The Basics of Capital Budgeting

* **Capital Budget** is a summary of planned investments in long-term assets, and * **Capital Budgeting** is the process of planning expenditures on assets with cash flows that are expected to extend beyond one year. * How to decide to accept or reject proposed capital expenditures?

long-term assets used in production

Plan that outlines projected expenditures during some future period

Capital Budgeting decision criteria

① NPV (Net Present Value)

② IRR (Internal Rate of Return)

③ Payback Period → Discounted Payback Period

MIRR (Modified Internal Rate of Return)

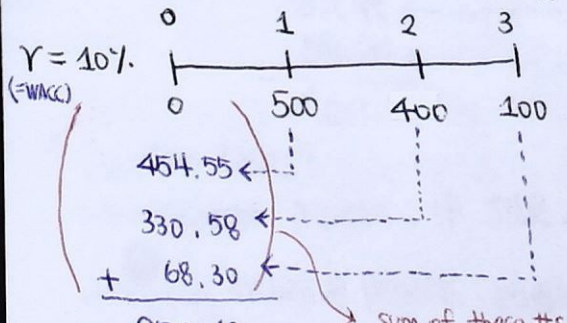
MIRR (Multiple Internal Rates of Return)

④ Con

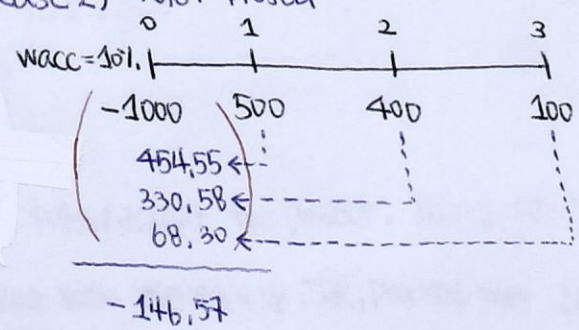
*** Why NPV is better than IRR? Because.....

① Net Present Value (NPV): A method of ranking investment proposals using the NPV, which is equal to the present value of the project's free cash flows discounted at the cost of capital. What? let's see how it looks like :)

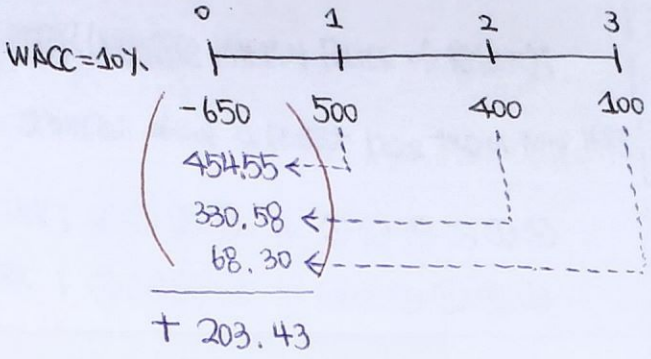
Case 1) Simple CFs Concept: The Best



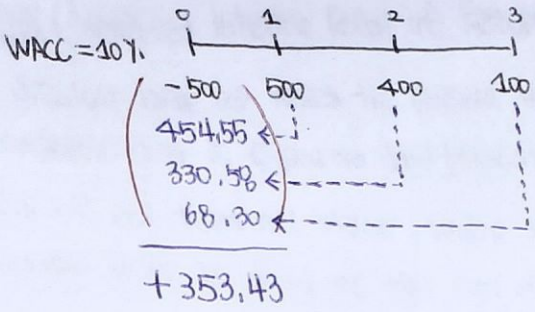
Case 2) idiot Project



case 3) Good project!



case 4) Better project

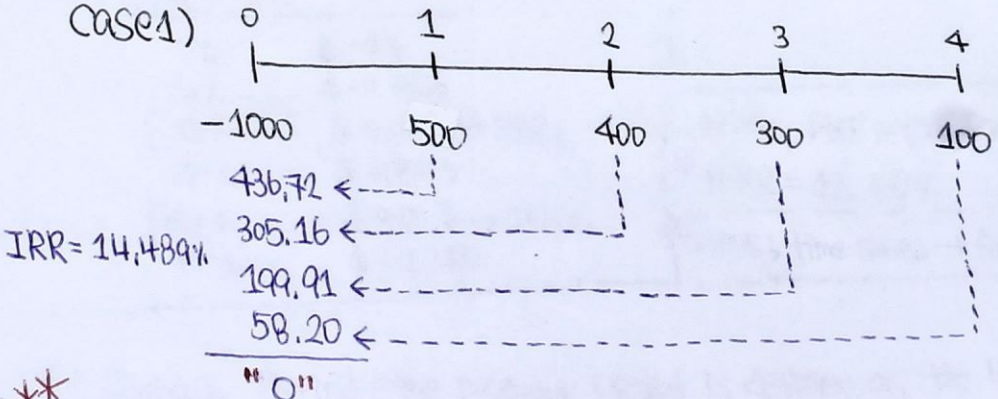


$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \cdots + \frac{CF_N}{(1+r)^N} \quad ; \; r = WACC$$

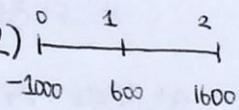
* ② Internal Rate of Return (IRR); The discount rate that forces a project's NPV to equal zero;

$$NPV = CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \frac{CF_3}{(1+IRR)^3} + \cdots + \frac{CF_N}{(1+IRR)^N} = 0$$

case1)



* case2)



Can you find IRR?

** Decision Rules?

1) Independent Projects; If IRR > WACC, take/accept the project; reject if IRR < WACC.

2) mutually exclusive projects; accept the project with the highest IRR, provided that IRR > WACC. reject otherwise.

* IRR

MIRR (Multiple Internal Rates of Return):

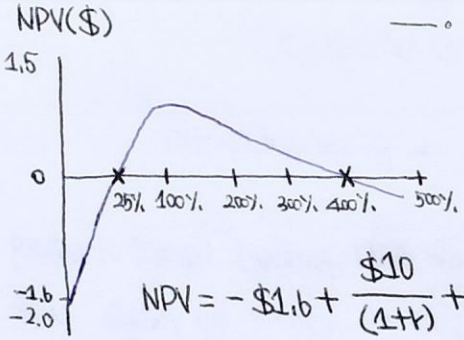
The situation where a project has two or more IRRs

IRR ; ⊖⊕⊕⊕ or ⊖⊖⊕⊕⊕⊕

MIRR ; ⊖⊕⊕⊖ or ⊖⊕⊕⊖⊕⊕

Example) WACC = 10%.

Year(t)	CFs
0	$1.6
1	$10.00
2	$-10.00



$$NPV = -\$1.6 + \frac{\$10}{(1+r)} + \frac{\$-10}{(1+r)^2}$$

Discount Rate	NPV
0%	$ -1.6
10%	$ -0.7736
[25%	$ 0.00] → IRR1
110%	$ 0.8943
[400%	$ 0.00] → IRR2
500%	$ -0.2111

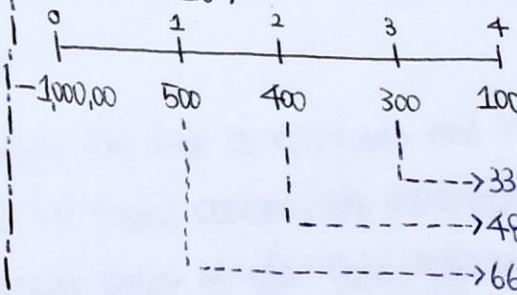
* MIRR (Modified Internal Rate of Return);

The discount rate at which the present value of a project's cost is equal to the present value of its terminal value, where the terminal value is found as the sum of the future values of the cash inflows, compounded at the firm's cost of capital

* How to measure the MIRR?

Let's take a very simple(?) example!

WACC = 10%.



TV: $1579.50

N=4, PMT=∅, PV=-1000, FV=1579.50

* MIRR = 12.66%

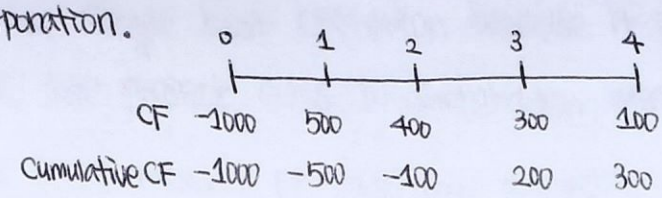
* Steps; time line(s) → find TV → calculate MIRR!

③ Payback Period; the payback period is defined as the length of time required for an investment's cash flows to cover its costs.

How to calculate payback? *

Payback Period = # of years Prior to full recovery + Uncovered cost at start of year / Cash flow during full recovery year

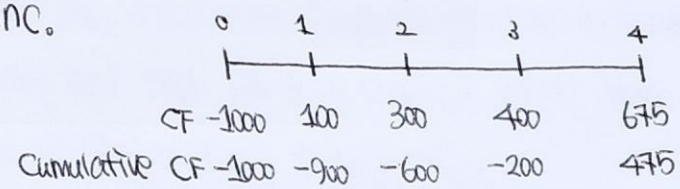
① Kevin Corporation.



WACC = 10%.

* $Payback_K = 2 + \frac{100}{300} = 2.33$

② Abed inc.



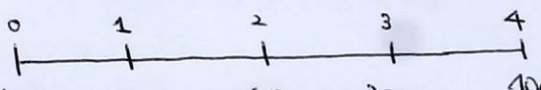
wacc = 10%.

* $Payback_A = 3 + \frac{200}{675} = 3.3$

payback period ignores cash flow ocurring after the cost is recovered and it ignores the time value of money. In orden to alleviate the second concern, the discounted payback was developed, which incorporates the present value of cash flows received.

WACC = 10%.

① Kevin Corporation.

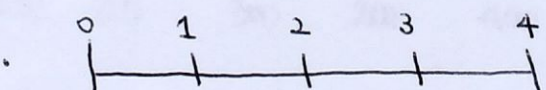


CF	-1000	500	400	300	100
Discounted CF	-1000	455	331	225	68
Cumulative discounted CF	-1000	-545	-215	+11	79

* $Discounted\ Payback_K = 2 + \frac{215}{225} = 2.95$

Try this ↘

② Abed Inc.



find payback and discounted payback, WACC = 10%. (3.3, 3.78 respectively)

④ *** Conclusions on Capital Budgeting Methods.

* NPV is the single best criterion because it provides a direct measure of value the project adds to shareholder wealth
* IRR and MIRR measure profitability expressed as a percentage rate of return, which is useful to decision makers. IRR and MIRR also contain information concerning a project's "safety margin".
* Payback and discounted payback provide indications of a project's liquidity and risk. (A long payback means that investment dollars will be locked up for a long time). → this indicates "illiquidity"
* In summary, the different measures provide different types of information. Because it is easy to calculate all of them, all should be considered when capital budgeting decisions are being made. For most decisions, the greatest weight should be given to the NPV, but it would be foolish to ignore the information provided by the other criteria.

Chapter Exist Question:

Please find its NPV, IRR, MIRR, Payback, and Discounted Payback and suggest accept/reject this project. WACC = 14%.