Abstract

Time value of money is an important concept in financial management. It plays a crucial role in Banking and Non-Banking sector, generally it refers to the value of money is different in different time periods; it is called time value of money. It is one of the Limitation of Profit maximization. At the same time it does not consider the magnitude and timing of earnings. The time value of money impacts business finance, consumer finance, and government finance. Time value of money results from the concept of interest.

I. INTRODUCTION

Most of the financial decisions depend on time value of money such as financing decision, investment decision and dividend decision. For example if invested Rs.10,000 @ 8% interest in any nationalized bank, how much amount would get after one year (10,000 + 10,000×0.08=10,800). Beginning of the year the value of money is Rs.10,000 at the end of the year the value of money is 10,800, so end of the year the value of money is greater than beginning of the year. So the value of money is different in different time periods.

The value of Money is depends on two techniques, such as

- Compounding Technique
- Discounting Technique

II. OBJECTIVES OF THE STUDY

- To Understand the Time value of Money
- To Know How it Calculate the Time value of money
- To Know how it influence the Investment decision
III. COMPOUNDING TECHNIQUE

Compounding Technique is one of the Ingredients of time value of money. It is a Method of estimating the future value of a present investment by applying compound interest rates. This technique can be useful to know the future value of present cash out flow. Future value is depends on Size of investment, market rate of interest and maturity period. Generally compounding is refers to the process of accumulating the time value of money forward in time. For example interest earned in one period earns additional interest during each subsequent period. Before going to know the compounding technique first of all to know the simple interest.

Simple Interest:

Simple interest is one of the topic that most of the people cover in elementary school in their education. Interest may be thought of as rent paid on borrowed money. Simple interest is calculated only on the beginning principal. For instance, if one were to receive 5% interest on a beginning value of Rs.100, the first year interest would be:

\[ \text{Interest} = P \times I \]

Whereas,
\[ P = \text{Principal amount}, \quad I = \text{Rate of interest} \]

Here, \( P = Rs. 100 \quad I = 5\% \ (0.05) \)

\[ \text{Interest} = 100 \times 0.05 = 5 \]

Continuing to receive 5% interest on the original amount, Rs.100, over five years the growth of the original investment would look like:

<table>
<thead>
<tr>
<th>Year</th>
<th>5% of Rs.100</th>
<th>=Rs. 5 + Rs.100</th>
<th>=105</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>5% of Rs.100</td>
<td>=Rs. 5 + Rs.105</td>
<td>=110</td>
</tr>
<tr>
<td>Year 2</td>
<td>5% of Rs.100</td>
<td>=Rs.5 + Rs.110</td>
<td>=115</td>
</tr>
<tr>
<td>Year 3</td>
<td>5% of Rs.100</td>
<td>=Rs.5 + Rs.115</td>
<td>=120</td>
</tr>
<tr>
<td>Year 4</td>
<td>5% of Rs.100</td>
<td>=Rs.5 + Rs.120</td>
<td>=125</td>
</tr>
<tr>
<td>Year 5</td>
<td>5% of Rs.100</td>
<td>=Rs.5 + Rs.125</td>
<td></td>
</tr>
</tbody>
</table>

Graph I: The value of money is different in different timeperiods
3.1 Compound interest

Compound interest is another Topic. It's good to receive compound interest, but not so good to pay compound interest. With compound interest, interest is calculated not only on the beginning interest, but on any interest accumulated in the meantime. For instance, if one were to receive 5% compound interest on a beginning value of Rs.100, the first year interest would be the same as simple interest on the Rs.100, or Rs. 5. The second year, though, interest would be calculated on the beginning amount of year 2, which would be Rs.105. So the interest would be:

Rs.105 × .05 = – Rs.5.25 in Interest

This provides a balance at the end of year two of Rs.110.25. If this were to continue for 5 years, the growth in the investment would look like:

| Year 1 | 5% of Rs.100.00 | =Rs. 5.00 + Rs.100 | = 105.00 |
| Year 2 | 5% of Rs. 105.00 | =Rs. 5.25 + Rs.105 | =110.25 |
| Year 3 | 5% of Rs. 110.25 | =Rs. 5.51 + Rs.110 | =115.76 |
| Year 4 | 5% of Rs. 115.76 | =Rs. 5.79 + Rs.115 | =121.55 |
| Year 5 | 5% of Rs. 121.55 | =Rs. 6.08 + Rs.120 | =127.63 |

There is a significant difference between simple and compound interest. In simple interest there is no opportunity to earn interest on interest where as in compounding interest each interest payment is (reinvested) having the opportunity to earn interest on interest. There is no difference between simple interest and compound interest when investment maturity period is one year maturity. But difference can be seen only when the investment is made for more than two years between

3.2 Compounding Value of A Single amount

Compound value or future value of single amount at single time for future period can be calculated by the following formula

\[ FV = Po(1 + I)^n \]
Example: 1
Suppose if you have Rs.10,00,000 and Deposit any nationalized bank @ 8% compound rate of interest for 5 years period. How much amount would get after 5 years?

\[
FV = 10,00,000(1 + 0.08)^5
\]

\[
= 10,00,000(1.469)
\]

\[
= Rs. 14,69,000
\]

3.3 Variable Compounding Periods:
Generally Compounding is done annually. If the investor promised to pay Compound interest for variable periods such as semi-annually, quarterly, and etc.

3.3.1. Semi-Annual Compounding:
It is one of the components of Variable Compounding Periods; according to this interest calculate twice in a year. The Following Formula can be useful to us to know the value of an investment.

\[
FV = Po(1 + \frac{I}{m})^{n \times m}
\]

Whereas,
FV=Future vale of an Investment
Po=Invested amount   I=Rate of Interest
M=No. of times Compounded annually,  n=No. of years to maturity

Example: 2
If amount Rs.50,000, Deposited @6% rate of interest in SBI for 10 years Period, it is compounding twice in a year. How much amount would get after 10 years?

\[
FV = Po(1 + \frac{I}{m})^{n \times m}
\]

\[
FV = 50,000 (1 + .06/2)^{10 \times 2}
\]

\[
= 50,000(1.806)
\]

\[
= Rs. 90,300
\]

3.3.2. Quarterly Compounding
It is one of the components of Variable Compounding Periods, according to this interest calculate once in every three months it means four times in a year. The Following Formula can be useful to us to know the value of an investment.

\[
FV = Po(1 + \frac{I}{m})^{n \times m}
\]

Whereas,
FV=Future vale of an Investment
Po=Invested amount   I=Rate of Interest
M=No. of times Compounded annually,  n=No. of years to maturity
Example: 3
Suppose the firm Deposits Rs.1, 00,000 for four years period @ 8% rate of interest p.a, here interest compounding quarterly. How much amount would get after four years?

\[
FV = Po \left(1 + \frac{I}{m}\right)^{m \times n}
\]

\[
FV = 1, 00,000 \left(1 + \frac{0.08}{4}\right)^{4 \times 4}
\]

\[
=1, 00,000 \times (1.373) = Rs.1, 37,300
\]

3.4. Compounded Value of Series of Cash flows: According to this some cases investor may be deposits annually up to certain future date, that may be even cash deposits or uneven cash deposits, then we need to find out the deposits value in future date.

3.4.1. Even Cash deposits annually up to certain future date:

The following formula can be useful to know the value of Deposits in future

\[
FV = P1\left(1 + I\right)^{n-1} + P1\left(1 + I\right)^{n-2} + P1\left(1 + I\right)^{n-3} + \ldots + Pn-1\left(1 + I\right) + P^n
\]

Example: 4
If you deposits Rs.1000 at the end of every year for Six years@6% rate of interest. Determine the value of money after six years

\[
FV = 1000\left(1 + 0.06\right)^{6-1} + 1000\left(1 + 0.06\right)^{5-1} + 1000\left(1 + 0.06\right)^{4-1} + 1000\left(1 + 0.06\right)^{3-1} + 1000\left(1 + 0.06\right)^{2-1} + 1000\left(1 + 0.06\right)^{1-1}
\]

\[
= 1000(1.338) + 1000(1.262) + 1000(1.191) + 1000(1.124) + 1000(1.060) + 1000(1.00)
\]

\[
= 1338 + 1262 + 1191 + 1124 + 1060 + 1000
\]

\[
= Rs.6975
\]

3.4.2. Even Cash deposits annually up to certain future date:

The following formula can be useful to know the value of Deposits in future

\[
FV = P1\left(1 + I\right)^{n-1} + P1\left(1 + I\right)^{n-2} + P1\left(1 + I\right)^{n-3} + \ldots + Pn-1\left(1 + I\right) + P^n
\]

Example: 5
If an Investor Deposits at the end of every year Rs.10,000, Rs.15000, Rs.20,000, Rs.25,000 and Rs.30,000 in a year 1.2.3,4and5,respectively at 6% rate of interest. How much he will get at the end of five years?

\[
FV = 10, 000\left(1 + 0.06\right)^{4} + 15, 000\left(1 + 0.06\right)^{3} + 20, 000\left(1 + 0.06\right)^{2} + 25, 000\left(1 + 0.06\right)^{1} + 30, 000\left(1 + 0.06\right)^{0}
\]

\[
= 10,000\left(1.262\right) + 15,000\left(1.191\right) + 20,000\left(1.124\right) + 25,000\left(1.060\right) + 30,000(1.00)
\]

\[
= 12,620 + 17,865 + 22,480 + 26,500 + 30,000
\]

\[
= Rs.1, 09,465
\]
IV. DISCOUNTING TECHNIQUE

It is an important component of Time value of money it can be useful to know the present value of future cash inflows. Present value is exact contrary to compound value. The process of determining present value of future cash flows is called discounting. It is concerned with determining the present value of future amount with that value investors will take decision whether accept or reject of the investment proposal.

4.1. Present Value of Future Single amount:

It is one of the ingredients of discounting technique it can be useful to know Present value of future single cash flow. Through the following formula we can calculate the present value.

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

Where

- \( PV \) = Present Value,
- \( FV \) = Future value receivable at the end of ‘n’ years
- \( I \) = Interest rate
- \( N \) = Duration of the cash flow

Example: 6

An Investor wants to know the Present value of Rs.20,000, it will come after 3 years current market interest rate is 10%

\[ PV = \frac{20,000}{(1 + 0.10)^3} \]
\[ = 20,000 (0.751) \]
\[ = Rs. 15,020. \]

4.2 Present Value of a series of Cash flows

We have calculated present value of a single cash flow to be received in future date. Not only that some cases we need to convert future series of cash inflows into present values. This may be uneven cash inflows or even cash inflows.

4.2.1 Present Value of Even Cash inflows

In future if we will get even cash inflows annually up to certain future. Through the following formula we can calculate the present value.

\[ PV = \frac{CF}{(1+I)^n} \left( \frac{1-(1+I)^{-n}}{I(1+I)} \right) \]

Example: 7

Mr. Anand wants to invest his funds in a particular project, expected cash inflows from that project Rs.50,000 annually up to six years period and he wants to know the Present value of future cash inflows. Current market interest rate is 10%

\[ PV = \frac{50,000}{(1+0.10)^6} \left( \frac{1-(1+0.10)^{-6}}{0.10(1+0.10)} \right) \]
\[ = 50,000 (4.355) = 2,17,750 \]

4.2.2 Present Value of uneven Cash inflows

In future if we will get uneven cash inflows annually up to certain future. Through the following formula we can calculate the present value.
\[ PV = \frac{C_1}{(1+I)^1} + \frac{C_2}{(1+I)^2} + \frac{C_3}{(1+I)^3} + \ldots + \frac{C_n}{(1+I)^n} \]

Where

- \( C_1, C_2, C_3 \) and \( C_n \) = Expected future cash flows
- \( I \) = Rate of Interest Rate
- \( n \) = Duration of cash flows

**Example: 8**

Ms. Sahasra wants to invest some of her funds in a particular Project, expected cash inflows from that project Rs.10,000, Rs.15,000, Rs.20,000, Rs.22,000 and Rs.18,000 in years 1,2,3,4 and 5 respectively. The current market interest rate is 10% and finds out the Present value of future cash inflows.

\[ PV = \frac{10,000}{(1+0.1)^1} + \frac{15,000}{(1+0.1)^2} + \frac{20,000}{(1+0.1)^3} + \frac{22,000}{(1+0.1)^4} + \frac{18,000}{(1+0.1)^5} \]

\[ = 9,090 + 12,390 + 15,020 + 15,026 + 11,178 \]

\[ = \text{Rs.} 62,704 \]

**V. CONCLUSION**

Companies apply the time value of money to make yes-or-no decisions on capital projects as well as to decide between competing projects. Two of the most popular methods are net present value and internal rate of return. You start with the cost of the project and determine the rate of return that would make the present value of the future cash flows equal to your upfront cost. This concept is crucial in areas like capital budgeting, lease-or-buy decisions, accounts receivable analysis and many others.

**VI. REFERENCES**


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