Mitigation Enabling Energy Transition in the MEDiterranean region

Economic Analysis and Project Financing

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December 9th, 2019
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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 future.
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

<table>
<thead>
<tr>
<th>Year</th>
<th>Simple</th>
<th>Compounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
<td>121</td>
</tr>
<tr>
<td>3</td>
<td>130</td>
<td>133.1</td>
</tr>
<tr>
<td>4</td>
<td>140</td>
<td>146.4</td>
</tr>
<tr>
<td>5</td>
<td>150</td>
<td>161</td>
</tr>
<tr>
<td>6</td>
<td>160</td>
<td>177.15</td>
</tr>
</tbody>
</table>
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
- $\pi$: Inflation Rate
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:

\[ FV = PV \times (1 + i)^n \]

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:**

\[ FV = PV \times (1 + i)^n \]

\[ FV = 100,000 \times (1 + 0.15)^5 \]

\[ FV = EGP 201,136 \]
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:*

\[
PV = \frac{FV}{(1+ i)^n}
\]

*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:

\[ FV = PV \times (1 + i)^n \]

\[ FV = 1,000,000 \times (1 + 0.1)^8 \]

\[ FV = 1,000,000 \times (1 + 0.1)^8 \]

\[ FV = 2,143,589 \]

\[ PV = FV / (1 + i)^n \]

\[ PV = 2,143,589 / (1 + 0.15)^8 \]

\[ PV = EGP\ 700,743 \]
Mixed Stream – Investment case

**Example:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(100,000)</td>
</tr>
<tr>
<td>1</td>
<td>20,000</td>
</tr>
<tr>
<td>2</td>
<td>35,000</td>
</tr>
<tr>
<td>3</td>
<td>55,000</td>
</tr>
<tr>
<td>4</td>
<td>40,000</td>
</tr>
<tr>
<td>5</td>
<td>30,000</td>
</tr>
</tbody>
</table>

**Initial Investment**

**Revenues**

**Required Return (R.R) = 20%**

**Discounted Present Value (Discounted total Cash Flows)**

\[
= \frac{20,000}{(1.2)^1} + \frac{35,000}{(1.2)^2} + \frac{55,000}{(1.2)^3} + \frac{40,000}{(1.2)^4} + \frac{30,000}{(1.2)^5}
\]

\[
= 104,147
\]
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
  - Bond
  - \( s \)

- **Cost of Equity**
  - \( P. \)
  - \( C. \)
  - \( S \)
  - \( S \)
**Weighted Average Cost of Capital – WACC: 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.
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.
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

Example:

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flows</th>
<th>Discounted Cash Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(200,000)</td>
<td>(200,000)</td>
</tr>
<tr>
<td>1</td>
<td>60,000</td>
<td>= (60,000)/(1.2126)^1 = 49,480</td>
</tr>
<tr>
<td>2</td>
<td>90,000</td>
<td>= (90,000)/(1.2126)^2 = 61,208</td>
</tr>
<tr>
<td>3</td>
<td>110,000</td>
<td>= (110,000)/(1.2126)^3 = 61,694</td>
</tr>
<tr>
<td>4</td>
<td>75,000</td>
<td>= (75,000)/(1.2126)^4 = 34,689</td>
</tr>
<tr>
<td>5</td>
<td>85,000</td>
<td>= (85,000)/(1.2126)^5 = 32,421</td>
</tr>
<tr>
<td>Total</td>
<td>∑ = 420,000</td>
<td>∑ = 239,492</td>
</tr>
</tbody>
</table>

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

Required Return (R.R) = 21.26%
Capital Budgeting Techniques

**Payback Period** = 2 years + \( \frac{50,000}{110,000} \) = 2.45 years

**Return On Investment** = \( \frac{60,000}{200,000} \) = 30%

**Discounted Payback Period** = 3 + \( \frac{27,618}{34,689} \) = 3.8 years

**Net Present Value** = -\( CF_0 + \sum CF_{1\rightarrow n} \)

\[
= -200,000 + 239,492
\]

\[
= 39,492
\]

**Internal Rate of Return** = 29.66%

**Profitability Index** = \( \frac{239,492}{200,000} \) = 1.2
Thank you!