

LECTURE 3

CONCEPTS | GDP OVER TIME

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GDP OVER TIME

- government's goal: measure production over time
- **nominal GDP**: final goods \times **current prices**
- nominal GDP increases for two reasons:
 - the productions of most goods increase
 - the prices of most goods increase
- **real GDP**: final goods \times **constant prices**

CONSTRUCTING GDP

- consider an economy in which only cars are produced
- take expenditure approach:

Year	Quantity of Cars	Price of Cars	Nominal GDP	Real GDP (in 2009 dollars)
2008	10	\$20,000	\$200,000	\$240,000
2009	12	\$24,000	\$288,000	\$288,000
2010	13	\$26,000	\$338,000	\$312,000

CONSTRUCTING NOMINAL GDP

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we want to clean the time series of GDP from the increase in car prices, which does not reflect an increase in production

CONSTRUCTING REAL GDP

Year	Quantity of Cars	Price of Cars	Nominal GDP	Real GDP (in 2009 dollars)
2008	10	\$20,000	\$200,000	\$240,000
2009	12	\$24,000	\$288,000	\$288,000
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- **base year:** the year used to construct prices (2009)
- for more than one good, relative prices may change over time
 - constant-price real GDP keeps relative price constant
 - chain-weighted real GDP reflects changing relative prices

LEVEL & GROWTH RATE OF GDP

- because GDP grows over time, it is useful to look at growth rate instead of level
- the growth rate of GDP is:

$$\frac{Y(t) - Y(t - 1)}{Y(t - 1)}$$

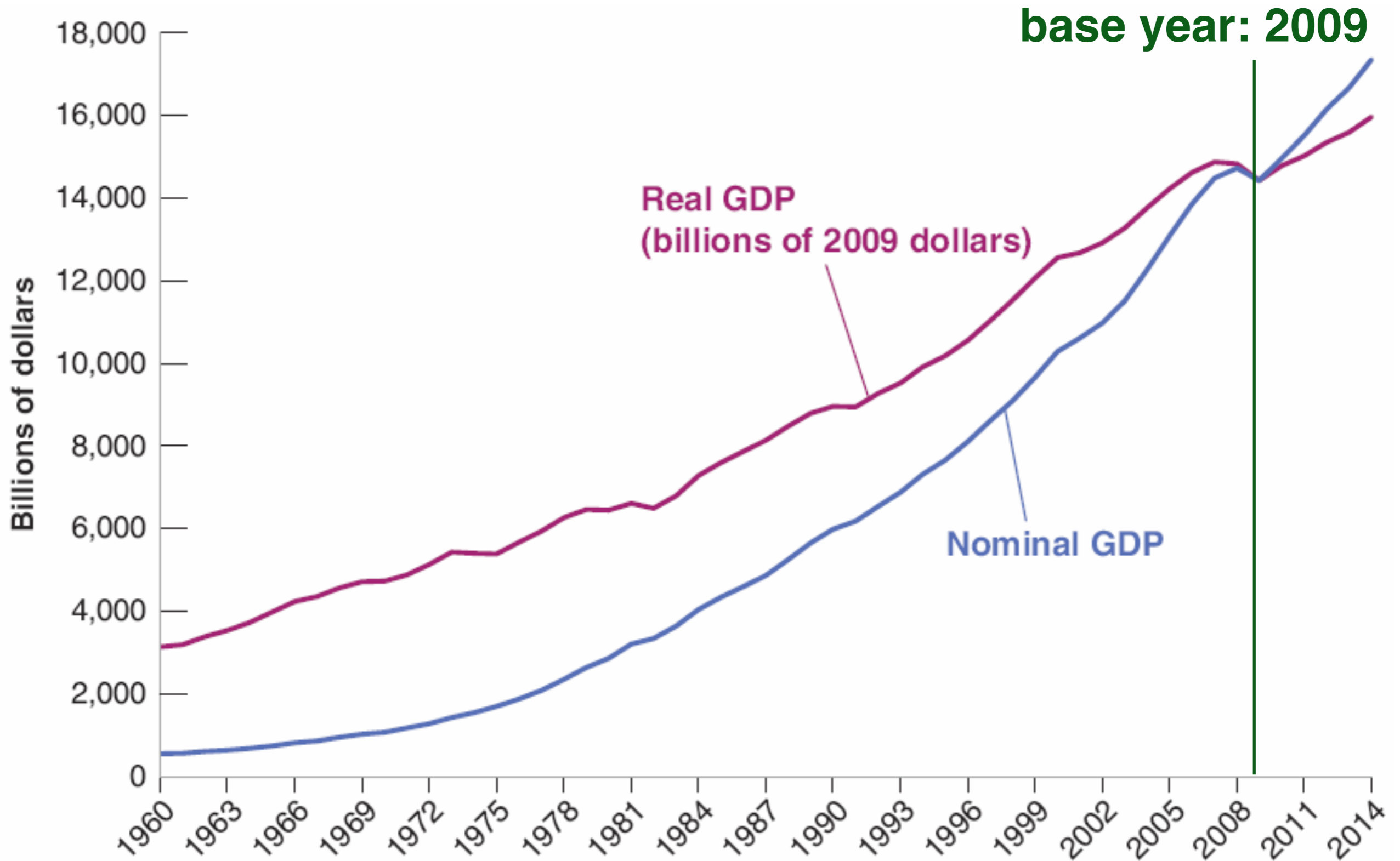
- growth rate of GDP = percentage change in GDP

1. For any variables X and Y ,
percentage change in $(X \times Y)$
 \approx percentage change in X
+ percentage change in Y

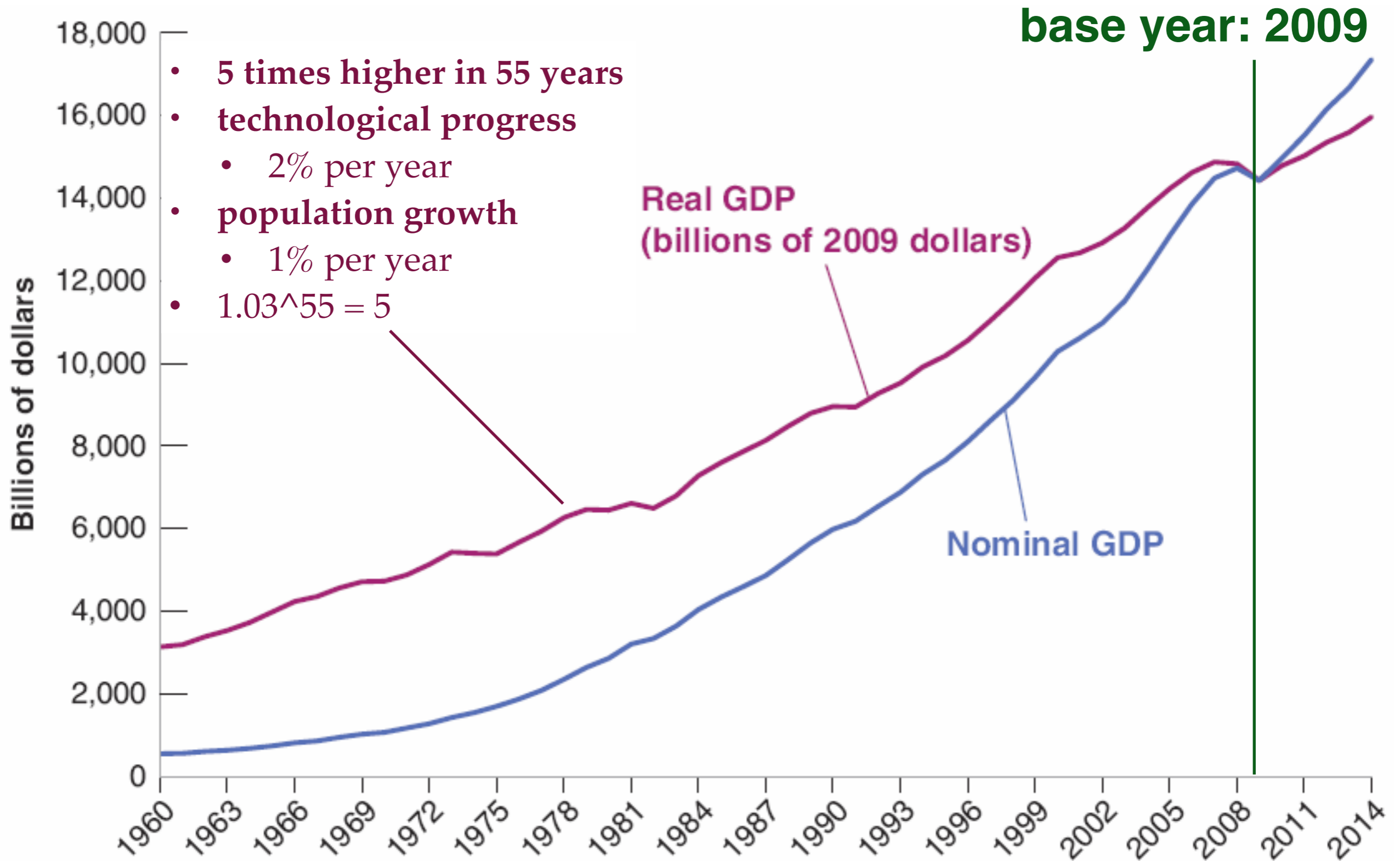
2. Percentage change in (X/Y)
 \approx percentage change in X
– percentage change in Y

- equivalently:
- growth rate of $(X \times Y) = \text{growth rate of } X + \text{growth rate of } Y$
- growth rate of $(X/Y) = \text{growth rate of } X - \text{growth rate of } Y$
- and growth rate of $X^a = a \times \text{growth rate of } X$
- these are the same properties as the log function!

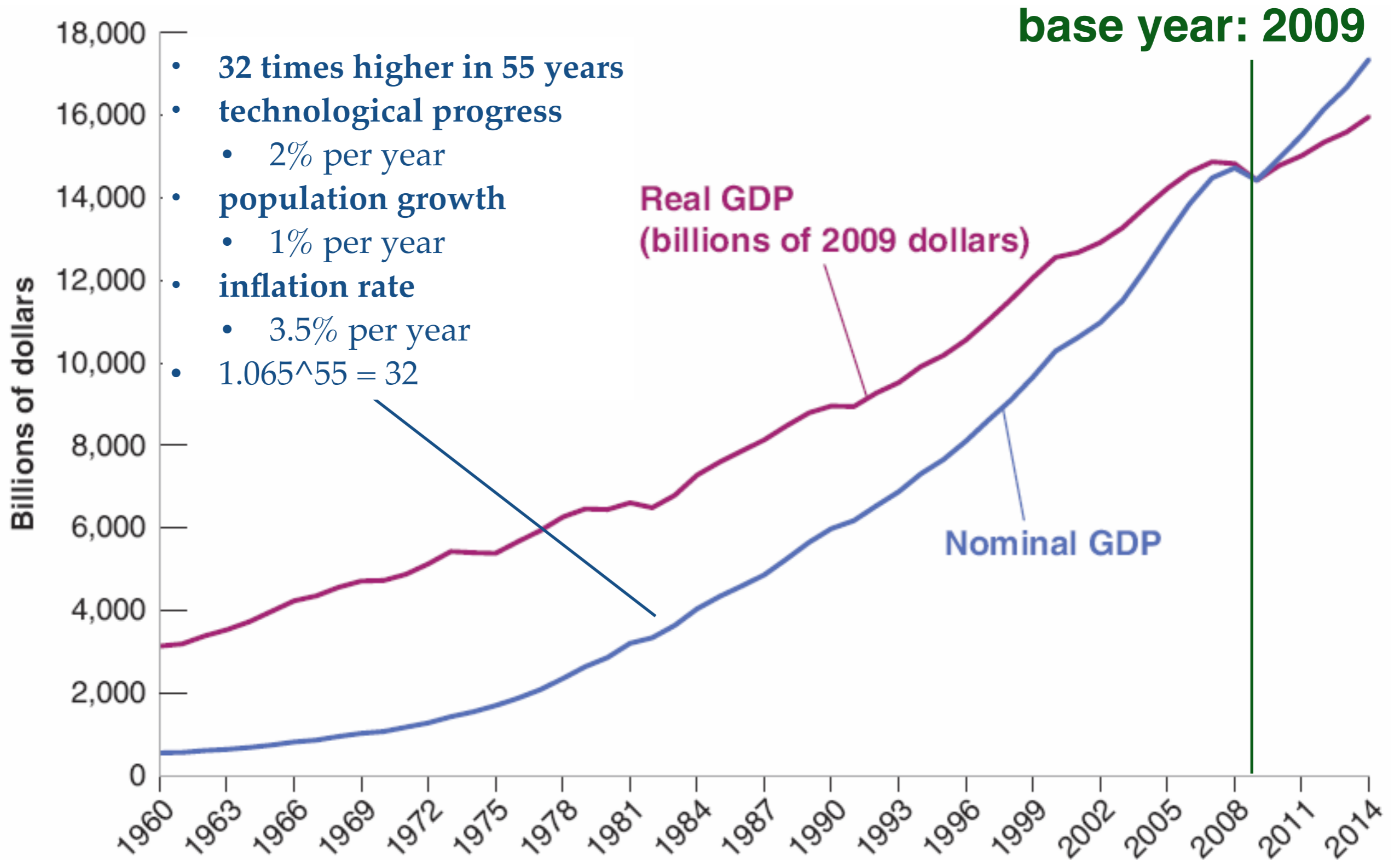
NOMINAL & REAL GDP



NOMINAL & REAL GDP



NOMINAL & REAL GDP



HEDONIC PRICING

- the Department of Commerce deals with **changes in the quality of existing goods** with the method of hedonic pricing
 - treats goods as providing a collection of characteristics
- the quality of a new laptop computer has increased by 18% per year since 1995
 - higher memory, higher CPU, better battery, better screen
- the price of a laptop has declined by 7% per year since 1995
- the hedonic price of a laptop has fallen at $18\% + 7\% = 25\%$ per year since 1995