Economic Analysis and Project Financing

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Regional Center for Renewable Energy and Energy Efficiency
المركز الإقليمي للطاقة المتجددة وكفاءة الطاقة

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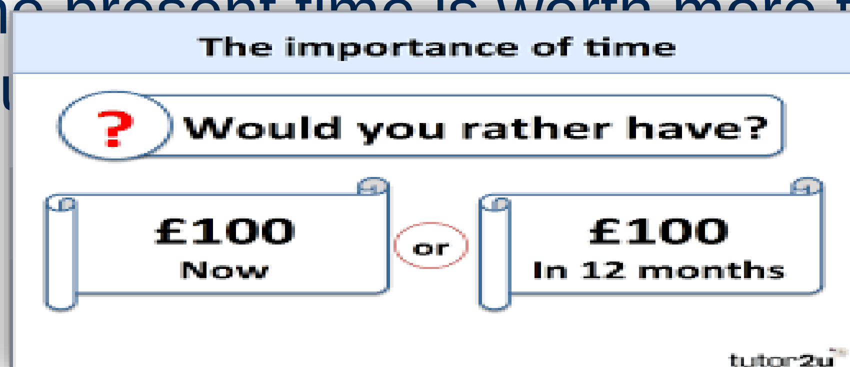
Main Calculation Pillars

Inflation: A quantitative measure of the rate at which the average price level of a basket of selected goods and services in an economy increases over a period of time. Inflation indicates a decrease in the purchasing power of a nation's currency.

Time Value of Money (TVM): The concept that money available at the present time is worth more than the identical sum in the fut



Main Calculation Pillars

Interest: Interest rates apply to most lending or borrowing transactions.

Businesses take loans to fund capital projects and expand their operations by purchasing fixed and long-term assets such as land, buildings, and machinery. Borrowed money is repaid by periodic instalments.

A country's central bank sets the interest rate. When the central bank sets interest rates at a high level, the cost of debt rises. Interest rates tend to rise with inflation.

Types of Interest

Interest Rate

Year	Simple	Compounded
0	100	100
1	110	110
2	120	121
3	130	133.1
4	140	146.4
5	150	161
6	160	177.15

Nominal Vs. Real Interest Rate

Fisher Equation provides the link between nominal and real interest rates.

Equation:

$(1 + i) = (1 + r) \times (1 + \pi)$.

Where:

r: Real Interest Rate

i: Nominal Interest Rate

π: Inflation Rate

Time Value of Money

Future Value (FV) Future value (FV) is the value of a current asset at a specified date in the future based on an assumed rate of growth.

Equation:

$FV = PV * (1+ i)^n$

Where:

PV: Present Value

FV: Future Value

i: Interest Rate

n: Number of periods

Time Value of Money

Examples:

1) If I have currently EGP 100,000 and I want to invest them for 5 years with an annual interest rate 15%, What is the amount of money after 5 years?

Solution:

$$FV = PV * (1+ i)^n$$

$$FV = 100,000 * (1 + 0.15)^5$$

$$FV = EGP\ 201,136$$

Time Value of Money

Present Value (PV) The current value of a future sum of money or stream of cash flows given a specified rate of return.

Equation:

$PV = FV / (1+ i)^n$

Where:

PV: Present Value

FV: Future Value

i: Interest Rate

n: Number of periods

Time Value of Money

Examples:

2) A Solar factory has a plan is to expand its production capacity in the future by purchasing a new machine besides the existing one, If this machine is currently selling for EGP 1 million and this price is expected to inflate by 10% annually, how much should the factory deposit today in an account that will earn 15% to be able to purchase this machine after 8 years?

Time Value of Money

Solution:

$$FV = PV * (1+ i)^n$$

$$FV = 1,000,000 * (1 + 0.1)^8$$

$$FV = 1,000,000 * (1 + 0.1)^8$$

$$FV = 2,143,589$$

$$PV = FV / (1+ i)^n$$

$$PV = 2,143,589 / (1 + 0.15)8$$

$$PV = EGP\ 700,743$$

Mixed Stream – Investment case

Example:

Year	Cash Flows
0	(100,000)
1	20,000
2	35,000
3	55,000
4	40,000
5	30,000

(100,000) → *Initial Investment*

20,000 to 30,000 → *Revenues*

Required Return (R.R) = 20%

Discounted Present Value (Discounted total Cash Flows)

= 20,000 /(1.2)1 + 35,000 /(1.2)2 + 55,000 /(1.2)3 +

40,000 /(1.2)4 + 30,000 /(1.2)5

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Capital Structure & Cost of Capital

Capital Structure: is how a firm finances its overall operations and growth by using different sources of funds.

Cost of Capital: the required return necessary to make a capital budgeting project, such as building a new factory or buying a new machinery.

Cost of Capital (Debt to Equity)

- *Cost of debt*
  - *Loan s*
  - *Bond s*
- *Cost of Equity*
  - *P. S*
  - *C. S*

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<u>Weighted Average Cost of Capital – WACC:</u> is a calculation of a firm's cost of capital in which each category of capital is proportionately weighted. All sources of capital, including common stock, preferred stock, bonds, and any other long-term debt, are included in a WACC calculation.

Capital Budgeting Techniques

Capital budgeting consists of various techniques used by managers in order to evaluate the profitability of the project such as:

1. *Payback Period.*
2. *Return on Investment.*
3. *Discounted Payback Period.*
4. *Net Present Value.*
5. *Internal Rate of Return.*
6. *Profitability Index.*

Capital Budgeting Techniques

Payback Period: measures the time in which the initial cash flow is returned by the project. Cash flows are not discounted. Lower payback period is preferred.

Return On Investment: is the percentage increase or decrease in an investment over a set period.

Discounted Payback Period: is a variation of payback period which uses discounted cash flows while calculating the time an investment takes to pay back its initial cash outflow.

Net Present Value (NPV): is equal to initial cash outflow less sum of discounted cash inflows. Higher NPV is preferred and an investment is only viable if its NPV is positive.

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Capital Budgeting Techniques

Internal Rate of Return (IRR): is the discount rate at which net present value of the project becomes zero. Higher IRR should be preferred.

Profitability Index: is the ratio of present value of future cash flows of a project to initial investment required for the project. Profitability index must be greater than 1.

Capital Budgeting Techniques

Required Return (R.R) = 21.26%

Example:

Year	Cash Flows	Discounted Cash Flows
0	*(200,000)*	*(200,000)*
1	*60,000*	*=(60,000)/(1.2126)1 = 49,480*
2	*90,000*	*=(90,000)/(1.2126)2 = 61,208*
3	*110,000*	*=(110,000)/(1.2126)3 = 61,694*
4	*75,000*	*=(75,000)/(1.2126)4 = 34,689*
5	*85,000*	*=(85,000)/(1.2126)5 = 32,421*
Total	***∑ = 420,000***	***∑ = 239,492***

Calculate the four types of capital Budgeting Techniques and select from them the most important technique for taking the

Capital Budgeting Techniques

Payback Period = 2 years + (50,000/110,000) = ***2.45 years***

Return On Investment = 60,000 / 200,000 = ***30%***

Discounted Payback Period = 3 + (27,618/34,689) = ***3.8 years***

Net Present Value = $- CF_0 + \sum CF_{1 \to n}$

= -200,000 + 239,492

= 39,492

Internal Rate of Return = 29.66%

Profitability Index = 239,492 / 200,000 ***= 1.2***


Thank you!