

Time Value of Money

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Look ahead

- Definition of Time Value of Money
- Why time is important ?
- Notations
- Formulas
- Example Calculation
- Calculation using Tables
- Benefits of the Knowledge of Time Value of Money

Introduction

Definition:

time value of money is the premise that an investor prefers to receive a payment of a fixed amount of money today, rather than an equal amount in the future, all else being equal.

Source: http://en.wikipedia.org/wiki/Time_value_of_money

Time Value of Money

- Which would you rather have -- \$1,000 today or \$1,000 in 5 years?
- Money received sooner rather than later allows one to use the funds for investment or consumption purposes.
- All other factors being equal, it is better to have \$1,000 today.
- Simply put this is the concept of the time value of money.

Importance of Time Factor

Why is **TIME** such an important element in your decision?

TIME allows one the opportunity to postpone consumption and earn INTEREST.

Calculations based on the time value of money

- **Present Value (PV)** of an amount that will be received in the future.
- **Future Value (FV)** of an amount invested (such as in a deposit account) now at a given rate of interest.
- **Present Value of an Annuity (PVA)**
- **Future Value of an Annuity (FVA)**

Notations

- PV (Present Value) is the value at time = 0
- FV (Future Value) is the value at time = n
- 'r' is the rate at which the amount will be compounded each period
- 'n' is the number of periods

Notations

- $PV(A)$ the value of the annuity at time = 0
- $FV(A)$ the value of the annuity at time = n
- 'A' the value of the individual payments in each compounding period

Formulas

- **Present value of a future sum / Future value of a present sum**

$$PV = \frac{FV}{(1 + r)^n}$$

Formulas

- Present value of an annuity

$$PV(A) = A \times \frac{1 - \frac{1}{(1+r)^n}}{r}$$

Time value of money

- Consider 2 situations
 - **Option A:** You receive Rs. 10,000 today.
 - **Option B:** You receive Rs. 10,000 in 3 years time
- Assume no inflation
- Assume interest rate 10% (Compound Interest)
- Assume no change in any other financial situation

Future Value Calculation

- Consider Option A
- Let's calculate the future value of Rs. 10,000 received at the present time.

Present Value = Rs. 10,000

$$\mathbf{FV = PV \times (1 + r)^n}$$

For Year 1:

$$\mathbf{FV = 10,000 \times (1 + 0.1)^1}$$

$$\mathbf{\therefore FV = 11,000}$$

Future Value Calculation

For Year 2:

$$\text{FV} = 10,000 \times (1 + 0.1)^2$$

$$\text{FV} = 12,100$$

For Year 3:

$$\text{FV} = 10,000 \times (1 + 0.1)^3$$

$$\text{FV} = 13,310$$

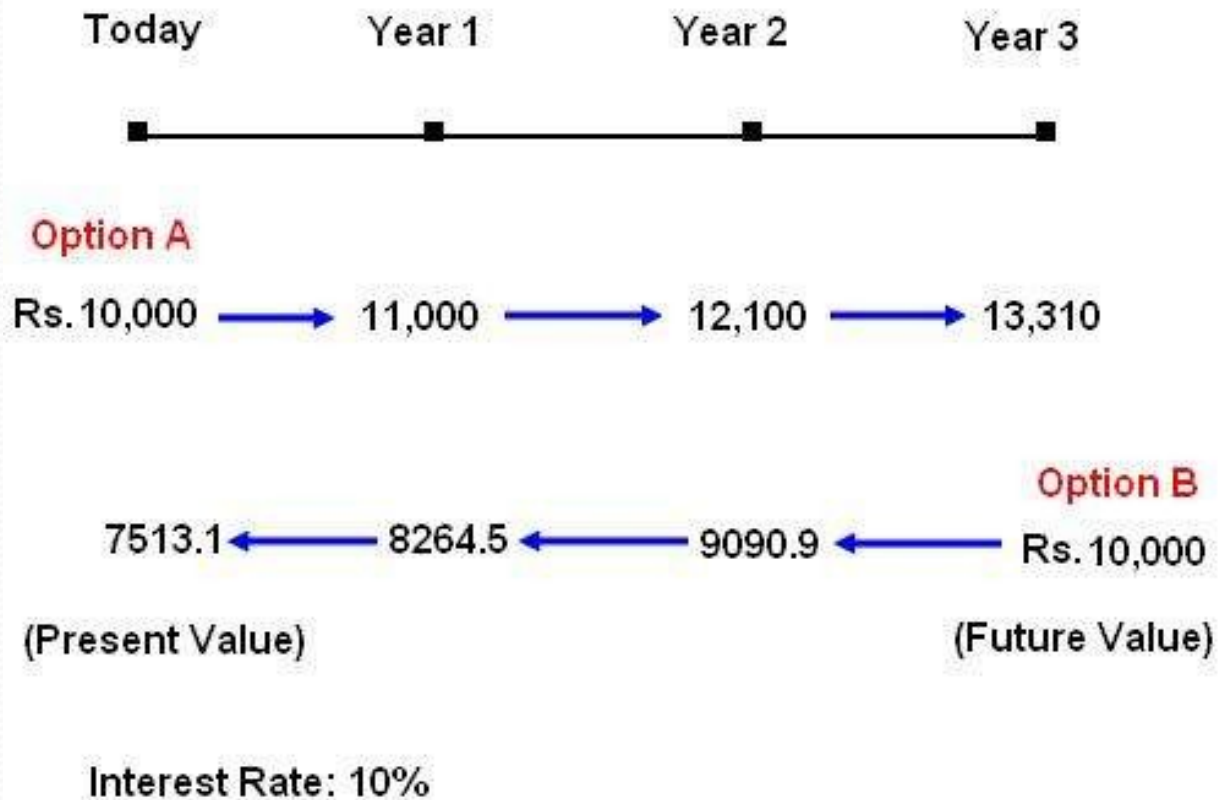
Present Value Calculation

- Similarly using the equation as

$$PV = \frac{FV}{(1 + r)^n}$$

the present value of Rs. 10,000 received in 3 years when the interest rate is 10% can be calculated as Rs. 7513.1

Time Value of Money



Time Value Calculations using Tables

Periods	1%	2%	3%	4%
1	1.0100	1.0200	1.0300	1.0400
2	1.0201	1.0404	1.0609	1.0816
3	1.0303	1.0612	1.0927	1.1249
4	1.0406	1.0824	1.1255	1.1699
5	1.0510	1.1041	1.1593	1.2167
6	1.0615	1.1262	1.1941	1.2653
7	1.0721	1.1487	1.2299	1.3159
8	1.0829	1.1717	1.2668	1.3686
9	1.0937	1.1951	1.3048	1.4233
10	1.1046	1.2190	1.3439	1.4802
11	1.1157	1.2434	1.3842	1.5395
12	1.1268	1.2682	1.4258	1.6010
13	1.1381	1.2936	1.4685	1.6651
14	1.1495	1.3195	1.5126	1.7317
15	1.1610	1.3459	1.5580	1.8009
16	1.1726	1.3728	1.6047	1.8730
17	1.1843	1.4002	1.6528	1.9479
18	1.1961	1.4282	1.7024	2.0258

Interest Rate

e.g. For 12 time
periods at 3%
interest

Time Period

Future Value Table

Benefits of the knowledge of the time value of money

- For investment analysis – To decide the financial benefits of projects
- To compare investment alternatives
- To analyze how time impacts business activities such as loans, mortgages, leases, savings, and annuities.



Useful References



Thank you