Time Value of Money (TVM)

Topic Content

01 The TVM: Introduction to Valuation

02 Future Value and Compounding

03 Present Value and Discounting

04 Present versus Future Value

05 Determining the Discount Rate

06 Determining the Time Period

07 Future Value of Annuity

08 Present Value of Annuity

09 Comparison of Different Types of Interest Rates

10 Fractional Time Period

11 Sub Topic #11

12 Sub Topic #12

Introduction

Which would you prefer?

$1,000 today

OR

$1,000 in 2 years

Introduction

Which would you prefer?

$1,000 today

OR

$1,000 in 2 years

Introduction

Which would you prefer?

$1,000 today

OR

$1,000 in 2 years

You already recognize that there is

TIME VALUE TO MONEY !!

Introduction

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

TIME allows you the opportunity to postpone consumption and earn **INCOME** or **INTEREST**.

Introduction

01. The time value of money (TVM) refers to the fact that a dollar in hand today is worth more than a dollar promised at some time in the future.

02. On a practical level, one reason for this is that you could earn interest while you waited; so a dollar today would grow to more than a dollar later.

03 The trade-off between money now and money later thus depends on, among other things, the rate you can earn by investing.

Introduction

TVM is useful in decision making.

Ranging from simple personal decisions — buying a house, saving for a child's education, and estimating income in retirement — to more complex corporate financial decisions —picking projects in which to invest and the right financing mix for these projects.

Thus, TVM can solve the basic problems faced by the financial manager: how to determine the value today of cash flows expected in the future.

Introduction

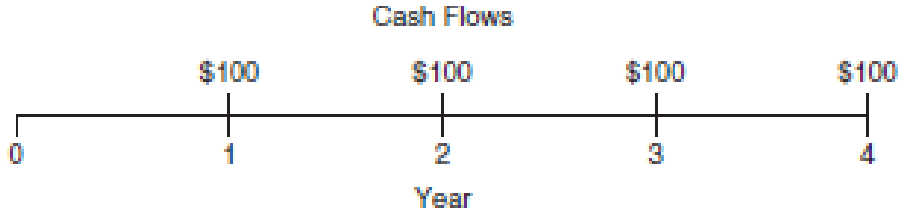
- One of the most important tools in time value analysis is the time line, which is used by analysts to help visualize what is happening in a particular problem and then to help set up the problem for solution.
- Time 0 is today; Time 1 is one period from today, or the end of Period 1; Time 2 is two periods from today, or the end of Period 2; and so on.
- Thus, the numbers bellow the tick marks represent end-of-period values.
- Often the periods are years, but other time intervals such as semiannual periods, quarters, months, or even days can be used.

Introduction

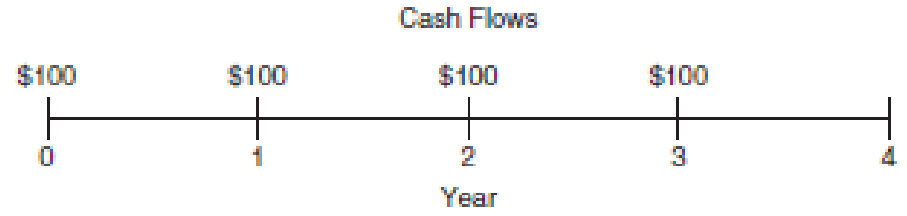
- If each period on the time line represents a year, the interval from the tick mark corresponding to 0 to the tick mark corresponding to 1 would be Year 1, the interval from 1 to 2 would be Year 2, and so on.
  - Note that each tick mark corresponds to the end of one period as well as the beginning of the next period.
  - In other words, the tick mark at Time 1 represents the end of Year 1, and it also represents the beginning of Year 2 because Year 1 has just passed.

Introduction

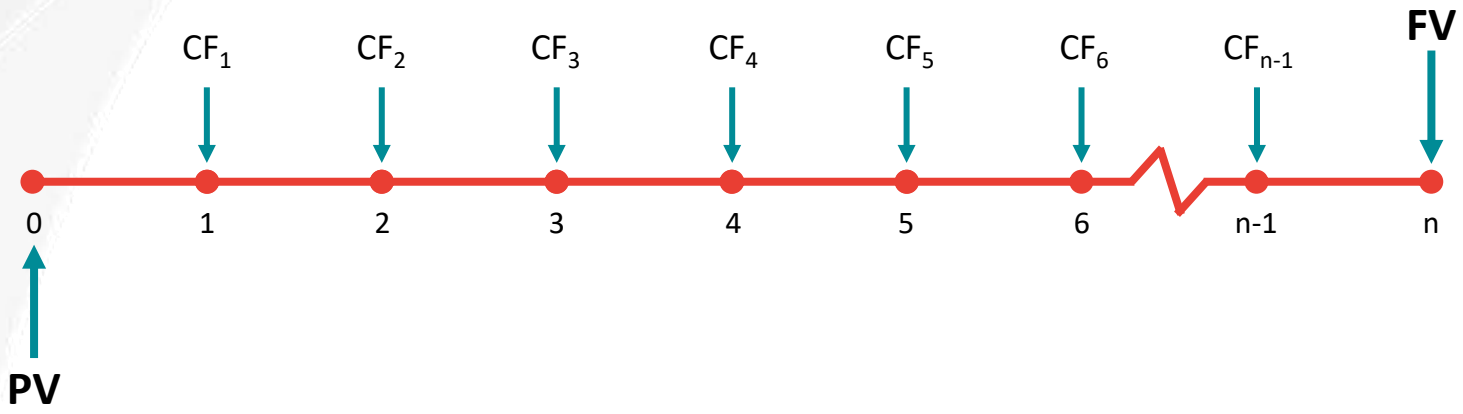
- Dealing with cash flows that are at different points in time is made easier using a time line that shows both the timing and the amount of each cash flow in a stream.
  - A Time Line for Cash Flows of $100 in Cash Flows Received at the End of Each of Next 4 Years:



  - A Time Line for Cash Flows of $100 in Cash Received at the Beginning of Each Year for Next 4 Years:

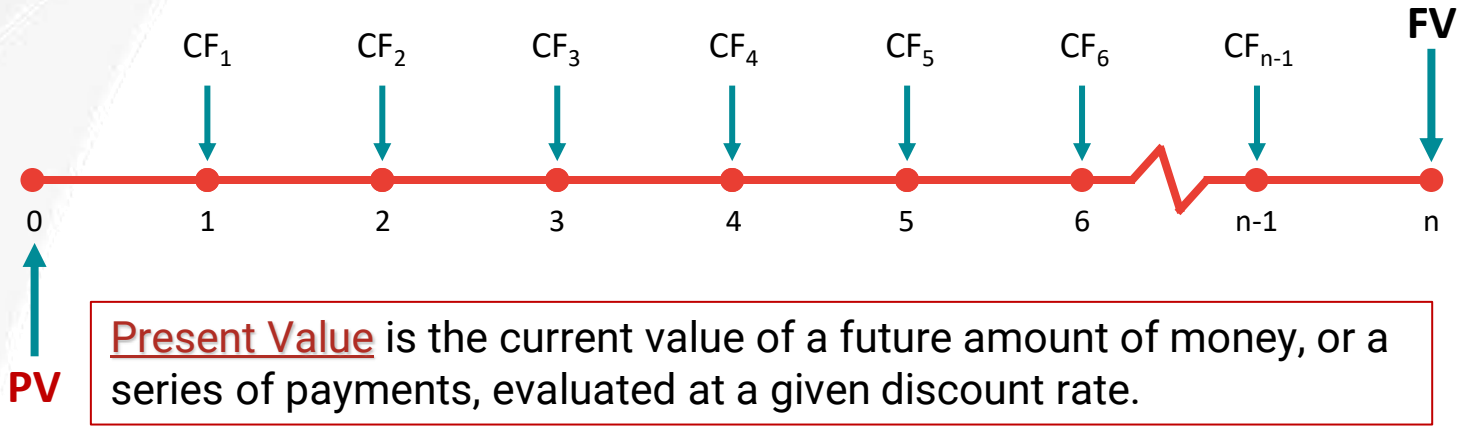


Notation



Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid

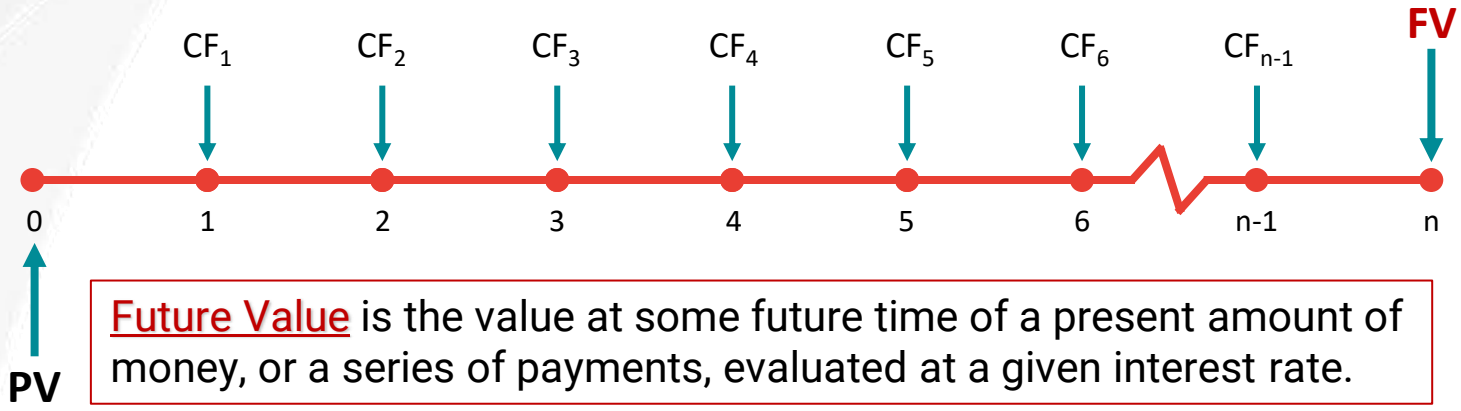
Notation



Present Value is the current value of a future amount of money, or a series of payments, evaluated at a given discount rate.

Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid

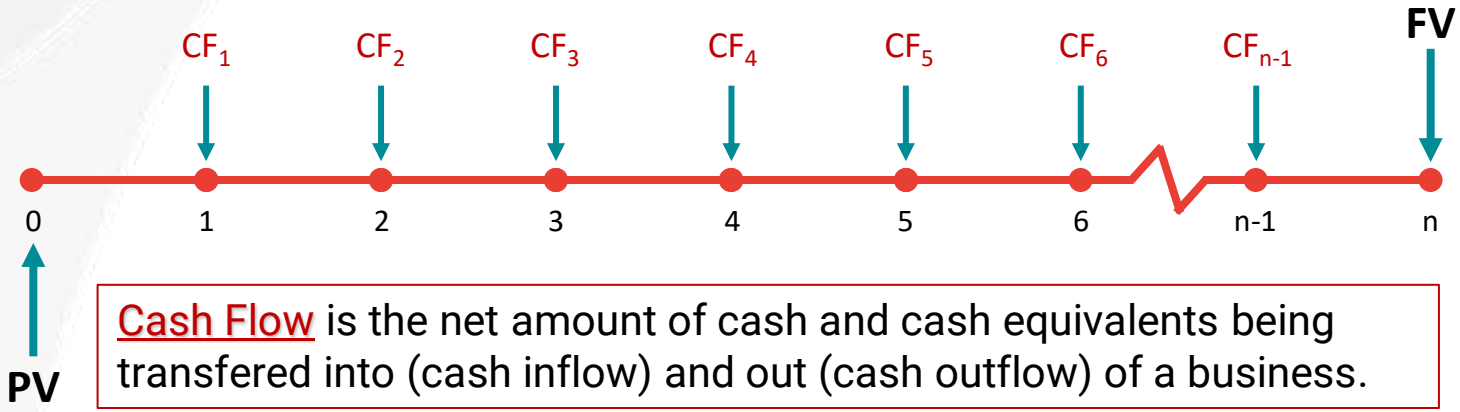
Notation



Future Value is the value at some future time of a present amount of money, or a series of payments, evaluated at a given interest rate.

Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid

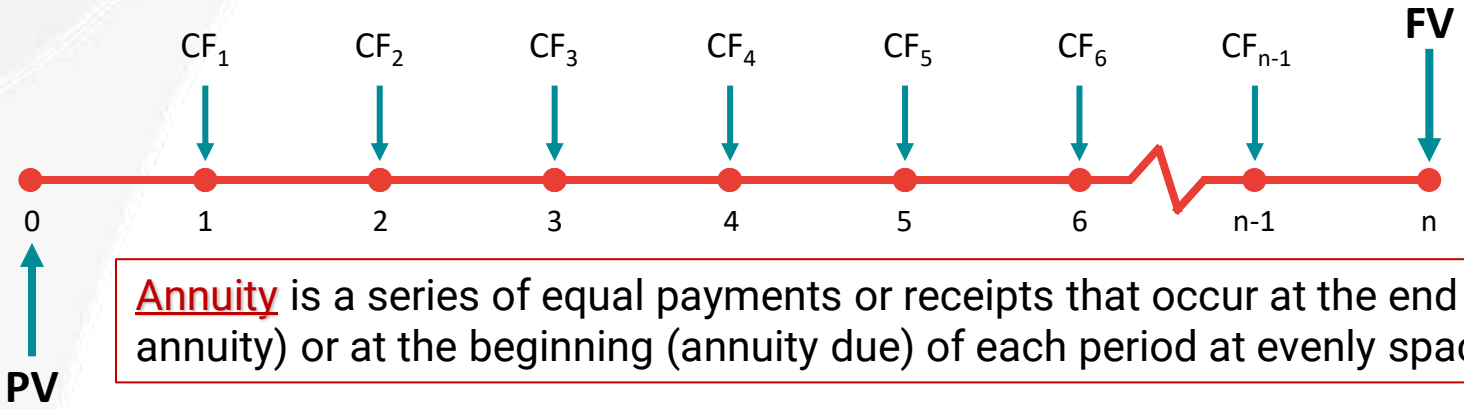
Notation



Cash Flow is the net amount of cash and cash equivalents being transfered into (cash inflow) and out (cash outflow) of a business.

Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid

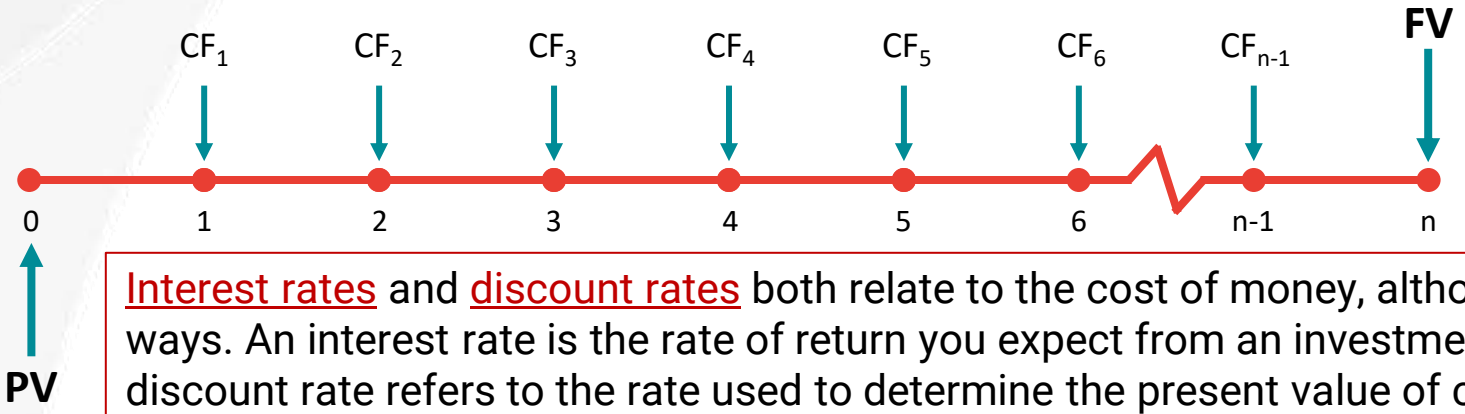
Notation



Annuity is a series of equal payments or receipts that occur at the end (ordinary annuity) or at the beginning (annuity due) of each period at evenly spaced intervals.

Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid

Notation



Interest rates and discount rates both relate to the cost of money, although in different ways. An interest rate is the rate of return you expect from an investment, while discount rate refers to the rate used to determine the present value of cashflows.

Notations	Stand For
PV	Present value
FV	Future value
CF_t	Cash flow at the end of period t
A	Annuity: constant cash flows over several periods
r	Interest rate or discount rate
g	Expected growth rate in cash flows
n	Number of periods/ years over which cash flows are received or paid