GDP: Different shapes and forms

EC 103–003

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Motivation

Housekeeping

Required readings:

- `OpenStax, ch. 6`.

Nominal vs. Real

Nominal vs. Real

A **crucial** distinction in Economics is between **real** and **nominal** values.

For the case of GDP, this is especially important when **inflation** is such an important component of the economy.

> **Inflation** is a *sustained* increase in an economy's price level.

The **nominal** value of any economic measure implies a statistic in terms of **actual prices** that exist at the time.

On the other hand, **real** values refer to the *same* statistic after it has been **adjusted for inflation**.

Nominal vs. Real

Reality check...

`US Nominal Gross Domestic Product`

Nominal vs. Real

Simply looking at *nominal* values when evaluating economic statistics may be **misleading**.

Consider the number of *cars sold*, for instance.

- Does an SUV have the *same* price today, relative to, say, 1985?

Thus, to have a more ***accurate*** basis for evaluating economic growth, economists prefer **real** measures, as they account for inflation.

For the case of GDP, we use the **GDP deflator** to ***normalize*** nominal GDP values.

> The **GDP deflator** is a *price index* measuring the average prices of all final goods and services included in the economy.

Nominal vs. Real

Before we move on...

- What is a **price index**?

An **index** is a number that allows for comparisons across different points in time or different entities.

For our purposes, a **price index** is a reference number that allows us to compare economic statistics at different points in time, serving as an *overall average change in relative prices over time*.

Over time, the amount of goods and services produced by an economy **increases**, and so do **their prices**.

To that end, the **GDP deflator** is a price index that includes **all** goods and services that are counted in GDP through a *weighted average* methodology.

Nominal vs. Real

Suppose a "toy" economy, with **no** government and **no** interactions with the foreign sector, that only produces **apples**.

In this case, its **GDP** will simply be the price of apples multiplied by the amount of apples sold.

And a few periods:

Year	Current Price (per unit)	Quantity sold	Nominal GDP
2015	1.00	200	200.0
2016	1.10	250	275.0
2017	1.15	230	264.5

In case we want to calculate this economy's **real GDP**, we first need to set a **base year**.

- Meaning: we will select a year whose **price level** will be the reference for all years.

Nominal vs. Real

Suppose we set our **base year** to 2016.

What we need to do is multiply the **quantities produced** each year by the **base-year price**.

Then,

Year	Constant Price (per unit)	Quantity sold	Real GDP
2015	1.1	200	220
2016	1.1	250	275
2017	1.1	230	253

Nominal vs. Real

Comparing:

Nominal GDP	Real GDP (Constant 2016 prices)
200.0	220
275.0	275
264.5	253

Nominal vs. Real

Reality is way more complicated than our "toy" economy from the previous example.

However, the intuition about the **indexing** procedure remains the same.

What the `Bureau of Economic Analysis (BEA)` does is computing a GDP deflator with the **average prices** of all goods and services included in the economy.

And we obtain real GDP values applying the formula below:

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}}$$

Nominal vs. Real

Reality check...

`The US GDP price deflator`

Nominal vs. Real

Consider the following data (in US$ billions) for the US, between 2008q1 and 2009q4 (base year = 2005):

Quarter	Nominal GDP	GDP deflator
2008q1	14373.9	1.08
2008q2	14497.8	1.08
2008q3	14546.7	1.09
2008q4	14347.3	1.09
2009q1	14178.0	1.10
2009q2	14151.2	1.10
2009q3	14242.1	1.10
2009q4	14453.8	1.10

- Calculate the **Real GDP** for the US economy over this period.
- Let's practice this using our **applied skills**!

Domestic vs. National

Domestic vs. National

A close "cousin" of GDP is the **Gross National Product** (GNP).

The main **difference** between the two is that, while GDP only includes what a country produces **within its borders**, GNP *adds* what domestic businesses and labor **abroad** produce, and *subtracts* any payments that foreign labor and businesses located in the local country send home to other countries.

- In other words, GNP is based more on what a country's citizens and firms produce, *wherever* they are located, and GDP is based on what happens within a certain country's geographic *boundaries*.

`US Gross National Product Data`

Comparing different countries

Comparing different countries

Applying a similar reasoning to the *Real vs. Nominal* GDP, we can also compare the economic performances among **different countries**.

A *first* common option is to divide a country's GDP by its **population size**.

This is known as **GDP *per capita***:

$$\text{GDP } \textit{per capita} = \frac{\text{Nominal or Real GDP}}{\text{Population size}}$$

This way, we are able to take into account how **populous** one country is when looking at its **economic performance**.

Comparing different countries

The *second* option concerns looking for a way to compare economic performance for countries where **money values differ**.

To that end, given that almost each nation has its own **currency**, we use the **exchange rate** as a common denominator.

> The **exchange rate** is the value of one currency in terms of *another* currency.

Economists typically use the **Purchasing Power Parity (PPP)** measure of GDP to compare the size and performance of different economies.

Comparing different countries

As an example, suppose we would like to compare two countries: Japan and the United States.

Suppose that, in 2021, 1 Japanese *Yen* is equivalent to 0.007 US dollar.

- Thus, the exchange rate Yen/Dollar is 142.85 Yen = US$ 1.

If we wish to **convert** Japan's GDP of 541,473.00 Billions of Yen to US dollars, we simply apply the following formula:

$$\text{Japan's GDP in US\$} = \frac{\text{Japan's GDP in Yen}}{\text{Yen/Dollar Exchange Rate}} = \frac{541,473.00}{142.85} = \text{US\$ } 3,790.50$$

Comparing different countries

In 2021, the Euro/US Dollar exchange rate was 0.98 Euro = 1 US Dollar.

Also, Germany's GDP was 3,570.62 billions of Euros.

- Compute Germany's GDP in terms of Purchasing Power Parity (PPP) in US dollars.

Next time: Economic growth