



MACRO ECONOMICS

Compounding

Growth on growth: how time, rate and frequency change the answer, and why the assumed rate matters most

Inflation and yield figures as on the dates shown

For training and education only. Not investment advice.

Compounding means growth is added to the base, so the next period's growth is worked out on a larger base.

It is arithmetic, not a feature of any product. It needs a rate. For anything market-linked, that rate is not fixed, is not known in advance and can be negative.

Three inputs, one formula



Principal

The amount at the start.
Under compounding, each period's growth is added to it and becomes part of the base.



Rate

The growth in one period, as a percentage of the base. In a formula it is fixed. In a market-linked investment it is not.



Periods

How many times growth is added. More years, or growth added more often within a year, both mean more periods.

Amount = principal $\times$ (1 + rate per period) raised to the number of periods.

Simple and compound, side by side

THREE YEARS AT 8%

₹1,00,000 is left untouched for three years.

Assumed rate: 8% a year.

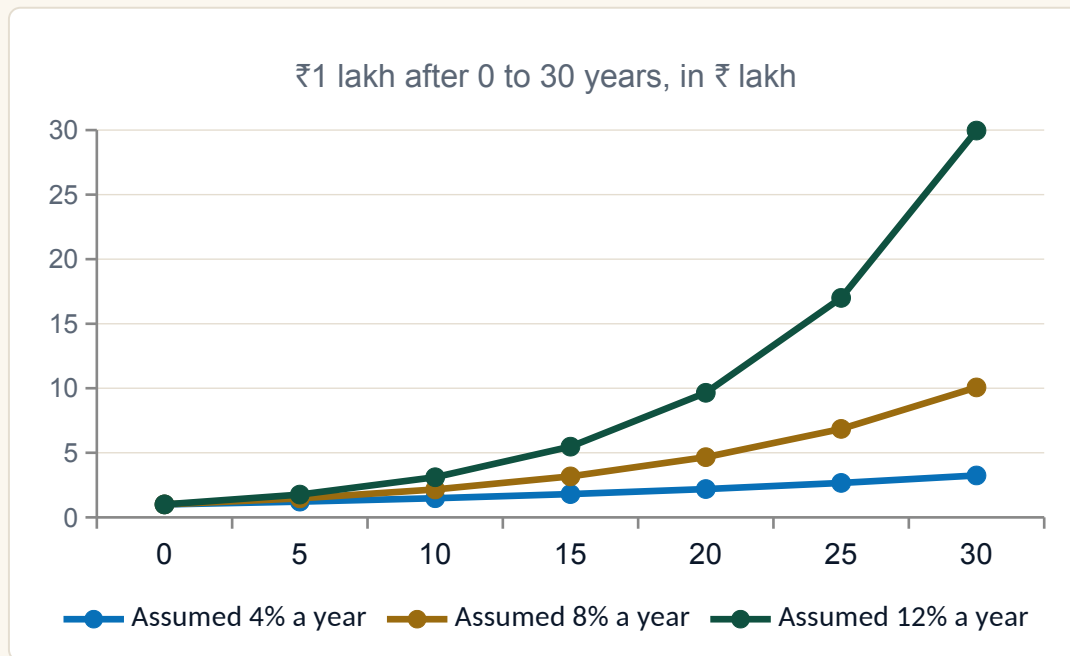
First as simple growth, then compounded once a year.

- 1 Simple: 8% of ₹1,00,000 is ₹8,000 a year. After three years: ₹1,00,000 + $3 \times ₹8,000 = ₹1,24,000$.
- 2 Compound, year 1: ₹1,00,000 $\times 1.08 = ₹1,08,000$. Year 2: ₹1,08,000 $\times 1.08 = ₹1,16,640$.
- 3 Compound, year 3: ₹1,16,640 $\times 1.08 = ₹1,25,971.20$.
- 4 The difference is ₹1,971.20. All of it is growth worked out on earlier growth.

Simple growth adds the same amount each year. Compound growth adds a larger amount each year.

Illustration. The 8% rate is an assumption for the arithmetic, not a forecast.

What time and rate do



Read the chart

- Each line starts at ₹1 lakh and is compounded once a year. Only the assumed rate differs.
- Time: at 8%, the first ten years add ₹1.16 lakh. The last ten add ₹5.40 lakh.
- Rate: after 30 years the lines reach ₹3.24 lakh, ₹10.06 lakh and ₹29.96 lakh.
- The lines are smooth only because each rate is fixed by assumption.

Illustrative data: $₹1,00,000 \times (1 + \text{rate})^{\text{years}}$ raised to the number of years. The three rates are assumptions, not forecasts.

How often growth is added

₹1,00,000 for one year at an assumed 12% a year, with growth added at different intervals.

Growth added	Working	After one year	Effective yearly rate
Once a year	$₹1,00,000 \times 1.12$	₹1,12,000.00	12.00%
Every six months	$₹1,00,000 \times 1.06 \times 1.06$	₹1,12,360.00	12.36%
Every quarter	$₹1,00,000 \times 1.03$, four times	₹1,12,550.88	12.55%
Every month	$₹1,00,000 \times 1.01$, twelve times	₹1,12,682.50	12.68%

Illustration. The 12% rate is an assumption for the arithmetic. Amounts are rounded to the nearest paisa.

The Rule of 72: how close is it?

A shortcut: years to double $\approx 72 \div$ the yearly rate in per cent. It is an approximation.

Assumed yearly rate	$72 \div \text{rate}$	Exact years to double	The shortcut is
4%	18.0 years	17.67 years	0.33 year too long
6%	12.0 years	11.90 years	0.10 year too long
8%	9.0 years	9.01 years	0.01 year too short
12%	6.0 years	6.12 years	0.12 year too short
24%	3.0 years	3.22 years	0.22 year too short

Exact figures are for growth compounded once a year: $\log 2 \div \log (1 + \text{rate})$. All rates are assumptions for the arithmetic.

It works on costs and prices too



Prices

At an assumed 5% a year, something that costs ₹100 today costs ₹265.33 in 20 years. Inflation compounds.



Costs

₹1 lakh for 20 years at an assumed 10% a year becomes ₹6.73 lakh. If costs take 1 percentage point a year, 9% gives ₹5.60 lakh.



Losses

A fall of 50% needs a gain of 100% to get back to the start. A fall of 20% and then a gain of 20% leaves ₹96 of every ₹100.

Compounding has no direction of its own. It multiplies whatever rate it is given.

A projection is only as good as its rate

₹10,000 paid at the end of each month for 20 years: 240 instalments, ₹24,00,000 paid in.

Assumed rate a month	Same as, a year	Result at rate	Growth or loss
-0.25%	-2.96%	₹18,06,402	Loss of ₹5,93,598
0%	0%	₹24,00,000	Nil
0.25%	3.04%	₹32,83,020	Growth of ₹8,83,020
0.50%	6.17%	₹46,20,409	Growth of ₹22,20,409
0.75%	9.38%	₹66,78,869	Growth of ₹42,78,869

Illustration. Each rate is an assumption, compounded monthly; none is a forecast. Actual returns vary from month to month.

Three rates that are not assumptions

Measured or official figures, with dates. Each is a reading for its date, not a rate to project forward.

CPI INFLATION

4.82%

Rise in consumer prices over the year to August 2026. Provisional.

INFLATION TARGET

4%

Set by the Government for 1 April 2026 to 31 March 2031, with a band of 2% to 6%.

10-YEAR G-SEC YIELD

6.96%

Yield on the 6.94% Government security maturing in 2036, on 1 September 2026: 6.9570%.

Sources: MoSPI CPI press release, 14 Sep 2026 (base 2024=100); Government notification of the inflation target, Mar 2026; RBI Current Rates, 1 Sep 2026.

Four things people get wrong



'Double the rate, double the result.'

Over 30 years, ₹1 lakh at an assumed 4% becomes ₹3.24 lakh. At 8% it becomes ₹10.06 lakh: more than three times as much.



'The Rule of 72 is exact.'

It is a shortcut. At 24% it says 3.0 years; the exact figure is 3.22 years.



'Compounding always works for me.'

It also works on costs, on rising prices and on losses. It multiplies whatever rate it is given.



'The calculator shows what I will get.'

It shows what an assumed rate produces. No market-linked investment has a fixed rate. Returns are not assured.

Check yourself

Q1

₹50,000 grows at an assumed 10% a year for two years. What is it worth with simple growth, and with growth compounded once a year?

Q2

Using the Rule of 72, about how long does an amount take to double at an assumed 9% a year? Is the answer exact?

Q3

A client shows a calculator result: '₹10,000 a month becomes ₹67 lakh in 20 years.' What do you ask and explain?

Sources and disclaimer

SOURCES FOR THE FIGURES IN THIS DECK

- CPI inflation 4.82% for August 2026 (provisional, base 2024=100): Ministry of Statistics and Programme Implementation, press release of 14 Sep 2026.
- Inflation target of 4% with a band of 2% to 6% for 1 Apr 2026 to 31 Mar 2031: Government of India notification under the Reserve Bank of India Act.
- 10-year Government security (6.94% GS 2036) yield 6.9570% on 1 Sep 2026: Reserve Bank of India, Current Rates (page archived 2 Sep 2026).
- Every other rate, amount and result in this deck is an assumption or is computed from one, for illustration. None is a forecast or an expected return.

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