

Lesson 1: Introduction, Interest Rates, Future Value and Present Value

Interest rates can be thought of in three ways:

- The minimum rate of return that you require to accept a payment at a later date.
- The discount rate that must be applied to a future cash flow in order to determine its present value.
- The opportunity cost of spending the money today as opposed to saving it for a certain period and earning a return on it.

- Real risk-free rate
- Inflation premium
- Default risk premium
- Liquidity premium
- Maturity premium

The Future Value of a Single Cash Flow

- If you had \$100 in your pocket right now, and interest rates were 6%, what would be the future value of your money in one year, and in two years?

Since PV and FV are separated in time, remember the following:

- We can add sums of money only if they are being valued at exactly the same point in time.
- For a given interest rate, the future value increases as the number of periods increases.
- For a given number of periods, the future value increases as the interest rate increases.

Example 1-1: Calculate the FV of \$750 at the end of 12 years if the annual interest rate is 7%.

Example 1-2: Calculate the value after 20 years of an investment of \$500, which will be made after 7 years. The expected annual rate of return is 8%.

The Present Value of a Single Cash Flow

Example 1-3: Given a discount rate of 10%, what is the PV of a \$1,500 cash flow that will be received in 6 years?

The Present Value of a Single Cash Flow

- For a given discount rate, the longer the time period till the future amount is received, the lower the present value.
- For a given time period, the higher the discount rate, the lower the present value of the amount.

FV and PV of a Series of Cash Flows

Ordinary Annuities

Future Value of an Ordinary Annuity

Example 1-5: What is the future value after 10 years of seven \$1,000 payments to be received at the end of each of the first 7 years assuming that the interest rate is 4%?

Present Value of an Ordinary Annuity

Example 1-6: What is the present value of seven annual payments of \$1,000 if the first payment will be received after 4 years and the interest rate is 4%?

Annuities Due

Relationship Between Ordinary Annuity and Annuity Due

Future Value of an Annuity Due

Example 1-7: What is the value at the end of Year 4 of an annuity that pays \$500 at the beginning of each of the next four years, starting today? Assume that the cash flows can be invested at an annual rate of 8%.

Future Value of an Annuity Due

Example 1-8: If you make an investment of \$1,500 at the beginning of each of the next four years, how much will you have ten years from today assuming a 5% interest rate?

Present Value of an Annuity Due

Example 1-9: What is the present value of a 5 year annuity that makes a series of payments of \$300 at the beginning of each of the next 5 years starting today? The discount rate is 8%.

Perpetuity

Present Value of a Perpetuity

Example 1-11: ABC Corporation pays a \$10 per share annual dividend on its preferred stock. Given a 5% rate of return and assuming that this dividend policy will continue forever, what is the value of ABC stock?

Example 1-12: Using ABC stock from Example 1-11, determine the rate of return an investor would realize if the price of the stock were \$250.

Present and Future Value of Unequal Cash Flows

Example 1-13: Compute the future value, as of the end of Year 6, of the uneven cash flow stream given in the table below. Assume that the periodic discount rate is 5%.

Year	0	1	2	3	4	5	6
Cash Flows (\$)	0	-1,500	-500	2,000	0	3,000	2,500