

The time value of money (TVM) is a fundamental concept in finance that acknowledges the idea that a dollar today is worth more than a dollar tomorrow.

Future Value in Action:

- o **Savings goals:** Knowing the future value helps you determine how much to save today to reach a specific financial goal in the future (e.g., retirement savings).
- o **Capital budgeting:** Businesses use TVM to assess the profitability of long-term investments by considering the present value of future cash flows the investment will generate. In this scenario, you can rearrange the future value formula to solve for the present value (PV): $PV = \frac{FV}{(1 + i)^t}$
 $PV = \$50,000 / (1 + 0.07)^{18} = \$9,924.72$ (approximately) This means you would need to save around \$9,924.72 today and invest it at a 7% annual return to have \$50,000 in 18 years for your child's college education (considering this simplified example).
- o **Formula:** $FV = PV \times (1 + i)^t$
- o **Number of Periods (t):** This can be years, months, or any other relevant time unit depending on the interest rate applied.
- o **Loan payments:** Understanding TVM allows you to grasp the true cost of a loan by considering the total amount of interest you'll pay over time.
- o **Annuities:** TVM helps calculate the future value of annuity payments, which are a series of payments made at regular intervals.

Here's a breakdown of future value: **Formula:** $FV = PV \times (1 + i)^t$

- o **FV:** Future Value (amount of money in the future)
- o **PV:** Present Value (amount of money you have today)
- o **i:** Interest rate per period (e.g., annual interest rate)
- o **t:** Number of periods (e.g., number of years)

Example: Let's say you invest \$1,000 today (PV) at an annual interest rate of 5% (i) for 5 years (t). You can use the PV function with either fixed periodic payments (such as a mortgage or other loan) or any future value that constitutes your investment objective. Some TVM calculations may factor in inflation to get a more precise picture of future buying power.

Applications beyond the basics:

- o **Loan amortization schedules:** TVM is used to create loan amortization schedules that show the breakdown of each payment into principal and interest over the loan term.

Formulas and Calculations:

- o **Present Value (PV):** This calculates the current worth of future cash flows. It allows us to assess the present value of future cash flows, which is crucial for making sound financial decisions.

Here are some applications of time value of money:

- o **Saving for retirement:** TVM helps you figure out how much you need to save today to reach your retirement goals in the future.
- o **Using the formula:** $FV = \$1,000 \times (1 + 0.05)^5 = \$1,340.10$ This means after 5 years, your \$1,000 investment will grow to approximately \$1,340.10 due to compounded interest.
- o **Loan payments:** Understanding future value helps calculate the total amount you'll repay on a loan, considering the principal amount and the interest charged over time.
- o **Assuming an annual return of 7% on your investments,** you can use the future value formula to determine how much you need to save today to reach \$50,000 in 18 years.

There are two main reasons for this:

- o **Earning potential:** Money in your hand today can be invested and earn interest, growing your wealth over time.
- o **Inflation:** Inflation erodes the purchasing power of money over time.
- o **Investment decisions:** By considering the time value of money, you can compare the potential returns of different investments and choose the one that offers the best growth.

Factors Affecting TVM:

- o **Interest Rate:** A higher interest rate makes future money less valuable compared to present money because the present amount has a greater potential to grow.
- o **Inflation:** Inflation reduces the purchasing power of money over time. A dollar today buys more than a dollar tomorrow due to rising prices.
- o **Formula:** $PV = \frac{FV}{(1 + i)^t}$
- o **t:** Number of Periods
- o **Future Value (FV):** This calculates the future worth of a current investment considering the interest rate and time frame. It's a

core principle in finance because it acknowledges the time value of money.

- o Investment decisions: By comparing the future value of different investments, you can choose the one that offers the best potential growth for your money. Because of these factors, TVM helps us compare money across different points in time. Receive \$1,100 one year from now Assuming an interest rate of 5%:
 - o Option 1: You get \$1,000 today, which you could invest and potentially earn a 5% return in a year. In this scenario, even though Option 2 offers a higher face value, Option 1 might be the preferable choice. It considers the interest rate, number of periods, and the future cash flow amount. The money grows faster due to a larger interest earned each period.
 - o Time horizon: The longer the time frame (t), the more significant the impact of interest rate on the future value.
 - o Future value vs. present value: Generally, future value is higher than the present value because of interest earned over time. A dollar today could be \$1.05 next year if you invest it at a 5% interest rate.
 - o Time Horizon: The longer the time period, the greater the impact of interest rate on the present value. Money received much later in the future is worth less today due to compounding interest.
- Scenario: You are deciding between two options:
 1. However, because of the time value of money, that \$1,100 a year from now isn't quite as valuable as the \$1,000 you could have today. With the 5% interest rate, you could potentially turn \$1,000 today into \$1,050 by the end of the year.

PV = Present Value ? FV = Future Value ? Future value (FV) is the concept of what a current amount of money will be worth at a specific date in the future, considering an assumed interest rate. Money has more time to grow through compounding