

Finance Management & Planning

Project Appraisal (Week 5)

This Week

- Any Questions on NPV, Payback , IRR and PI
- Capital Rationing
- BCR

Financial Appraisals Tools

Internal Rate of Return (IRR)

IRR shows the expected annual rate of growth of an investment

IRR is the same concept as NPV however it is working as the rate of growth based on NPV being equal to zero.

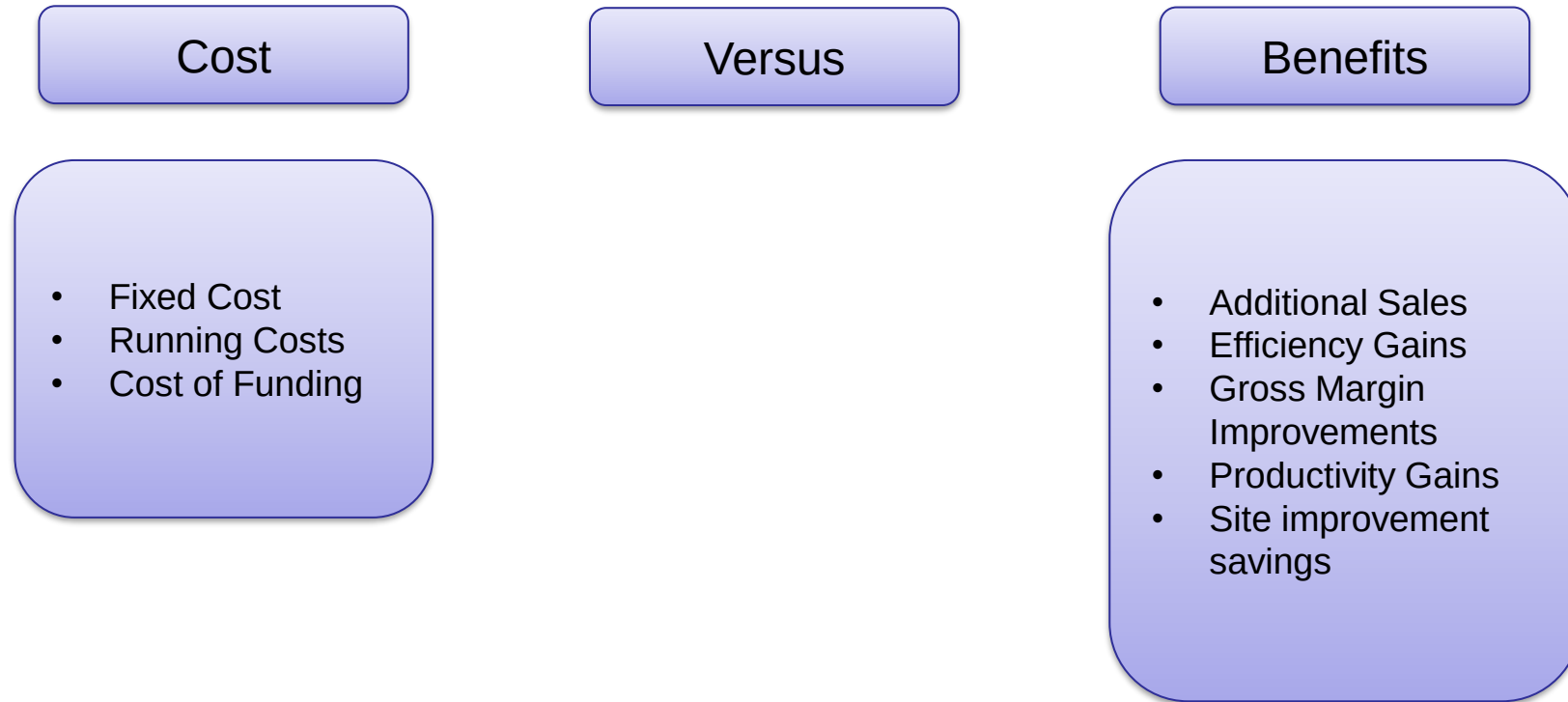
IRR is ideal for comparing capital budgeting projects to understand potential rates of annual return over time.

The higher the IRR the more desirable the project will be considered,

Capital Investment Appraisal

- Making capital investment decisions
- Methods of investment appraisal
- Capital rationing

Financial Appraisals



Remember your analysis is only as good as the strength of your data

Project Appraisals



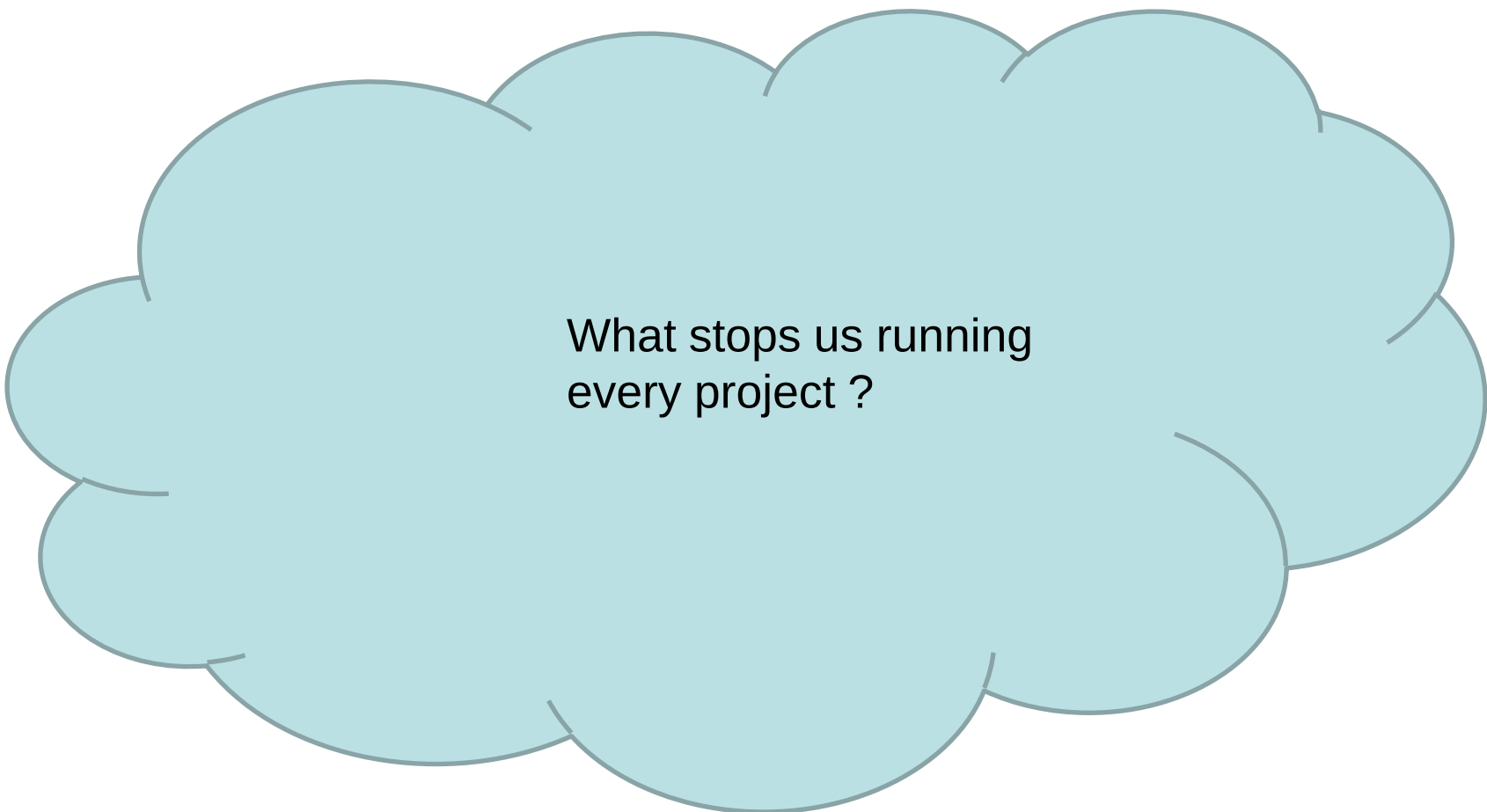
Project	Investment	1	2	3	4	5	IRR	Payback
A	(150,000)	50000	50000	50000	50000	50000	19.9%	3 years
B	(200,000)	60000	50000	40000	30000	20000	0.0%	5 Years
C	(175,000)	50000	60000	65000	60000	70000	20.7%	3 years

Calculate

- 1) Payback Period
- 2) Calculate the IRR (Internal Rate of Return)

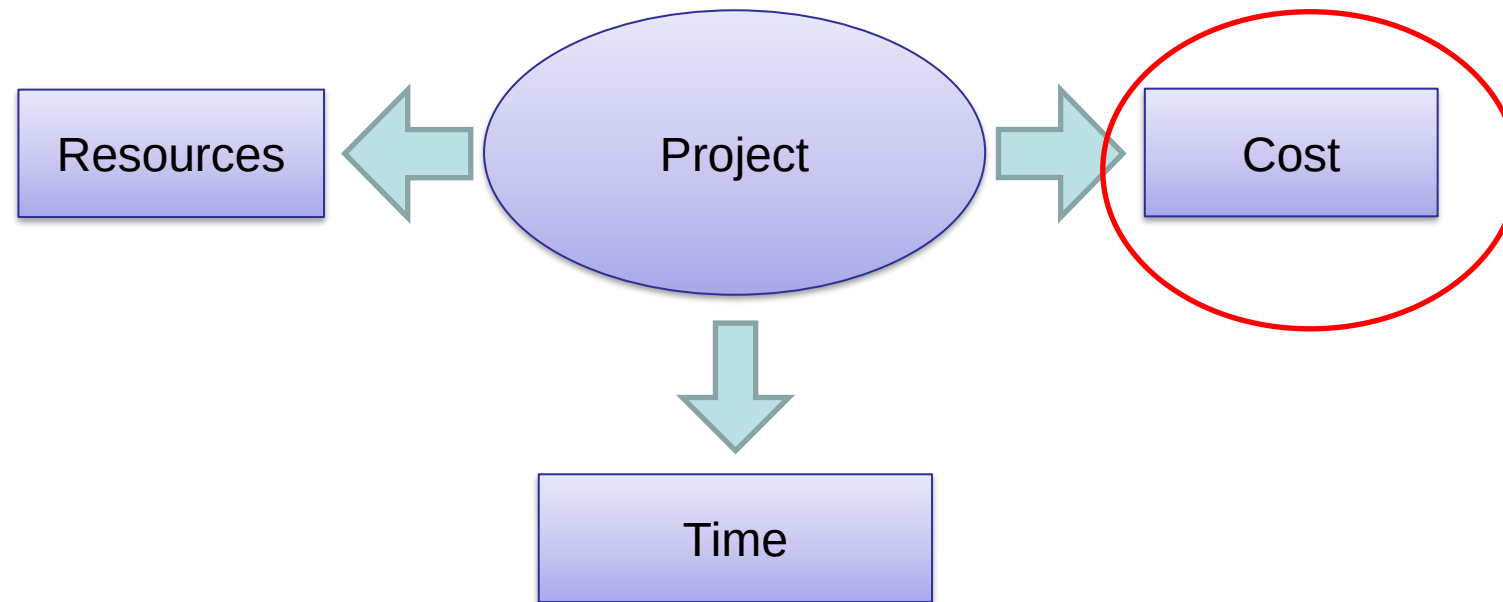
Do any of the above project pass the Company Criteria of:

- 1) Payback Period of 3 years or less and Internal Rate of Return greater than 20 %

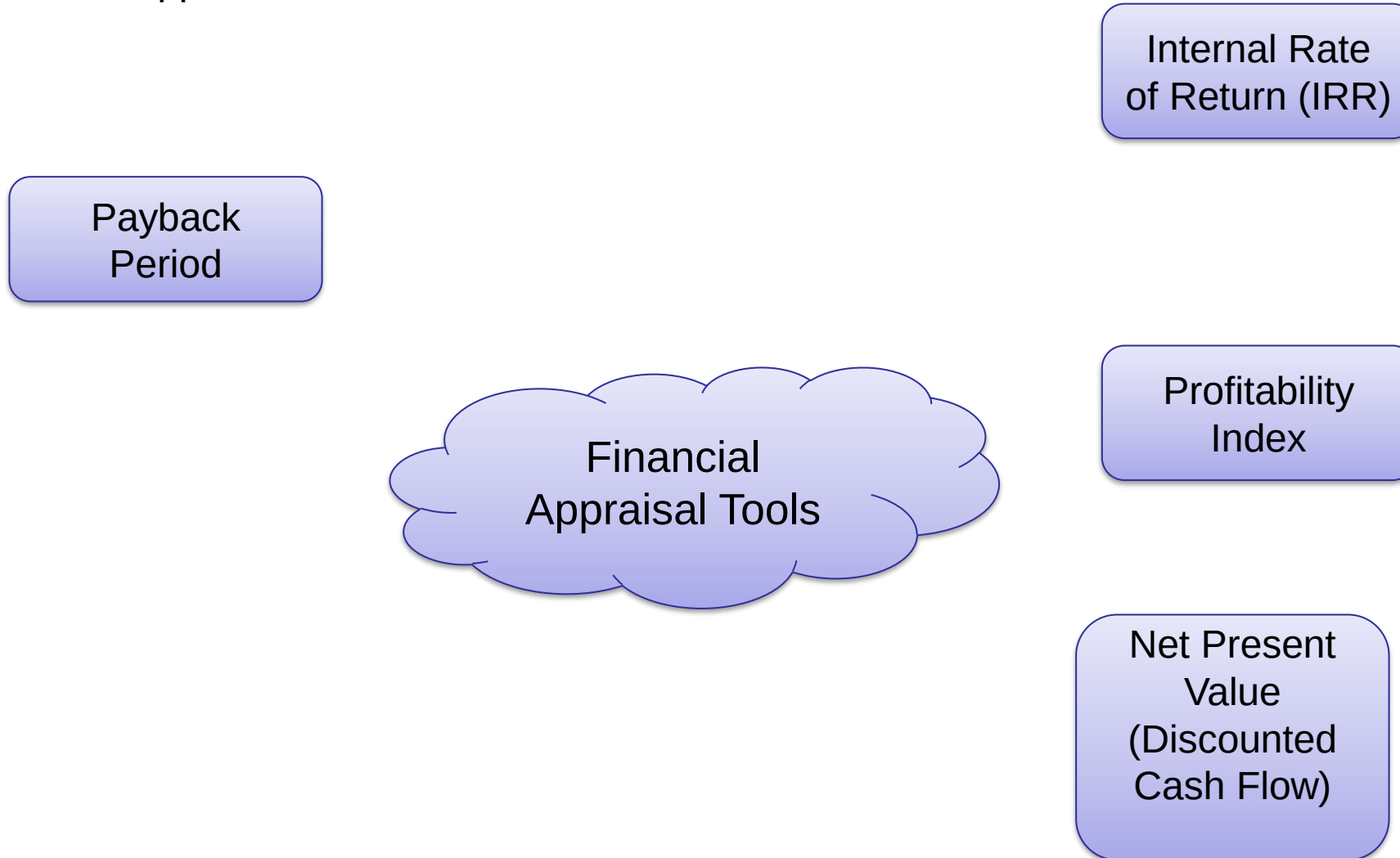


What stops us running
every project ?

- Limiting Factors



Financial Appraisals Tools



- Businesses may use more than one method to assess each investment decision – this is particularly so in larger businesses
- Payback period methods continue to be popular as a screening method
- There has been increased use of the discounting methods (NPV and IRR) over time – again in larger businesses this is the case

- All projects appraised that pass the decision rule should be selected
- This assumes unlimited funds available for investment
- If funds are **limited** then choices have to be made regarding project selection

In the latter case capital has to be **rationed**!!

- Types of rationing:
 - Soft rationing
 - Hard rationing
 - One-period rationing
- Soft rationing are internally imposed limits by the business
- Hard rationing relates to capital made available from external sources
- One-period rationing is the simplest because limits are placed on finance availability for one year only; for subsequent years funds are unlimited

- One-period capital rationing carry two options:
 - Divisible projects
 - Indivisible projects
- Divisible projects are projects for which a fraction can be undertaken
e.g. plan to open 5 new stores but only open 3.
- Indivisible projects are projects which have to be completed in full
e.g. project to build a bridge

Example of projects with capital allocation of £4.5M

Time (years)	Cost			NPV at 10% €m
	0 €m	1 €m	2 €m	
Project A	-2	6	1	4.281
Project B	-1	1	4	3.215
Project C	-1	1	3	2.389
Project D	-3	10	10	14.355

Relying on **NPV** as an indicator would give a priority order of **D,A,B,C** and with only £4.5M capital available then result would be as follows:

Rank according to absolute NPV

	<i>Initial outlay</i>	<i>NPV ((€m))</i>
All of Project D	3	14.355
$\frac{3}{4}$ of Project A	1.5	3.211
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The resulting NPV for doing Project D and $\frac{3}{4}$ of Project A is $14.355 + 3.211 =$
£17.566M

We need to determine the optimal combination for project selection within the capital constraints

Selecting highest NPV projects in order of rank will favour large projects only, when a combination of smaller projects might be optimal

To find the optimal combination we deploy either:

- Profitability Index
- Benefit-cost ratio

Profitability index:

Gross present value*

Initial outlay

*GPV is total present value of all cash flows excluding the initial investment

Benefit-cost ratio:

Net present value

Initial outlay

Both ratios provide a measure of profitability per unit of monetary value invested; selection of these ratios is down to individual choice

Using the Profitability Index / Benefit-cost ratio

<i>Project</i>	<i>NPV (@10%)</i>	<i>GPV (@10%)</i>	<i>Profitability index</i>	<i>Benefit-cost ratio</i>
A	4.281	6.281	$\frac{6.281}{2} = 3.14$	$\frac{4.281}{2} = 2.14$
B	3.215	4.215	$\frac{4.215}{1} = 4.215$	$\frac{3.215}{1} = 3.215$
C	2.389	3.389	$\frac{3.389}{1} = 3.389$	$\frac{2.389}{1} = 2.389$
D	14.355	17.355	$\frac{17.355}{3} = 5.785$	$\frac{14.355}{3} = 4.785$

Arrange projects in order of the highest profitability index **or** benefit-cost ratio and work down the list until the capital limit is reached.

This **now** changes the priority order to **D,B,C,A** from D,A,B,C

Example of projects with capital allocation of £4.5M

<i>Project</i>	<i>Profitability index</i>	<i>Initial outlay €m</i>	<i>NPV €m</i>
D	5.785	3	14.355
B	4.215	1	3.215
½ of C	3.389	0.5	1.195
Nothing of A	3.14	0	0
Total investment		4.5	18.765

Assumes projects are divisible.

Project A no longer ranks second because this provides the lowest return per unit of initial investment.

Net result is that an extra **£1.199M** ($18.765 - 17.566$) is created for shareholders by selecting projects via ratios rather than relying on NPV alone

In summary.....comparing the two approaches!

	€M	€M		€M	€M		€M	€M	€M
	Initial outlay	NPV @ 10%	Rank against NPV only	Against available funds of €4.5M	Total NPV using NPV ranking	Rank against Profit Index	Against available funds of €4.5M	Total NPV using PI ranking	NPV gained
Project A	2	4.281	2	1.5	3.21	4			
Project B	1	3.215	3			2	1	3.215	
Project C	1	2.389	4			3	0.5	1.1945	
Project D	3	14.355	1	3	14.355	1	3	14.355	
NPV ranking only =>					17.57	PI ranking =>			18.76
								1.199	<= increase in NPV

The return on the project will be increased by £1.199M by using Profitability Index ranking as opposed to NPV alone

If projects were **not divisible** then only projects D and B could be completed with the investment funds available as insufficient funds remain to complete the **whole** of Project C.

Question 2

Summary of capital appraisal techniques

A business is considering investing in two projects. It has raised a €150 million long term loan from a bank at 12% interest per annum.
Both of these projects are divisible i.e. it is possible to undertake a fraction of a total project.
The business has calculated its weight average cost of capital as 10%, after the introduction of the new loan.
The estimated net cash flows for each of the two projects are as follows:

	<i>Project A</i> €	<i>Project B</i> €
Initial capital expenditure	110	100
Net cash flows Year 1	55	30
Year 2	65	35
Year 3	30	50
Year 4	10	30
Estimated resale value end of year 4	10	10

Notes:

The weighted average cost of capital is 10%.

Calculate each project:

- (i). Payback period
- (ii). Discounted payback period.
- (iii). Net present value.
- (iv). Internal rate of return

Next Week

Work through exercises