

# Macroeconomics

Class 1.

Measurement and Calculation of GDP

# We need Macro Analysis...

- *Micro Analysis studies separate agents and separate markets.*
- ***Macro Analysis studies system of the markets as a whole and allows to reveal some problems not covered by Micro Analysis.***
- Such problems have “macroeconomic” nature.
- The starting point is to measure and to determine some macro indicator.

# What is National Income Accounting?

- ***National income accounting*** – a set of rules and definitions for measuring economic activity in the aggregate economy – that is, in the economy as a whole.

# What is GDP?

- **Gross Domestic Product** (aka **GDP**) is the total market value of all final goods and services produced in an economy in a one-year period.
- It is the single most-used economic measure used *to make comparisons among countries and to measure economic welfare over time*.
- GDP should not be confused with **Gross National Product** (aka **GNP**) that is the aggregate final output of citizens and businesses of an economy in one year.
- In order to receive GNP from GDP, we must add the foreign income of our citizens and subtract the income of residents who are not citizens.
- GDP is a measure of final output per year – it is a *flow* concept, not a *stock* (an amount at a particular moment in time).

# GDP as the Indicator of the Production of Final Goods

- GDP counts final output but not intermediate goods.
- **Final output** – goods and services purchased for final use.
- **Intermediate products** are used as inputs in the production of some other product.
- Counting the sale of final goods and intermediate products would result in double and triple counting.

# What is the Value Added Approach?

- To eliminate intermediate goods is to follow the *value added approach*.
- **Value added** is the increase in value that a firm contributes to a product or service.
- It is calculated by subtracting intermediate goods from the value of its sales.

# The Example of the Use of the Value Added Approach (production and sales of ice cream)

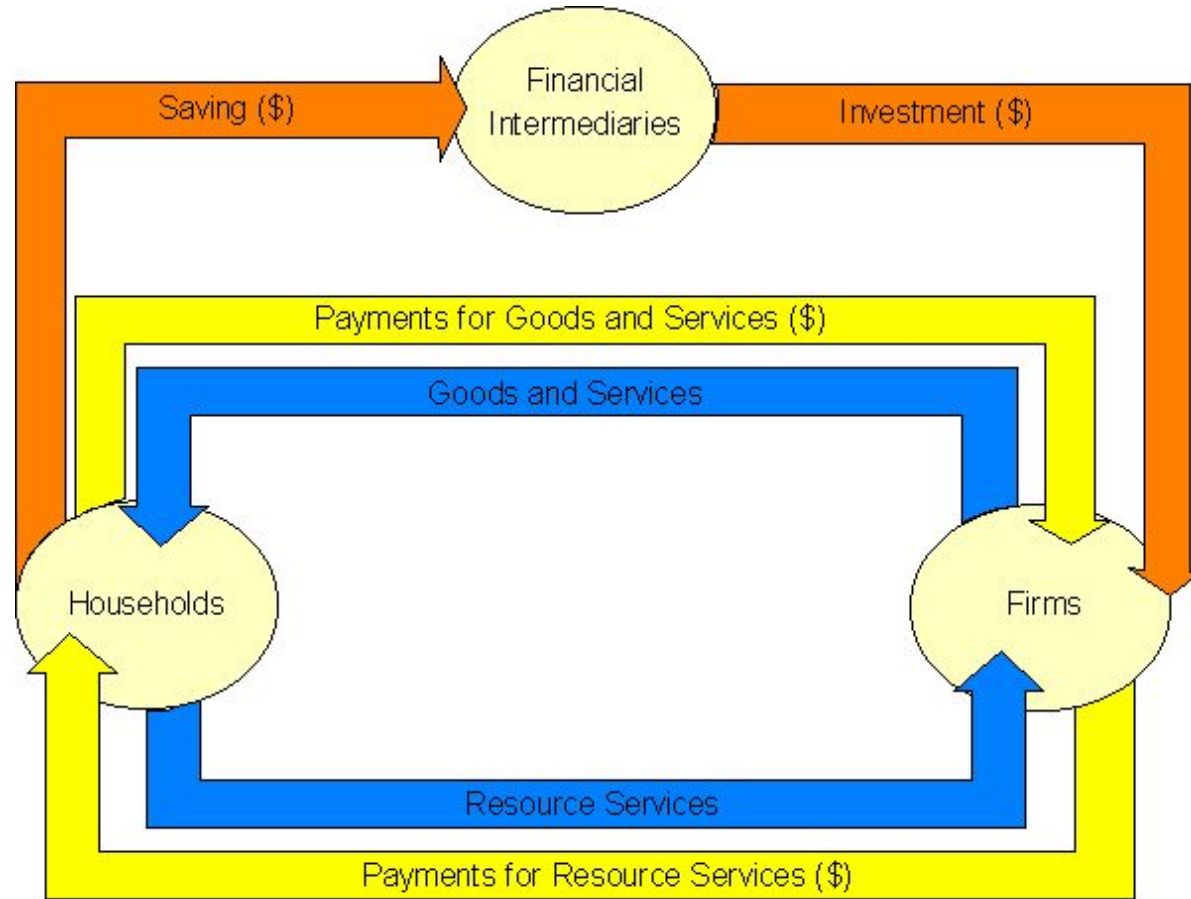
<b>Participants</b>	<b>Cost of Materials</b>	<b>Value of Sales</b>	<b>Value Added</b>
Farmer	\$ 0	\$ 100	\$ 100
Cone factory and ice cream-maker	100	250	150
Middleperson	250	400	150
Vendor	400	500	100
Totals	\$ 750	\$1,250	\$500

# The Methods of Calculating GDP

- There are three essential methods of calculating GDP: the value added (or product) approach, the expenditure approach and the income approach.
- The basic principle is that the equality of output and income is an accounting identity in the national income accounts.
- The identity can be seen in the circular flow of income in an economy.



# Perhaps, many students remember about the Circular Flow Model...



# The Expenditure Approach

- GDP is equal to the sum of the four categories of expenditures.
- $GDP = C + I + G + (EX - IM)$

# The equality of leakages and injections as a condition of macroeconomic equilibrium

- In the closed economy without the government:

$$S = I$$

- In the closed economy with the government:

$$S + T = I + G$$

- **In the open economy with the government:**

$$**S + T + IM = I + G + EX**$$

# The Factor Income Approach: the Basic Foundations

- Firms make payments to households for supplying their services as factors of production.
- **National income** is the total income earned by citizens and businesses of a country.
- It consists of employee compensation, rent, interest, and profits.
- When we add indirect taxes (less subsidies) and depreciation to nations income, we have GDP.

# Equality of Income and Expenditure

- Income and expenditures must be equal because of the rules of double-entry bookkeeping.
- The national income accounting identity allows GDP to be calculated either by adding up all values of final output or by adding up the values of all earnings or income.

# Exercise #1

- In 2019, Cocofarm Ltd. produced 4000 coconuts. Cocofarm Ltd. hired labor for 800 (EURO), leased machines for 200, and paid land rent of 200. It sold 5000 coconuts, for which it took 1000 out of its inventories from the previous year – 2018 - (the per unit production costs were 0.30 in the previous year). Cocofarm Ltd. sold its entire production for 0.50 per coconut to Brounty Inc., which produced 5000 coconut cream bars. For that purpose, Brounty Inc. hired labor of 500, leased machines for 1500, imported milk from Switzerland for 500. Brounty Inc. could, however, sell only 4000 of its coconut cream bars for 1.10 to the Pirate Beach Bar. The Pirate Beach Bar sold all of the 4000 coconut cream bars for 2.00 each at Mahijo Beach, paying 1200 for waiters, 800 to the community owning the beach, and 200 in order to lease machines.
- ***Determine GDP via the Product, Expenditure and Income Approach!***

# Revenue, costs, and profit of Cocofarm Ltd.

- Cocofarm Ltd.:

**Revenue**  $5000 \cdot 0.50 - 0.3 \cdot 1000 = 2200$

## **Costs**

Labor = 800

Capital = 200

Land = 200

Interm. materials = 0

**Profit** = 1000

*Think of inventory investment like buying/selling from inventory at production costs.*

# Revenue, costs, and profit of Brounty Inc.

- Brounty Inc.:

**Revenue**  $4000 \cdot 1.10 + 1000 \cdot 1.00 = 5400$

## **Costs**

Labor = 500

Capital = 1500

Land = 0

Interm. Materials =  $2500 + 500 = 3000$

**Profit** =  $5400 - 5000 = 400$



# Revenue, costs, and profit of Pirate Beach Bar

- Pirate Beach Bar:

**Revenue**  $4000 \cdot 2.00 = 8000$

## **Costs**

Labor = 1200

Capital = 200

Land = 800

Interm. materials = 4400

**Profit** = 1400

# Income Approach

	Cocofarm Ltd.	Brounty Bars Inc.	Pirate Beach Bar	Total
Labor	800	500	1200	2500
Land	200	0	800	1000
Capital	200	1500	200	1900
Profits	1000	400	1400	2800
<i>GDP</i>				<b>8200</b>

# Product Approach

	Cocofarm Ltd.	Brounty Bars Inc.	Pirate Beach Bar	Total
Value of goods produced	2200	5400	8000	15600
Intermediate goods	0	3000	4400	7400
<i>Value added</i>	<i>2200</i>	<i>2400</i>	<i>3600</i>	<b><i>8200</i></b>

# Expenditure Approach

	Cocofarm Ltd.	Brounty Bars Inc.	Pirate Beach Bar	Total
C	0	0	8000	8000
I	-300	1000	0	700
NX	0	-500	0	-500
<i>GDP</i>				<b>8200</b>

# Exercise #2

- Milky Ltd produced 1000 liters of milk, all produced is sold for 100 rubles. per liter to the company Production Ltd. At Milky Ltd, wage payments are equal to 20,000 rubles, equipment rental - 30,000 rubles, rent - 15,000 rubles.
- Production Ltd buys all of these products at the indicated price and manufactures on this basis 1000 liters of kefir, imports 40,000 rubles of ferments from Estonia, pays wage in the amount of 20,000 rubles, equipment rental of 25,000 rubles, and land rent of 15,000 rubles. This firm sells 700 liters of kefir to trading company Trade Inc. at a price of 400 rubles for 1 liter.
- Trade Inc. sells all these products to consumers at a price of 600 rubles for 1 liter. It pays wage in the amount of 40,000 rubles, rents equipment in the amount of 35,000 rubles, pays rent in the amount of 25,000 rubles.
- ***Calculate GDP by three methods!***

# Homework #1

In 2019, Johnson Ltd. produced 1,400 kg of fish, and price of 1 kg was equal to 100 rubles. This company hired labor for 15,000 rubles, leased machines for 8,000 rubles, and paid land rent of 7,000 rubles.

Johnson Ltd. sold all output to Paulson Ltd.

The latter company produced 1,400 kg of fish cake using this fish and imported potatoes from Brazil for 9,000 rubles.

Paulson Ltd. paid 4,000 rubles for employees' activity and 15,000 rubles for leased machines.

This producer of fish cake sold 1,000 kg for 300 rubles per 1 kg to Martin Inc. that is the large retailer.

This outlet chain sold this product at a price of 900 rubles.

The wage bill of Martin Inc. is 160,000 rubles, cost of leased machines = 20,000 rubles, cost of used land = 220,000 rubles.

***Determine GDP via the Product, Expenditure and Income Approach!***

# Homework #2

- We know that: gross investment = 55, wages = 218, income of entrepreneurs and owners from participation in production = 166, no indirect taxes, net exports = 9, government purchases = 90, drug traffickers' income from drug resale = 23, consumption = 260.
- ***Calculate GNP and depreciation amount.***