

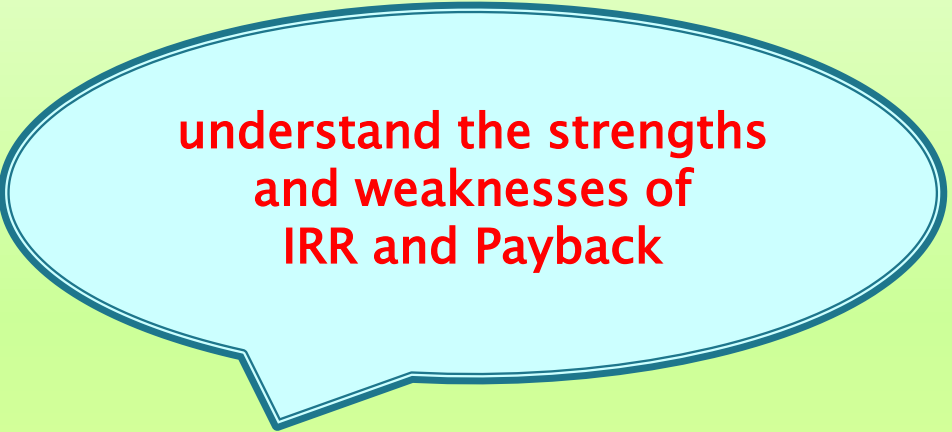
# Teach Yourself: Economic Evaluation:

Step 3 of Evaluating the Business/Project

**2e: IRR & Payback**

# The purpose of this module is to ...

Level 3: Decision making



**understand the strengths  
and weaknesses of  
IRR and Payback**

**Level 2: Evaluating the business/project**

Level 1: Hands-on economic modelling

Spend only a few seconds on most slides.

# Level 2: Evaluating the business/project

Step 1: Find out what is required

Step 2: Create the hands-on model

Step 3: **Compute the basket of powerful economic measures: NPV, IRR, Payback, four cash streams, key drivers, break-evens, uncertainty, risk, optionality**

Step 4: Assess alternatives, flexibility, options, risks, the business, the industry

Step 5: Communicate your message

# Step 3: Compute Powerful Metrics

As noted in the previous module, three metrics have become pre-eminent in economic evaluation: –

- a) **Net Present Value – NPV**
- b) **Internal rate of return – IRR**
- c) **Payback – real or nominal**

While NPV measures quantity,  
IRR and Payback measure quality.

# NPV, IRR and Payback

NPV has become pre-eminent because it is a great measure of what quantity of value will be outputted by a business or project over its life. But where there is upfront investment it does not reveal the quality of that investment.

For example: an NPV of \$3 million can result from investing \$2 million in a star business or from investing \$100 million in a poor project.

IRR and Payback are two powerful measures to help. Another is the ratio of NPV/investment.

# IRR is the second of the pre-eminent metrics.

It reveals the money generating power or quality of an investment.

It is the discount rate that gives a zero NPV.

- You could determine the IRR by trial and error, by repeatedly substituting higher/lower discount rates into your model until you find the rate that produces zero NPV.
- Fortunately Excel has a simple function that does it for you.
- I generally believe the use of Excel functions in an economic evaluation model is poor practice, for the numerous reasons I explain in these modules, but accept that the Excel function is the only sensible way to compute IRR.
- IRR and payback only work when there is an investment and negative net cashflow in at least one of the early years of a business or project. It is not relevant for an existing business or project which will have positive net cashflows every year.

In parallel with your computations of multiple NPVs you will need to compute multiple IRRs and/or Paybacks as warranted

1. Base case or mid scenario IRR and/or Payback
2. Minimum scenario IRR and/or Payback
3. Low scenario IRR and/or Payback
4. High scenario IRR and/or Payback
5. Maximum scenario IRR and/or Payback
6. Probability weighted IRR and/or Payback of min, low, mid, high, max scenarios
7. Alternative business scenarios IRR and/or Paybacks
8. Above scenarios with risks incorporated
9. Above scenarios with optionality added
10. Probabilistic IRR and/or Payback



# IRR: Mathematical Issues

1. IRR can be computed from net cash flows in real terms or in nominal terms. The difference is inflation. So if your model computes in nominal terms that  $IRR = 5.6\%$  nominal the IRR in real terms could be taken as  $= 5.6\% - 2.0\% \text{ inflation} = 3.6\%$  real.
2. Whilst learning economic evaluation many of us have made the silly mistake of computing IRR from the row of discounted cashflows rather than from the row of net cashflow before discounting. (Understandable once but not a second time.)
3. You will hear mathematically oriented 'experts' deride or dismiss IRR because if there is one stretch of negative cashflow followed by positive cashflows followed by another stretch (s) of negative cashflow and positive cashflow then more than IRR is mathematically possible. Tell them to use their brains to work out which/if any to accept.

# IRR: Warning bells

Whenever I see an IRR over say 15% to 20% warning bells go off in my head.

1. Perhaps there is a mathematical error –
  - ❖ First I look near the bottom of the model at the matrix from which IRR is derived to see if this is unnecessarily muddled or has obvious errors. A graph of the four cash streams would be ideal to check.
  - ❖ If the price is computed by extensive use of long and complex algorithms I would look there – possibly looking at the reasonableness of the price assumptions. In base metal mines I would check what percentage of each contained metal in the concentrate goes to the mine and what percentage to the smelter. eg ~80% zinc to mine or >20% to a copper smelter looks far too high.
2. It may be a ‘sell job’ where a very favourable scenario has been modelled to present a business/project in its best light.
3. I think why has this project not been developed already or this business sold if it is so good?

I maintain a healthy scepticism until I track down an explanation.

# Payback is the third of the pre-eminent metrics

It tells how soon the money invested upfront will be repaid by the business or project. It is a powerful guide.

Payback is a handy metric, that should not be seen as lesser than NPV and IRR even though it is less frequently computed.

Payback is very popular amongst wise, hands-on people because it tells them how long the investment is at risk. They can look at the industry, the business, the project, the risks and think:

*“It will be six years before we get our money back and separately we are discussing whether to revamp that whole section of our plant over the next years.”*

or

*“Payback is only 18 months and in that time the business risks should be low. Lets do it!”*

# Payback mathematics

Mathematically pay back can be computed in many different ways:

1. Dollars:
  - i. Real
  - ii. Nominal
2. Base date:
  - i. From today,
  - ii. From the start of investing big dollars or buying
  - iii. From the start of commercial operations
3. Tax
  - i. Before tax
  - ii. After taxes – in country
  - iii. After taxes – international

I shun any before-tax method, but accept any of the others providing it is clearly defined.

I usually read payback from the cumulative cash flow or its graph.

I love the saying for NPV, IRR and Payback →

**“If it looks too good to be true,  
it probably is too good to be true!”**

Fantastically good returns in your own work or in someone else’s presentation should send off warning bells inside your brain. Be alert for an error, exaggerations, misrepresentation, a fraud, or similar.

*NPV, IRR and Payback are pre-eminent and powerful  
but here is a lot more to evaluation!*

**END**