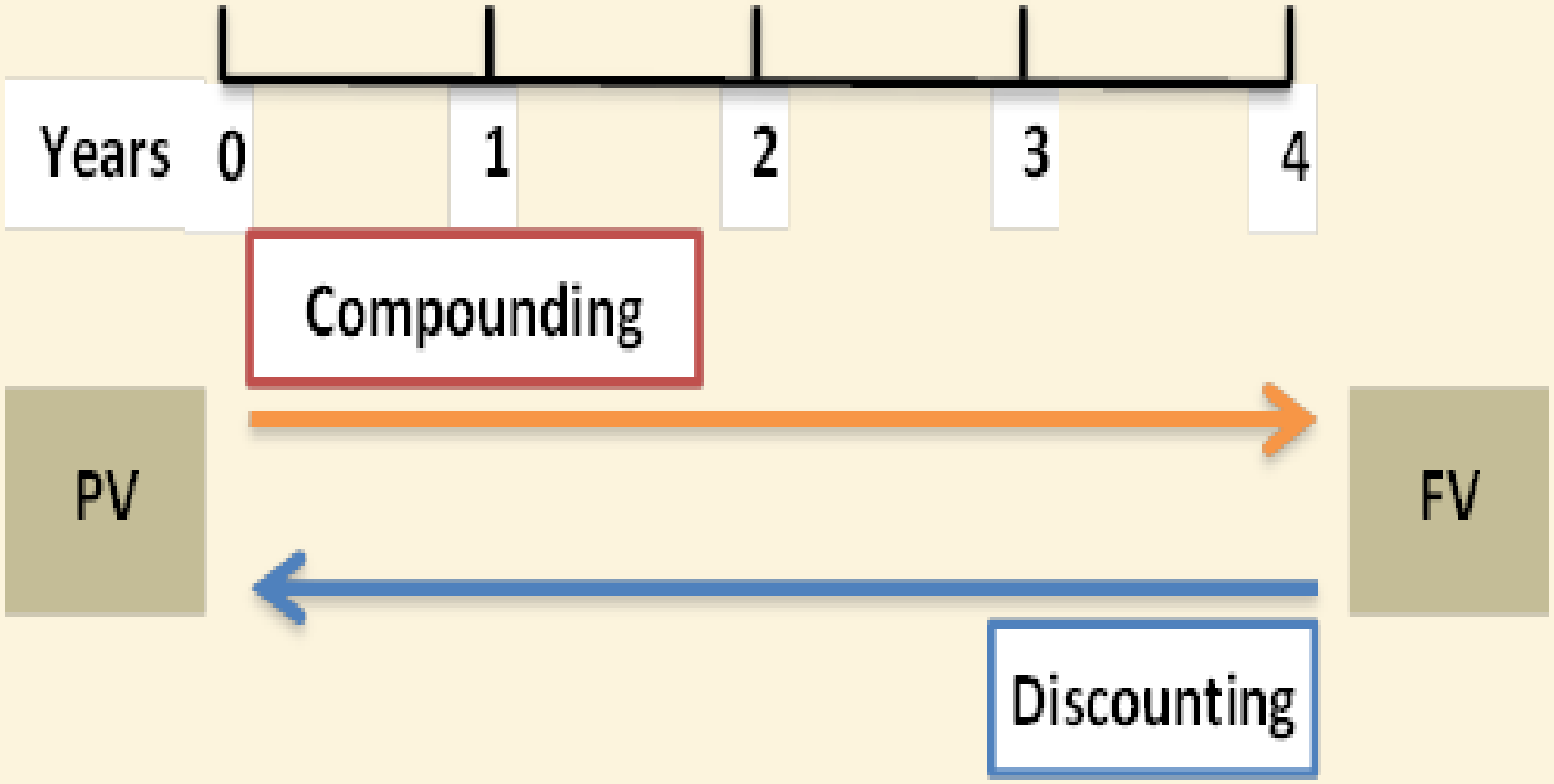
Compounding & Discounting



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Compounding

- A sum invested today will begin to earn interest
- Compounding calculates the value at maturity of the sum invested taking into account the interest rate(s) over the investment period

-Formula

$$\boldsymbol{FV = PV\ x\ (1 + r)^n}$$

- FV = Future value after n periods
- PV = Present or Initial value
- r = Rate of interest per period
- n = Number of periods

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Compounding example

Question

- XYX makes an investment of $100 . What will be the value of the investment after two years if the interest rate is 10%?

  -Solution

		$
Value after one year	100 × 1.1 =	110
Value after two years	110 × 1.1 =	121

- The $100 will be worth $121 in two years at an interest rate of 10%

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Discounting

- Investment project cash flows arise at many different points in time over its life
- In order to make a useful comparison of the different flows they must all be converted to a common point in time usually the present day,
- This is called discounting

  -The present value (PV) is the cash equivalent now of money receivable/payable at some future date

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Discounting

Formula

$$PV = FV \ / \ (1 + \ r)^n$$

- It is a re-arrangement of the compounding formula

or

$$PV = FV \ x \ (1 + \ r)^{-n}$$

$(1 + \ r)^{-n}$ is referred to as the *discount factor*

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Discounting example

Question

- What is the PV of $115,000 receivable in nine years' time if r = 6%?

Solution

- $PV = 115{,}000 \; / \; (1 + 0.06)^9$ = $68,068

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Discounted cash flows

Project B: Outlay of £1,000 produces £2,500 over 5 years

Project B						
Rate of return						**20.00%**
Yearly intervals		**Cash-flows**			**Discounted cash flows**	**£**
						NPV
0	Now	-1000				-1,000.00
1		500			$500 / (1 + 0.20)^1$	416.67
2		500			$500 / (1 + 0.20)^2$	347.22
3		500			$500 / (1 + 0.20)^3$	289.35
4		500			$500 / (1 + 0.20)^4$	241.13
5		500			$500 / (1 + 0.20)^5$	200.94
						495.31

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Net present value

- NPV is the sum of the present values of the expected incremental project net cash flows over the project's expected life
- It measures the increase / decrease in wealth due to the project
- The net present value (NPV) of a project is widely accepted as the one that yields the correct project choice in most circumstances
- The NPV is arrived at through discounting

$$\boldsymbol{NPV = NFV \,/\, (1 + r)^n}$$

•NFP is net future cash inflows and outflows

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NPV

Advantages

- Accounts for the time value of money
- Uses cash flows, not accounting profit
- Takes into account timing and amount of project cash flows
- Takes account of all relevant cash flows over the life of a project

Disadvantages

- Accepting all projects with positive NPV is only possible in a perfect capital market
- Cost of capital may be difficult to find
- Cost of capital may change over project life rather than being constant

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Internal rate of return (IRR)

- The IRR of a project is the discount rate (r) that is obtained by the solution of the following equation

$$\sum_{k=0}^{n}[FV_k/\ (1+\ r)^k] = 0$$

- This is where investors recover a zero NPV that investors and therefore earn a rate of return equal to IRR on their invested capital
- The IRR and the NPV are therefore related
  - To calculate the NPV the discount rate is given and used to find the present value of future cash-flows
  - To find the IRR of a project the net present value of future cash flows is set to zero and the rate of return is solved for

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Internal rate of return (IRR)

- IRR has been used extensively by both private and public sector investors as a way of describing the attractiveness of a particular project
- However does have several problems associated with it
  - IRR may not exist
  - There may be more than one IRR

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Session close

Let’s wrap up the session:

- Recap of key learning
- Final questions?
- Revisit session objectives – achieved?
- Application of learning – update your action plans
- What’s next?

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