

Finance Management & Planning

Project Appraisal (Week 6)

Capital Investment Appraisal

- Why do we appraise Capital Investments ?
- What Tools have we covered so far ?
- Which ones use the Time Value of Money Concept ?

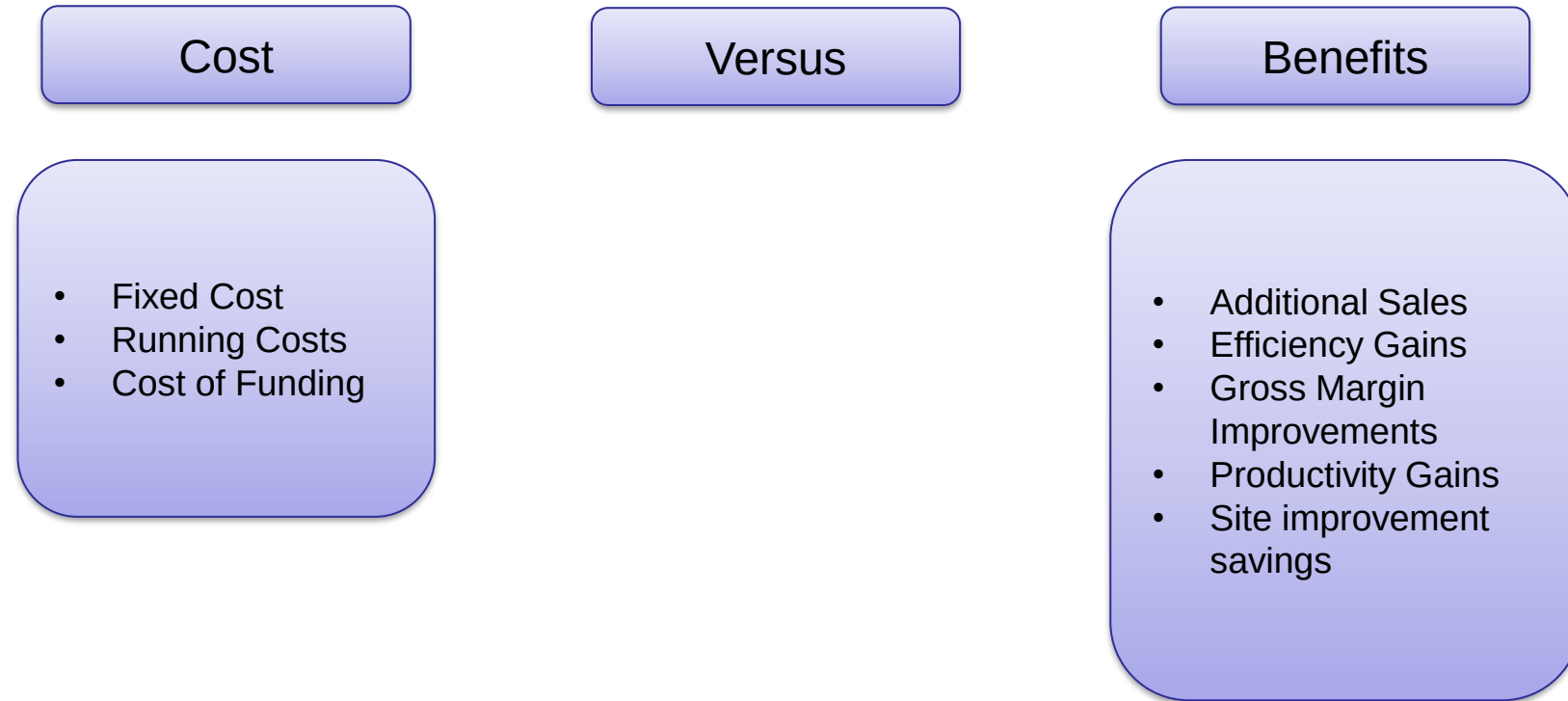
This Week

- Any Questions on NPV, Payback , IRR , BCR , PI
- Recap of Capital Rationing
- Sources of Funding

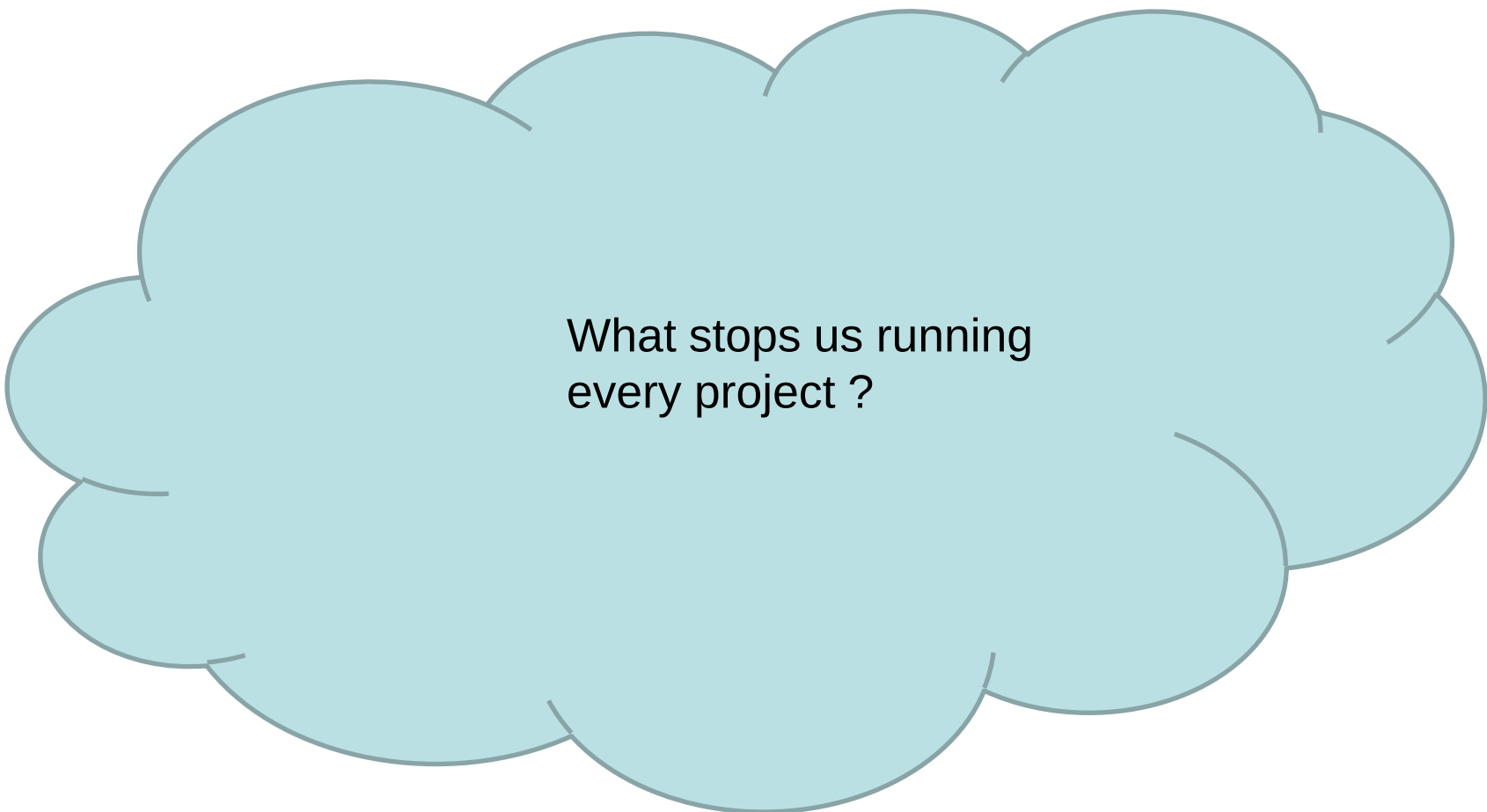
Capital Investment Appraisal

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

Financial Appraisals

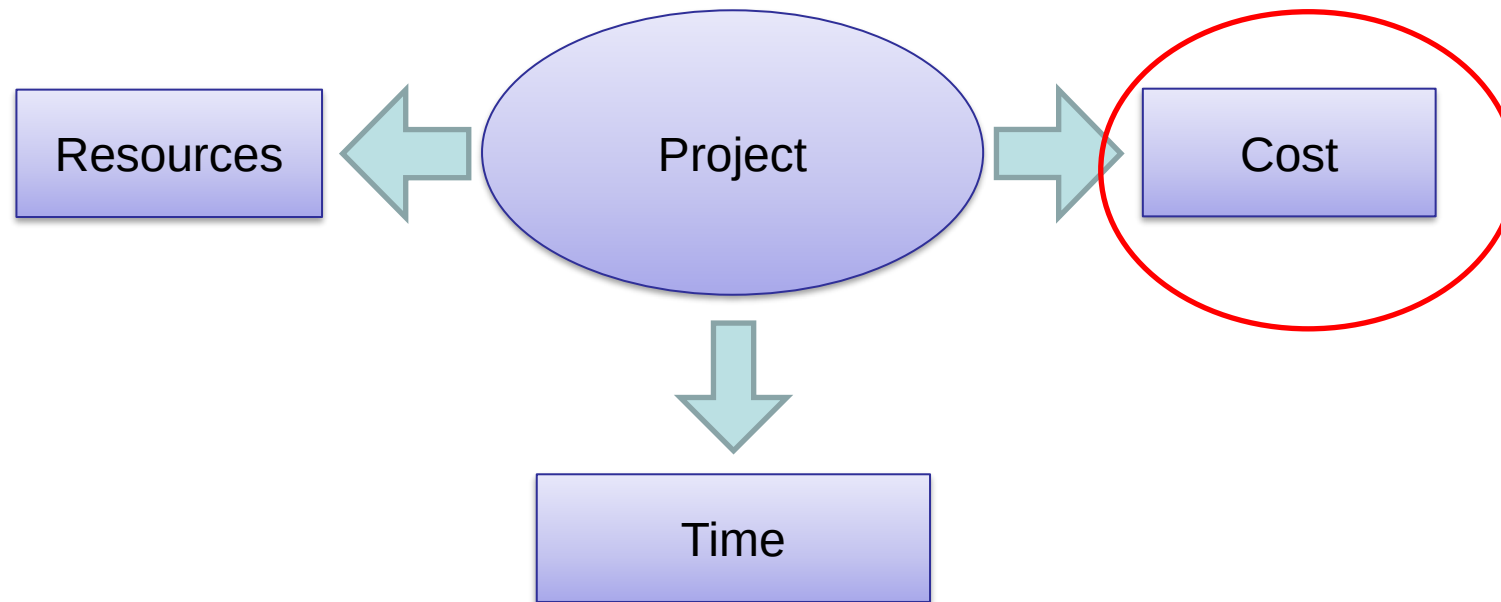


Remember your analysis is only as good as the strength of your data

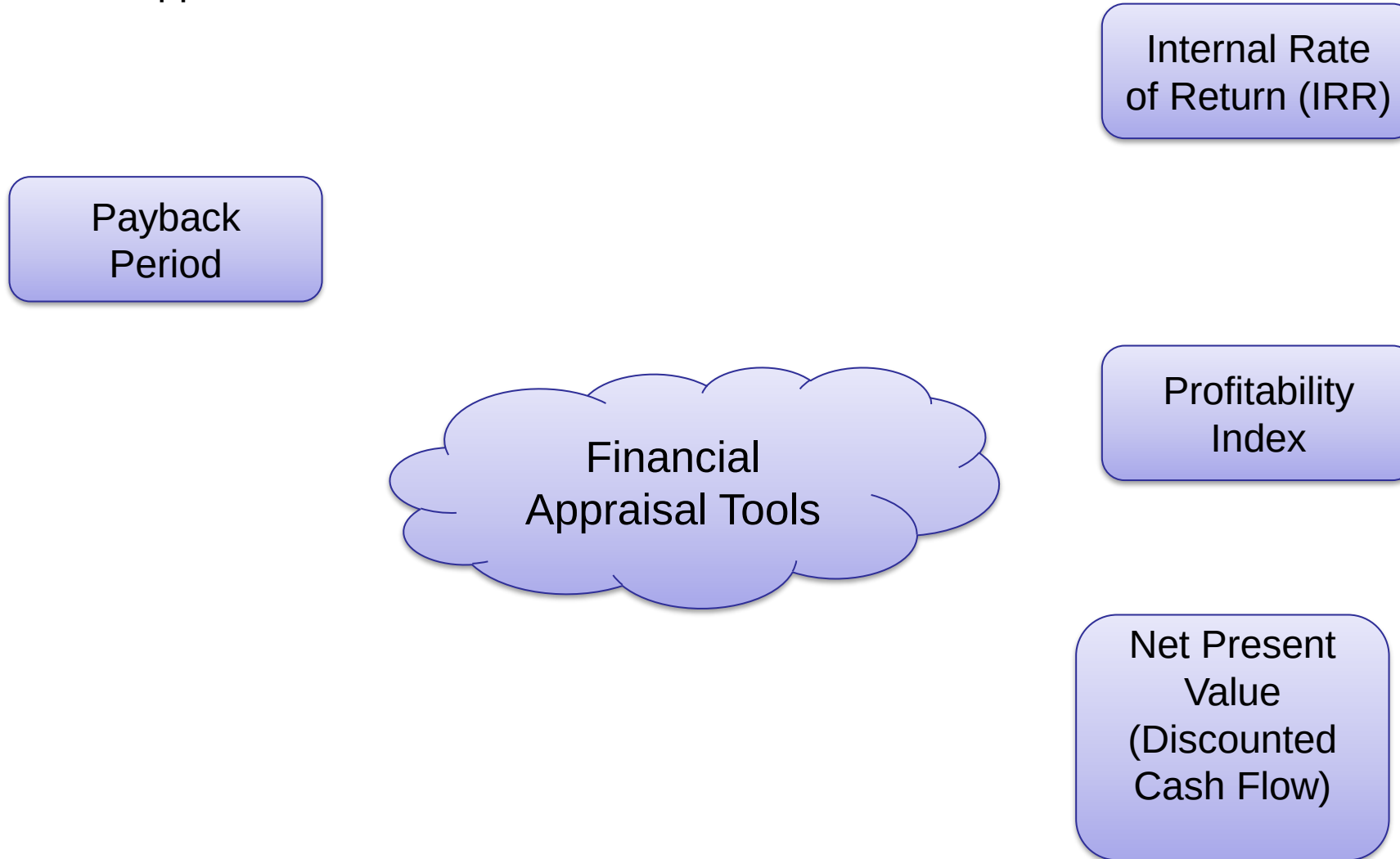
A large, light blue, cloud-like shape with a dark blue outline, centered on the slide.

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
	-----	-----

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

Project	A				
	Investment	1	2	3	4
Present Value	(110,000)	55,000	65,000	30,000	20,000
Payback period	1.84 years	(Manually Calculated 0.846154			
WACC / Discount Rate	10.00%				
Denominator	1.00	1.10	1.21	1.33	1.46
Future Value	(110,000)	50,000	53,719	22,539	13,660
Discounted Payback Period		(Manually Calculated)			
NPV	£29,919	PI		1.27	
NPV (Excel Calculated)	£29,919	CBR		0.27	
IRR (Excel Calculated)	24%				

Project	B				
	Investment	1	2	3	4
Present Value	(100,000)	30,000	35,000	50,000	40,000
Payback period	2.7 years	(Manually Calculated)			
WACC / Discount Rate	10.00%				
Denominator	1.00	1.10	1.21	1.33	1.46
Future Value	(100,000)	27,273	28,926	37,566	27,321
Discounted Payback Period		(Manually Calculated)			
NPV	£21,085	PI		1.21	
NPV (Excel Calculated)	£21,085	CBR		0.21	
IRR (Excel Calculated)	19%				

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Both projects are divisible what is the optimal investment profile for the €150m

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Optimum NPV	£
Project A	£29,918.72
Project B	£8,433.85
Total NPV	£38,352.57

What would the output be if the projects were not divisible ?

Company XYZ is assessing 4 projects for their business

WACC	8%
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£'000's

	A	B	C	D	Total
Investment	500,000	250,000	750,000	1,000,000	2,500,000

Cashflow Generated from Each Project

	A	B	C	D
1	300,000	100,000	300,000	250,000
2	300,000	100,000	350,000	500,000
3	300,000	125,000	400,000	600,000
4	300,000	130,000	450,000	650,000

The company has £1.25m to invest , all projects are divisible

What is the optimum investment ?

Optimum NPV from investment

						NPV	GPV	BCR	PI	Investment	NPV
A	-	500,000	300,000	300,000	300,000	493,638.05	£993,638.05	0.99	1.99	500,000	493,638
B	-	250,000	100,000	100,000	125,000	123,109.39	£373,109.39	0.49	1.49		0
C	-	750,000	300,000	350,000	400,000	476,142.70	£1,226,142.70	0.63	1.63	750,000	476,143
D	-	1,000,000	250,000	500,000	600,000	614,219.64	£1,614,219.64	0.61	1.61		0
										1,250,000	969,781

What would the output be if the projects were not divisible ?

Next Week

Accounting Rate of Return
Sources of Funding
Course Refresh