3 Gross domestic product

3.1 Introduction

You may have encountered this economic term in the news, trading discussions, etc. This is the most used metric in economics and its relevance for studying the economy of any country is hugely important.

According to Mankiw (2020), the gross domestic product, or GDP, is:

"The market value of all final goods and services produced within a country in a given period of time."

Let's understand this definition word by word:

- "GDP is the market value": In any country's economy, many goods are produced, sold and consumed. If you were to sum all the products to find the number of goods produced in the economy you would face the problem of summing potatoes with apples, or grapes with printers, or computers with pens. In order to have a metric that can sum all these products together, you can instead sum them by their dollar/currency value. This means multiplying the number of products of each good or service by their respective prices.
- "of all": As previously mentioned, we have many goods and services produced in the economy. The GDP will sum the market value of all goods and services sold legally in the markets. So narcotics and contraband items produced and sold won't get counted in GDP calculations!
- "Final": Imagine we own a bread store and we sell bread. The flour, oil, water, salt and other ingredients used to create the bread will be considered intermediate goods for the computation of the GDP. Thus, we wouldn't sum the market value of the raw materials sold to our bread store to compute the GDP. It's actually the bread we sell which we use to compute the GDP value.
- "Goods and Services": The computation of the GDP value will depend on tangible goods like fruits, restaurant dishes, clothing, computers, etc. and intangible services, i.e., cleaning services, medical appointments, car wash services, concerts, etc.
- "Produced": We don't include in the computation of the GDP, goods which have already been sold and are sold again in order to avoid counting the same transaction twice. In other words, instead of taking into account "traded items", we take into account goods and services which are the final output.
- "Within a country": Usually, we compute the GDP with respect to the goods and services produced in the same country, even if the firm owners are foreigners. Consider a foreign firm, e.g. Mercedes or BMW, that has operations in India, the final goods produced by this firm in India would be considered a part of India's GDP.
- "In a given period of time": GDP is computed for goods and services produced in a specified period of time. For example, we can compute the GDP of India for October 2022. In order to compute the GDP for this period, we wouldn't use data of goods and services from September 2020 or any other period.

3.2 An example of the calculation of GDP

The basic formula to compute the GDP is as follows:

$$GDP\ for\ year\ t = \sum_{i=0}^{N} P_{it} * Q_{it}$$

Where
P_{it}: Price of good "i" at time "t".
Q_{it}: Quantity of good "i" at time "t".
$P_{it} * Q_{it}$: Market value of good "i".

Suppose we have an economy "A" which has produced 3 goods: oranges, apples, and pineapples. Let's present the prices and quantities produced for each year from 2020 to 2022.

	Oranges		Apples		Pineapples	
	Price	Quantity	Price	Quantity	Price	Quantity
2020	5	1000	6	1500	10	1800
2021	4	1200	7	1300	13	2000
2022	6	1100	8	1600	11	1900

The GDP for each year will be calculated as follows:

- 2020: 5*1000+6*1500+10*1800 = 32,000
- 2021: 4*1200+7*1300+13*2000 = 39,900
- 2022: 6*1100+8*1600+11*1900 = 40,300

3.3 Computation of GDP

The GDP value can be calculated using 3 types of methodologies.

1. The income approach: GDP will be the sum of profits, wages, interest, and income.

$$GDP = \pi + \omega + i + \tau$$

Where:
π: The profits that are obtained from firms.
ω: The wages that employees earned from working for firms.
i: The interest that owners of physical capital earned by lending them.
τ: The income that people or firms earned by renting land.

2. The value-added approach: GDP will be the sum of the differences between all firms' output and the market value of their corresponding intermediate goods and services.
3. The expenditures approach says that GDP will be the sum of people's consumption, government expenditure, investment, and net exports.

What you should keep in mind is that the 3 approaches' GDP values should be identical, i.e., whatever method you use, you should obtain the same value as a result.

3.4 Real versus Nominal GDP

As you saw previously, the GDP formula depends not only on the number of goods and services produced but also on the prices. So, whenever GDP rises, this can be due to an increase in the number of goods and services produced but can be also due to an increase in their respective prices.

So, how can we know that GDP has increased due to quantity or price or due to both?

Here, we introduce the concept of real and nominal GDP.

Nominal GDP: It's the GDP calculated at current prices.
Real GDP: It's the GDP calculated at prices from an arbitrarily chosen base year.

For example, let's imagine we are in an economy in which we only produce computers and mobile phones. Let's suppose the prices and quantities for each good from 2020 to 2022 are the following:

	Computers		Mobile Phones	
	Price	Quantity	Price	Quantity
2020	5000	500	1000	1500
2021	6500	700	1200	1300
2022	8500	650	1100	1600

The nominal GDP for each will be:

- 2020: 5000*500+1000*1500 = 4,000,000
- 2021: 6500*700+1200*1300 = 6,110,000
- 2022: 8500*650+1100*1600 = 7,285,000

In order to calculate the real GDP we need to select the base year from which we will use the prices. Let's suppose the base year is 2020. Then the real GDP for each year will be the following:

- 2020: 5000*500+1000*1500 = 4,000,000

- 2021: 5000*700+1000*1300 = 4,800,000
- 2022: 5000*650+1000*1600 = 4,850,000

The real GDP gives us a GDP measure that is not influenced by goods' prices. The resulting value will give us a better indicator of how well the economy is doing. The base year is usually selected by the government. It's usually chosen based on the common goods and services that are transacted in a given period and which can represent the past years' and next years' consumers' similar consumption preferences. Consequently, it is updated once in a while to make it reflect the consumer's preferences. For example, in India the base year considered is 2011-12.

3.5 The GDP Deflator

What happens if we divide both GDPs (i.e. real and nominal)? We get the GDP deflator.

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

What economic intuition can you get from this deflator? Remember that nominal GDP is the market value of all goods and services at current prices, while the real GDP is the market value of all final goods and services at base year prices. Do you have the intuition, now?

See, the resulting value will be an indicator of the overall level of prices in the economy. From the previous example, let's compute the GDP Deflator:

Year	Nominal GDP	Real GDP	GDP Deflator
2020	4,000,000	4,000,000	1.00
2021	6,110,000	4,800,000	1.27
2022	7,285,000	4,850,000	1.50

You might understand that the GDP base year is equal to 1. For the rest of the years, it can be a different number.

And what about getting the GDP deflator rate of growth from one period to the next?

That metric will be the inflation rate, which is the percentage increase of the overall level of prices in the economy:

$$Inflation\ of\ year\ t\ = \frac{GDP\ Deflator_t}{GDP\ Deflator_{t-1}} - 1$$

We show you the inflation rate for each year from the previous example.

Year	GDP Deflator	Inflation Rate
2020	1.00	
2021	1.27	27.29%
2022	1.50	18.00%

In this example, the inflation rate for each year is 27% and 18%.

3.6 Is GDP enough to evaluate a country's economic health?

The GDP measures the overall economic production of a country. You can also get a measure of the level of production per citizen. This can be conceptualised as GDP per capita, which is the GDP divided by the population of the same country.

This GDP per capita can give us a grasp to compare countries, too. However, would you consider this metric enough to compare countries? Not necessarily.

The GDP per capita can't tell us how much inequality a country suffers. It doesn't also tell us how efficiently the political system addresses its citizens' issues. It doesn't measure the economic impact that households make doing their household chores. It doesn't tell us how good the education system level is, etc. The GDP metric is an imperfect measure of the overall situation of the economy.

We can infer many things from a particular country's GDP value.

3.7 How to use these concepts in trading?

We can make a few statements about the relationship between GDP and trade.

Since the GDP is a measure of the overall status of the economy, an increase is seen as a good sign of the economy for traders. Usually, when the increase in GDP exceeds the trader's expectation, we anticipate an increase in domestic stock prices.

- You can trade on the news: Whenever you see an increase in a country's GDP above expectations, you can buy the country's stocks for a short period of time so you can profit from this news.
- Global growth can also be considered a good indicator for trading stocks in all markets. Whenever you see an increase in the world GDP, you can expect an increase in the stock markets of the countries which have seen also an increase in their GDP.
- In the United States, there are 3 GDP value releases: Advanced, Preliminary, and Final. The advanced release shows the GDP value which is the least accurate. This is the first release of the US GDP. Usually, this estimate has a high standard deviation with respect to the economists' forecasts. The final release, since it takes the complete GDP components' information, will present a lower standard deviation and has a better accuracy of the GDP estimate. These 3 releases are presented quarterly since the GDP estimation in the US is done quarterly.
- Another useful indicator is the Core PCE (core Personal Consumption Expenditures index), which is released quarterly, too. It's defined as a price index related to personal and household expenditures, excluding energy and food prices. It is related to the prices that economic agents pay for goods and services. The Federal Reserve Bank cares about avoiding deflation, which is a decrease in the overall level of prices in the economy.
- Consumer confidence: Released monthly, it's a sign of the expectations people have of the overall health of the US economy. If the consumer confidence release results higher than expectations, then you might see an increase in stocks' prices. Why? Because an increase in consumer confidence will mean an increase in consumer expenditures, which in turn means an increase in GDP, which ultimately leads to an increase in stock prices.
- ISM Manufacturing: Released the first business day of every month, it's an index based on a survey of firms' top executives of their respective business output levels across the US economy on a monthly basis. A value higher than 50 means growth, and a lesser value indicates a reduction in GDP.
- ISM Non-Manufacturing: It's a similar index to the above indicator but related to services. If the value is higher than 50, it means the economy is doing well, if not, the economy is doing worse. If any of the two indicators' value for a particular month is higher than expectations, we would see an increase in stock prices.