UNIT 11

Purchasing Power





Purchasing power is the amount of goods and services that can be purchased with a unit of currency.

Purchasing power can weaken over time due to inflation. Inflation is the general increase in prices of goods and services over time, resulting in the erosion of the value of currency. This is because rising prices effectively decrease the number of goods or services you can buy. Purchasing power is also known as a currency's buying power. One U.S. measure of purchasing power is the Consumer Price Index, which measures the overall change in the prices of goods and services that people typically buy over time. Central banks adjust interest rates to try to keep prices stable and maintain purchasing power.

Exponential decay in purchasing power refers to the decline in the value or buying power of money over time due to the impact of inflation. Exponential decay implies that the decline in purchasing power is not linear but follows an exponential or compounding pattern. This means that the rate at which the value of money decreases, accelerates over time. As prices rise, each unit of currency can purchase fewer goods and services, leading to a decrease in the overall purchasing power.

For example, suppose you have $100 today, and the inflation rate is 3% per year. After one year, the purchasing power of that $100 will decline by 3%, leaving you with the equivalent purchasing power of $97. In the following year, the same 3% decline applies to $97, resulting in a further decrease to $94.09, and so on. Over time, the purchasing power diminishes at an increasing rate due to the compounding effect of inflation.

Exponential decay in purchasing power highlights the importance of considering inflation when making financial decisions and long-term financial planning. It emphasizes the need to account for inflation in budgeting, investment strategies, retirement planning, and setting financial goals to preserve and grow wealth effectively over time.

Conversely, exponential growth portrays the compounding increase of an investment or asset's value. As time progresses, the growth rate leads to substantial gains fueled by the reinvestment of returns.

11.1 Exponential Decay

To calculate exponential decay in purchasing power, we use the following formula:

$$f(x) = a(1 - r)^t$$

f(x): the value of money at a future time after experiencing inflation.

a: the initial value of money

r: the rate at which the value of money is decreasing each year due to inflation, expressed as a decimal.

t: the time period or time factor over which the inflation occurs.

The first one has been solved for you.

1 The inflation rate in a country is 4% per year. What will be the purchasing power of $1,000 be after 10 years?

SOLUTION

Calculate the inflation-adjusted purchasing power after 10 years.

Apply exponential decay formula: $f(x) = a(1 - r)^t$

$f(x) = \$1{,}000 \times (1 - 0.04)^{10}$

$f(x) = \$1{,}000 \times (0.664832636)$

$f(x) = \$664.83$

Therefore, the purchasing power of $1,000 after 10 years will be $664.83.

2 If the annual inflation rate is 6%, what will the purchasing power of $1,000 be after 9 years?

3 The inflation rate is 1.5% per year. What will the purchasing power of $500 be after 8 years?

4 The purchasing power of a currency decreases by 5% each year. If $1,000 is invested today, what will its purchasing power be after 10 years?

5 The purchasing power of a currency decreases by 4.5% each year. If $10,000 is invested today, what will its purchasing power be after 15 years?

6 Suppose the purchasing power of currency decreases by 5% annually. If the price of a bottle of shampoo is $10 and you have a budget of $100 to spend on shampoo, how many bottles of shampoo can you buy (a) after 1 year? (b) after 2 years? (c) after 3 years? (d) after 8 years?

11.2 Exponential Growth

To calculate exponential growth, use the following formula:

$$f(x) = a(1 + r)^t$$

1 Your company is currently valued at $5,000 and is projected to grow in value at a rate of 7% annually. If you plan to sell the business in 15 years, how much will your business be worth at that time based on this projection?

2 Mary invests 200,000 rupees in mutual funds that offer an annual growth rate of 5%. How much will her investment be worth in 10 years based on this information?

3 Rushee's painting is currently valued at 1,500 Euros and is expected to increase in value at a rate of 2% annually. Based on this information, how much will the painting be worth in 16 years?

4 The purchasing power of a currency increases by 5% each year. If $1,000 is invested today, what will its purchasing power be after 10 years?

5 Imagine you have $100 and the price of a bottle of shampoo is $10. The annual rate of deflation is 10%. How many bottles of shampoo can you purchase (a) after 1 year? (b) after 2 years? (c) after 3 years? (d) after 8 years?