

Gross Domestic Product and Economic Growth

Topic 6

Learning Objectives

Discuss how to measure a society's economic output

- Define gross domestic product
- Measure gross domestic product

Determine economic growth

- in the short-run
- in the long-run

Revision

- Macroeconomics: the study of the economy as a whole, focusing on levels and changes in aggregate measures.
 - What causes recessions?
 - What is the government budget deficit?
 - How can problems in the housing market spread to the rest of the economy?
- The Circular Flow Diagram
- Concept of demand and supply
 - How various events affect price and quantity turned over

Gross Domestic Product

Gross domestic product is the market value of all final goods and services produced in a country within a certain time period.

GDP can be measured as:

- Total expenditure on domestically produced final goods
- Total income earned by domestically located factors of production
- Total output

How can all measure GDP?

- Expenditure equals income because every dollar a buyer spends becomes income to the seller.

Gross Domestic Product – Ctd.

Gross domestic product is the market value of all final goods and services produced in a country within a certain time period.

- GDP is a measure of production.
- Economist get a total measure of the value of all goods and services by assuming that each individual good and service is valued at its market price.
- The market price is the results of the interaction of consumer demand with producer cost.

Gross Domestic Product – Ctd.

Gross domestic product is the market value of all final goods and services produced in a country within a certain time period.

- If the people are willing to pay a certain amount for something, when they have alternatives, then the good must be worth that amount to them.
- Multiplying the market price of a good by the quantity produced gives us the value of the total amount produced.
- $GDP = (P_1 \times Q_1) + (P_2 \times Q_2) + (P_3 \times Q_3) + \dots + (P_n \times Q_n)$

Gross Domestic Product – Ctd.

$$GDP = (P_1 \times Q_1) + (P_2 \times Q_2) + (P_3 \times Q_3) + \dots + (P_n \times Q_n)$$

An example:

Good	P	Q	(P x Q)
A	\$30	900	
B	\$100	200	
C	\$50	500	
D	\$25	750	
E	\$75	400	
GDP			

Gross Domestic Product – Ctd.

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An example:

Good	P	Q	(P x Q)
A	\$30	900	\$27,000
B	\$100	200	\$20,000
C	\$50	500	\$25,000
D	\$25	750	\$18,750
E	\$75	400	\$30,000
		GDP	\$120,750

Expenditure Components of GDP

Decompose GDP into four components

- Consumption
- Investment
- Government Spending
- Net Exports

Expenditure Components of GDP – Ctd.

Consumption by households (C)

- The value of all goods and services bought by households.
- Durable goods: last a long time
 - Cars, home appliances
- Nondurable goods: last a short time
 - Food, clothing
- Services: intangible items purchased
 - Dry cleaning, air travel

Expenditure Components of GDP – Ctd.

Investment Expenditures by businesses (I)

- Spending on capital, a physical asset used in future production
- Business fixed investment
 - Spending on plant and equipment
- Residential fixed investment
 - Spending by consumers and landlords on housing units (structures)
- Inventory investment
 - The change in the value of all firms' inventories

Expenditure Components of GDP – Ctd.

Government Spending (G)

- Includes all government spending on goods and services.
- Excludes transfer payments, such as unemployment insurance payments, because they do not represent spending on goods and services.

Expenditure Components of GDP – Ctd.

Net Exports (NX)

- The difference between exports and imports.
- Exports
 - The value of all goods and services sold to other countries
- Imports
 - The value of all goods and services purchased from other countries
- NX equals net spending from abroad on our goods and services.

GDP vs. GNP

- Gross Domestic Product (GDP)
 - The total market value of all final goods and services produced domestically over a certain period of time.
 - For example: The income you make working in the US is counted towards US GDP.
- Gross National Product (GNP)
 - The total market value of all goods and services produced by nationals over a certain period of time.
 - For example: The income I make working in the US is counted towards Germany's GNP.

Measuring Gross Domestic Product

GDP can be calculated using either one of the following approaches:

- Expenditure method
- Income method
- Value added approach

Each method yields the same amount for GDP. Let's look at an example...

Measuring Gross Domestic Product – Ctd.

During a given year in an abstract economy, the following activities occur:

1. A silver mining company pays its workers a total amount of \$200,000 to mine 75 pounds of silver.
2. The silver is then sold to a jewelry manufacturer for \$300,000.
3. The jewelry manufacturer pays its workers a total amount of \$250,000 to make silver necklaces.
4. The jewelry manufacturer sells the jewelry directly to consumers for a total amount of \$1,000,000.

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Expenditure Method

- Sum of all final goods and services produced
- Final goods are the ones that end up in the hands of the ultimate customer.
- GDP = \$1,000,000

Measuring Gross Domestic Product – Ctd.

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Income Method

- All income is simultaneously income to the person who produced the good or service
- Income of workers: wages
- Income of firms: profits (revenue-cost)

- $GDP = \text{wages} + \text{profits}$

Wages	200,000 + 250,000
Profits	100,000 + 450,000
GDP	1,000,000

Measuring Gross Domestic Product – Ctd.

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Value Added Approach

- Value added refers to the value of output minus the value of the intermediate goods used to produce that output

Or

- Revenue – cost of intermediate goods

Value added silver mine	300,000
Value added jewelry manufacturer	700,000
<hr/>	
GDP	1,000,000

Limitations of GDP as a measurement

Major problems in getting an accurate figure for GDP:

- The sale of used goods:
 - Goods that were produced in a previous period were already counted toward GDP.
- Non-market production:
 - The creation of goods and services that are not sold through a market.
- Underground economy/ black-market:
 - Goods and services sold and bought but not reported to the authorities.

Nominal vs. Real GDP

- GDP is the value of all final goods and services produced.
- **Nominal GDP** measures these values using current prices.
- **Real GDP** measures these values using the prices of a base year.

An Example

Good	Q ₂₀₀₀	P ₂₀₀₀	Q ₂₀₁₀	P ₂₀₁₀
A	100	50,000	120	60,000
B	500,000	10	400,000	20

$$NGDP_t = (Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t})$$

$$RGDP_t = (Q_{A_t} \times P_{A_b}) + (Q_{B_t} \times P_{B_b})$$

GDP	2000	2010
Nominal		
Real (b=2000)		

Nominal vs. Real GDP – Ctd.

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An Example

Good	Q_{2000}	P_{2000}	Q_{2010}	P_{2010}
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GDP	2000	2010
Nominal	10,000,000	15,200,000
Real (b=2000)	10,000,000	10,000,000

Inflation and the Accuracy of GDP

- As the prior example illustrates, changes in price and quantity distort the purchasing power of money.
- Changes in **nominal GDP** can be due to:
 - Changes in prices
 - Changes in quantities of output produced
- Changes in **real GDP** can only be due to changes in quantities because real GDP is constructed using constant base-year prices.
- These observable distortions are caused by inflation.

Inflation and the Accuracy of GDP – Ctd.

- Inflation rate refers to the percentage increase in the overall level of prices.
- Measures of the price level:
 - GDP Deflator
 - Consumer Price Index (CPI)

Inflation and the Accuracy of GDP

GDP Deflator

$$GDP\ Deflator = \frac{NGDP}{RGDP} \times 100$$

- Calculating the price level using the formula of the GDP Deflator means to hold the prices of the base year fixed.

- $GDP\ Deflator =$

$$\frac{(Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t}) + \dots + (Q_{n_t} \times P_{n_t})}{(Q_{A_b} \times P_{A_b}) + (Q_{B_b} \times P_{B_b}) + \dots + (Q_{n_b} \times P_{n_b})} \times 100$$

CPI

$$CPI = \frac{Cost\ of\ Basket_t}{Cost\ of\ Basket_b} \times 100$$

- Calculating the price level using the formula of the CPI means to hold the quantities of the base year fixed.

- $CPI = \frac{(Q_{A_b} \times P_{A_t}) + (Q_{B_b} \times P_{B_t}) + \dots + (Q_{n_b} \times P_{n_t})}{(Q_{A_b} \times P_{A_b}) + (Q_{B_b} \times P_{B_b}) + \dots + (Q_{n_b} \times P_{n_b})} \times 100$

Inflation and the Accuracy of GDP – Ctd.

$$NGDP_t = (Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t})$$

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$$GDP\ Deflator = \frac{NGDP}{RGDP} \times 100$$

$$CPI = \frac{(Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t}) + \dots + (Q_{n_t} \times P_{n_t})}{(Q_{A_b} \times P_{A_b}) + (Q_{B_b} \times P_{B_b}) + \dots + (Q_{n_b} \times P_{n_b})} \times 100$$

An Example

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GDP	2000	2010
Nominal	10,000,000	15,200,000
Real (b=2000)	10,000,000	10,000,000
GDP Deflator		
CPI		

Inflation and the Accuracy of GDP – Ctd.

$$NGDP_t = (Q_{A_t} \times P_{A_t}) + (Q_{B_t} \times P_{B_t})$$

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An Example

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A	100	50,000	120	60,000
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GDP	2000	2010
Nominal	10,000,000	15,200,000
Real (b=2000)	10,000,000	10,000,000
GDP Deflator	100	152
CPI	100	160

GDP vs. GDP per Capita

- Is GDP a good proxy for standards of living?

Country	2015	2016	2017	2018
USA	18,219,297,584,000	18,707,188,235,000	19,485,393,853,000	20,544,343,456,936
DEU	3,360,549,973,888	3,466,790,065,011	3,656,749,414,477	3,947,620,162,502

- Does that mean that people living in the US have an average living standard that is greater than in Germany?
- Thus, to have a useful measure, we need to look at income per person.

GDP vs. GDP per Capita – Ctd.

- GDP per capita shows how much income is available per person if it were equally spread across the entire population.

Country	2015	2016	2017	2018
USA	56,803	57,904	59,927	62,794
DEU	41,139	42,098	44,240	47,603

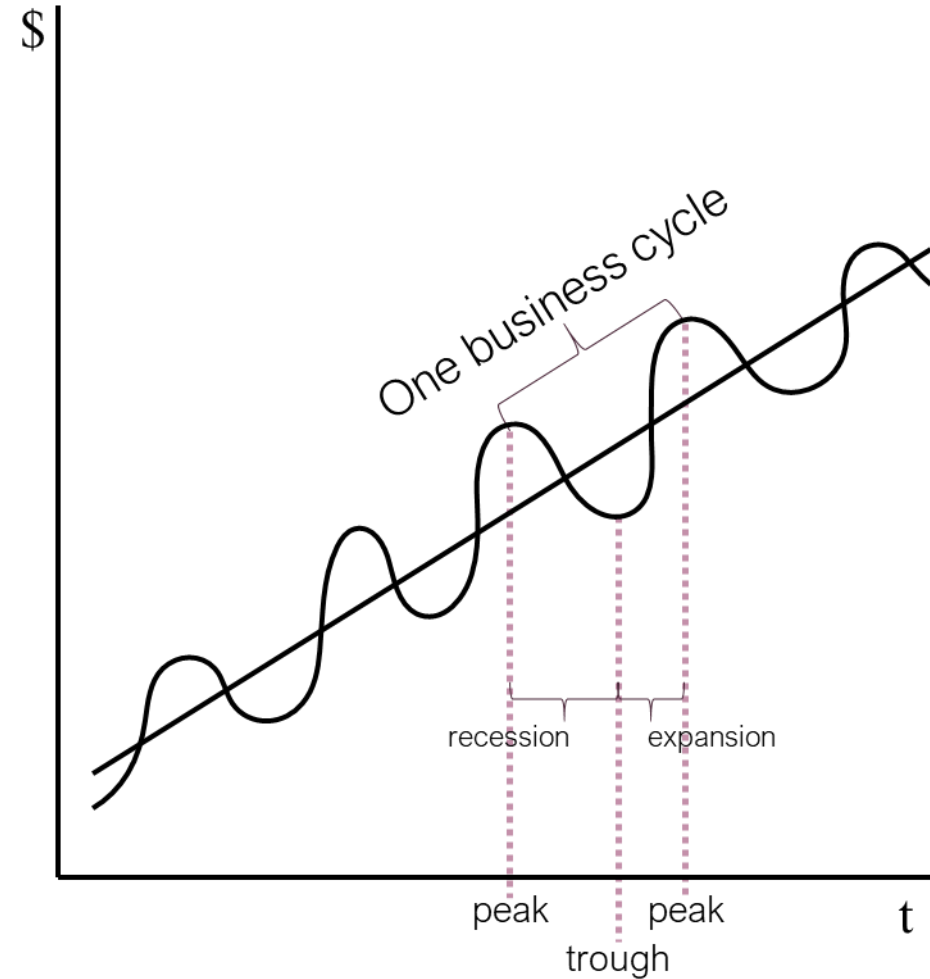
- $$GDP \text{ per capita} = \frac{GDP}{Population}$$

Economic Growth and Development

- Economic growth refers to sustained increases over time in the value of GDP.
 - Measured by the GDP growth rate
 - Adjusted for inflation -> RGDP
 - Adjusted for population growth -> RGDP per capita
- Economic Development refers to improvements over time in quality of life and living standards.
 - Assessed by factors such as life expectancy at birth, infant mortality, literacy rates, access to clean drinking water/ vaccinations/ electricity/ telephone/ internet, etc.
- Economic growth is often used as a proxy measure of economic development.

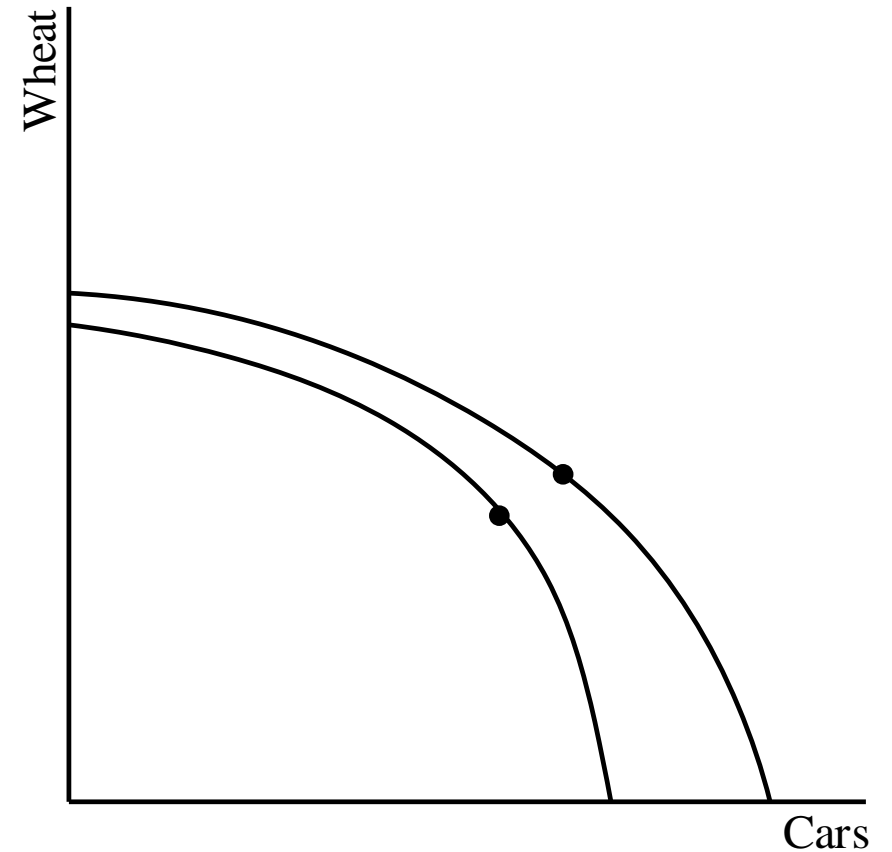
The Business Cycle

- It shows how GDP behaves over time or in the short-run
 - Expansion (booms)
 - Recession (bust)
- Economic growth is the long-term trend, which is the average growth of the economy over multiple business cycles.



Shifting the PPF

- Long-term economic growth is measured by the annual percentage increase in the value of GDP.
- It can be illustrated using the concept of the production possibilities frontier.
- Over time, as the amounts of available resources change or production technology advances, the shape and placement of the PPF can change.



Summary

- The national accounting system is based in the circular flow characteristics of economic activity.
- Economic activity is measured by GDP.
- GDP is the market value of all final goods and services produced in a country within a certain time period.
- Thus, everyone's expenditure must be someone else's income.
- Accordingly, GDP can be calculated using the income, expenditure, and value-added approach.
- GDP as a measure is often criticized for not accurately measuring improvements in quality of life and living standards, but despite this criticism, it is still a good proxy measure for many things.