Growth Rates

Growth rates are calculated as annual averages and represented as percentages. Except where noted, growth rates of values are compute
Three principal methods are used to calculate growth rates: least squares, exponential endpoint, and geometric endpoint. Rates of change
are calculated as proportional changes from the earlier period.

Least-squares growth rate. Least-squares growth rates are used wherever there is a sufficiently long time series to permit a reliable calcula
calculated if more than half the observations in a period are missing. The least-squares growth rate, *r,* is estimated by fitting a linear regress
ogarithmic annual values of the variable in the relevant period. The regression equation takes the form

$$\ln X_t = a + bt,$$

which is equivalent to the logarithmic transformation of the compound growth equation,

$$X_t = X_o\,(1 + r)^t\,. = X_o\,(1 + r)^t\,. = X_o\,(1 + r)^t\,.$$

In this equation *X* is the variable, *t* is time, and *a* = ln Xo and *b* =
n (1 + r) are parameters to be estimated. If *b** is the least-squares estimate of *b,* the average annual growth rate, r, is obtained as [exp(*b**)
for expression as a percentage.

The calculated growth rate is an average rate that is representative of the available observations over the entire period. It does not necessa
rate between any two periods.

Exponential growth rate. The growth rate between two points in time for certain demographic indicators, notably labor force and population,
equation

$$r = \ln(p_n/p_1)/n\,,$$

where p_n and p_1 are the last and first observations in the period, *n* is the number of years in the period, and ln is the natural logarithm opera
on a model of continuous, exponential growth between two points in time. It does not take into account the intermediate values of the series
the annual rate of change measured at a one-year interval, which is given by $(p_n – p_{n-1})/p_{n-1}$.

Geometric growth rate. The geometric growth rate is applicable to compound growth over discrete periods, such as the payment and reinve
dividends. Although continuous growth, as modeled by the exponential growth rate, may be more realistic, most economic phenomena are
which case the compound growth model is appropriate. The average growth rate over *n* periods is calculated as

$$r = \exp((\ln(p_n/p_1))/n) - 1$$

Like the exponential growth rate, it does not take into account intermediate values of the series.

S.No	Variable Name	Value Posted