**University of Macerata**
**Economics - A.Y. 2021/2022**
**Dr. Mattia Tassinari**

- Introductory concepts of Macroeconomics

REF. Chapter 19.A pp. 367-377

- Measuring Economic Activity

REF. Chapter 20

# Introduction to Macroeconomics

- Concepts and fundamental problems of macroeconomics.
- Real growth. Economic cycle. Unemployment. Inflation.
- International relations.
- Macroeconomic policy tools.

# Macroeconomics

Macroeconomics is the study of an economy as a whole (refers to macro-aggregates):

- Functioning of the **economic system** as a whole
- **forces** that influence businesses, consumers and workers (as a whole).

The recurring topics concern:

- **economic cycles**, i.e. short-term fluctuations in output, employment and prices (with a given stock of capital, technology, … potential output)
- **economic growth**, i.e. the long-term trends of output and wealth

# The main issues studied by macroeconomists:

- How can **economic growth** be improved (GDP increases)?
- How can **unemployment** (the number of people looking for a job but not finding it) be reduced?
- What are the causes of **inflation** (a percentage increase in the general price level) and how can it be fought?

# Keynes: the founding father of Macroeconomics

In *The general theory of employment, interest and money* (1936), Keynes lays the foundation for the theory based on the concept of **aggregate demand**, explaining the changes in the overall level of economic activity as observed during the **Great Depression**.

K. argues that policies designed to **stimulate demand** in times of unemployment, for example by increasing public spending, are justifiable.

In this context, the market left free to operate is seen as incapable of leading to full employment, and state intervention is considered necessary to stimulate demand for goods and services and increase employment.

These arguments find concrete confirmation in the results of the **New Deal** policy, launched in the same years by President Roosevelt in the United States.

# Macroeconomic policies

| Objectives |
| --- |
| **Output:** |
| High level and rapid growth of output |
| **Employment:** |
| High level of employment with low involuntary unemployment |
| **Stable prices** |
| **Instruments** |
| **Monetary policy:** |
| Buying and selling bonds, regulating financial institutions |
| **Fiscal policy:** |
| Government expenditures |
| Taxation |

**TABLE 19-1. Goals and Instruments of Macroeconomic Policy**

# 1. The trend of the real gross domestic product


**FIGURE 19-1.** Growth Rate of U.S. Real Gross Domestic Product, 1929–2008

Real GDP is the most comprehensive measure of an economy's output. This figure shows the rate of growth from one year to the next. Note the string of negative growth rates in the Great Depression of the 1930s. Also, we see the Great Moderation of the 1990s, in which output was less volatile than in earlier periods.

# Actual and Potential GDP

Potential GDP identifies the maximum productive capacity of the economy (maximum quantity that can be produced), when the workforce and the stock of capital are best used. The potential **production** is given both by the available inputs (work, land, machines, etc ...), and by the technological efficiency (remember the *production possibilities frontier*).

- When actual GDP is lower than the potential, there is **unemployment**. Any greater demand for goods or services compared to the available supply tends to determine a greater use of the production capacity, which is still available (=> not higher prices)
- When the demand for goods and services grows beyond the potential GDP, the country uses all the production capacity available (even beyond its *natural* availability: for example, *overtime* for workers); the scarcity of supply increases prices (**inflation**).

# Actual and Potential GDP in the US

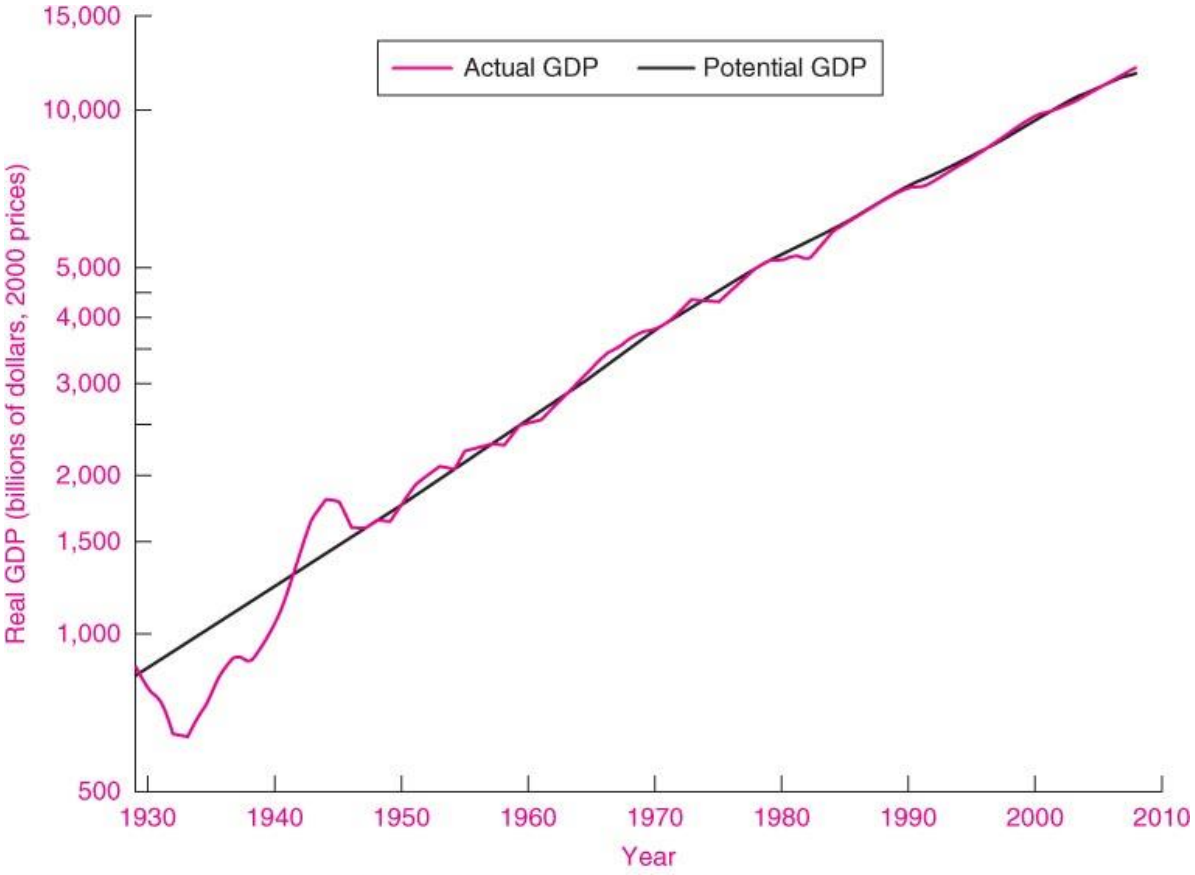



**FIGURE 19-2.** Actual and Potential GDP in the United States

Business cycles occur when actual output departs from its potential. The smooth blue line shows potential output over the period 1929–2008. Potential output has grown about 3.4 percent annually. Note the large gap between actual and potential output during the Great Depression of the 1930s.

# 2. Unemployment rate

Unemployment rate = (Unemployed/labor force)%

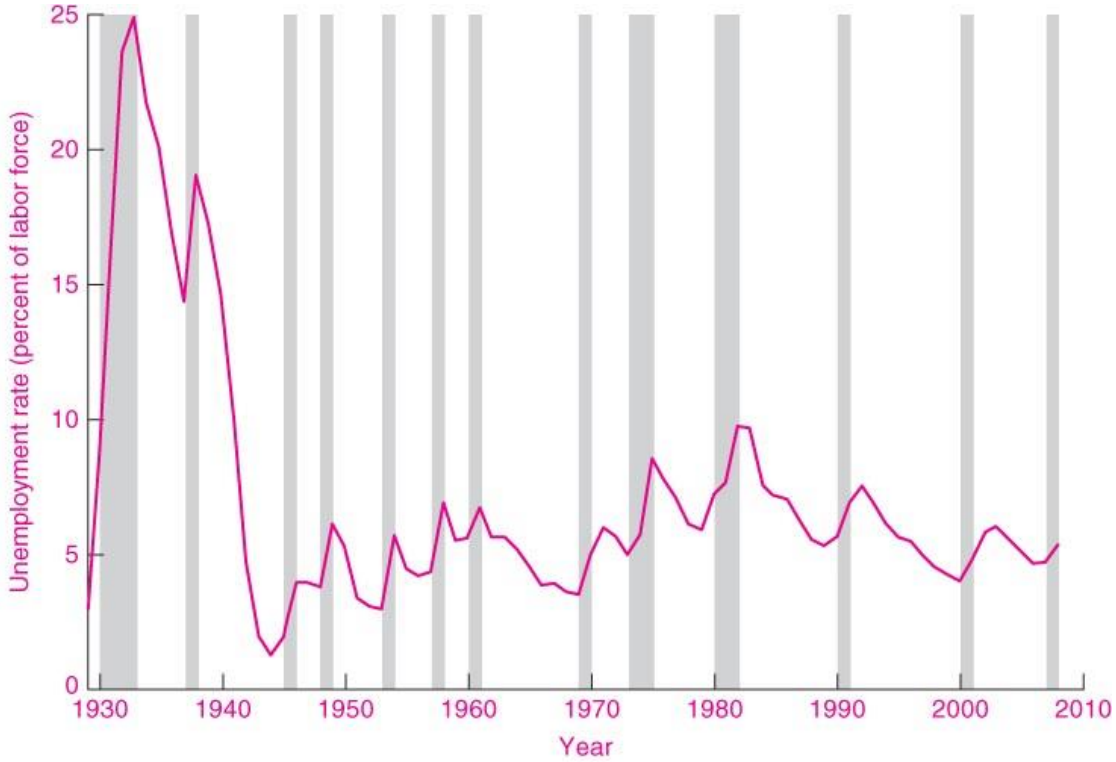



**FIGURE 19-3.** Unemployment Rises in Recessions, Falls during Expansions

The unemployment rate measures the fraction of the labor force that is looking for work but cannot find work. Unemployment rises in business-cycle downturns and falls during expansions. Shaded regions are National Bureau of Economic Research (NBER) recessions.

# 3. Inflation - USA, 1929-1999

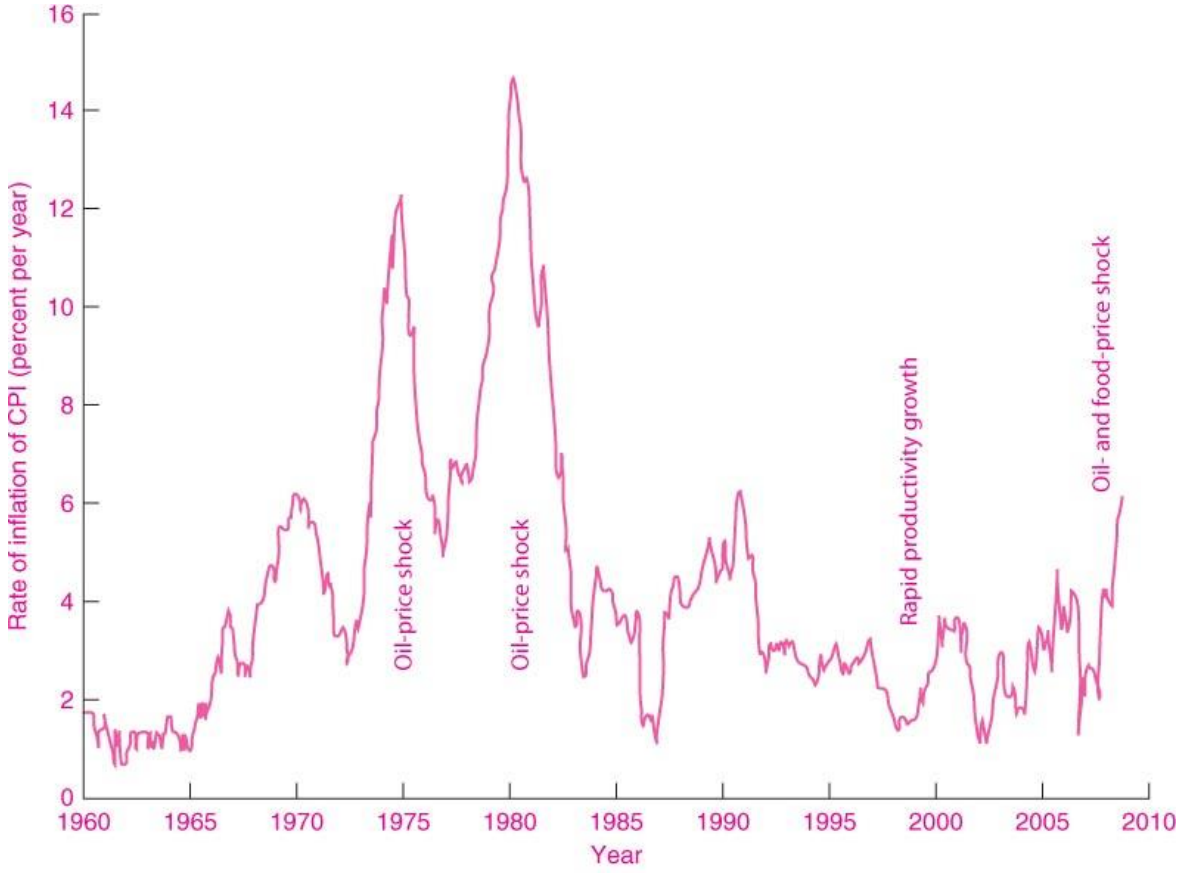



**FIGURE 19-4.** U.S. Consumer Price Inflation, 1960–2008

The rate of inflation measures the rate of change of prices from one year to the next; here we see the rate of inflation as measured by the consumer price index (CPI). Most inflationary episodes have been associated with shocks to oil or food prices. Note that inflation has moved in a narrow corridor since the mid-1980s.

# International trade relations

In pursuing their macroeconomic objectives (growth, employment, price stability), nations must consider the links that exist with other national economies:

- trade (exports, imports)
- trading of financial assets (capital movements, exchange rates of currency)

Impact on rich and poor countries: e.g. export of competitive products abroad increases domestic income; global recessions reduce national export and income; lack of skills, capital, knowledge and technology to be competitive make foreign productions more convenient respect to the national ones increasing import and reducing national income and employment; low financial capitals for investments in education, skills, productive capacity, technology, reduce national productivity and possibilities of creating income and employment.

Specific policies can be implemented to mitigate these effects:

- **Trade policies** (duties, quotas, regulations affecting exports and imports )
- **International finance management** (exchange rates)

# Macroeconomic policy instruments

## Fiscal policy

It concerns the using of **taxes** (which act as incentives / disincentives for work, investments, consumption and savings) and **public spending** (purchases by the PA and public transfers, which act as incentives / disincentives for consumption)

## Monetary policy

It concerns the cost of money (**interest rates**) and the **amount of money in circulation**. It acts as an incentive / disincentive to investments, savings and consumption (e.g. in the case of high utilization of production capacity – i.e. shortage of supply and inflation – the central bank can raise interest rates in order to make saving more convenient, reducing consumption and increasing investments in production capacity).

# SUMMARY

**Macroeconomics** is concerned with the following aggregate economic variables and the issues associated with them:

Short-term fluctuations (i.e. economic cycles) of:

- Aggregate production (exploitation of potential output)
- Employment / Unemployment
- Inflation / Deflation (change in aggregate prices)

Long-term trends in output

- Economic growth (increasing of potential output, e.g. stock of capital, technology)

**Macroeconomic policy** has in particular objectives related to:

- Growth of aggregate production (expansion of production possibilities)
- Reduction of unemployment
- Price stabilization (control of inflation)

Instruments:

- Monetary policy: control of the money supply to influence interest rates
- Fiscal policy: use the levers of public spending and taxation

**University of Macerata**
**Economics - A.Y. 2021/2022**
**Dr. Mattia Tassinari**

# - Measuring Economic Activity

REF. Chapter 20

# Measuring Economic Activity

- Gross domestic product. Measurement methods.
- The added value.
- Domestic and national. Gross and net.
- Real value and nominal value.
- Composition of GDP.
- Price indices.

# National accounts

(«Accounts of national income and product»)

The National Accounting is the set of statistics, held at national level (ISTAT) that allow to measure and evaluate the economic activity of the nation. This is the quantitative and systematic description of the flows that exist between homogeneous categories of operators.

The main indicator is GDP (Gross Domestic Product), which is the total market value of the final goods and services produced within a nation during a given year.

GDP is equal to the sum of the money value of all:

- consumption (C)
- gross investments (I)
- government purchases of goods and services (G)
- net exports (X)

# The measurement of GDP

To understand how GDP is calculated, let's proceed initially by setting **restrictive assumptions**:

- Closed economy (no trade with foreign countries)
- There is no state intervention (no public spending).
- There are no investments, firms do not purchase durable productive factors necessary to carry out production

**Purchasers** are beneficiaries of economic activity and holders of the factors of production (eg. labor).
**Producers** are transformation "boxes". There is vertical integration (all activities are managed internally, there are no intermediate goods, only final goods).

GDP = C (market prices X quantities sold)

**GDP equals ...**
**Purchases =** the sum of the annual flow of final goods and services
**Costs/Income =** the costs of doing business / the earnings that households receive from firms

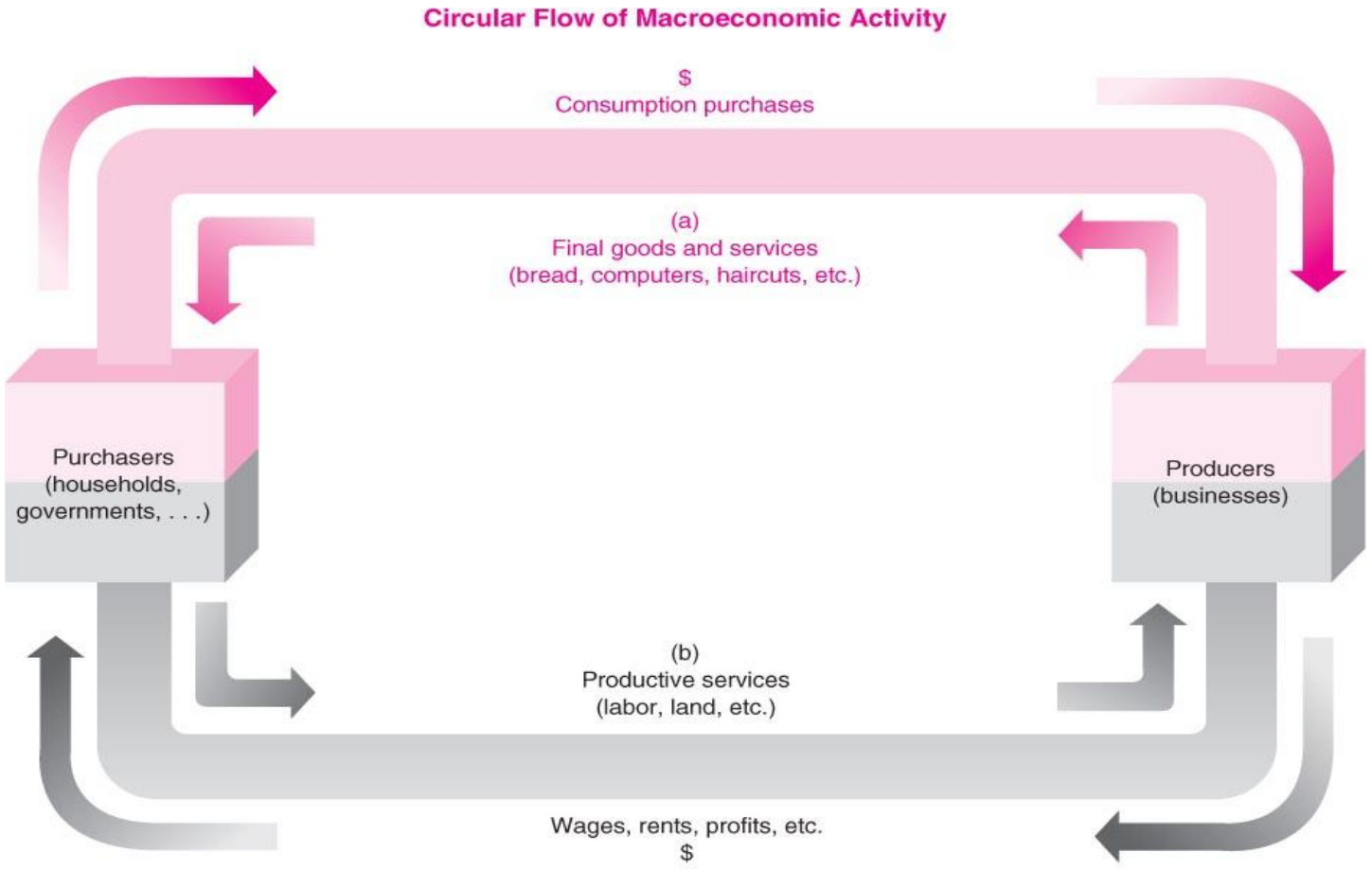



**FIGURE 20-1. Gross Domestic Product Can Be Measured Either as (*a*) a Flow of Final Products or, Equivalently, as (*b*) a Flow of Earnings or Incomes**

The lower loop represents the money value of the remuneration of the factors of production used by the enterprises: the wage is the remuneration of the employees of the enterprise; profit is the remuneration of the entrepreneur of the enterprise; the rent is the income received as a return on the company's capital; such remuneration includes the taxes paid to the State ... this is the value of all the costs incurred by the companies for the realization of the final goods and services, but they are also equivalent to all the income received in the economic system by the subjects who have lent productive factors, which will be in turn spent on consumption (upper loop).

# 2 equivalent way to calculate GDP

- **Flow-of-Product Approach:** summation ($\Sigma$) of the money value of the flow of final products produced by the nation (*the upper loop*).

- **Earnings or Income Approach (also called the Cost approach):** $\Sigma$ of the total of factor earnings (wages, interest, rents, and, profits); that are the $\Sigma$ of costs of producing society's final products (*the lower loop*)

Data to calculate GDP (and other National accounts) can be derived from Business Accounts (=> Income Statement and the Balance Sheet): an example.

**(a) Income Statement of Typical Farm**

| Output in Farming | | Earnings | |
|---|---|---|---|
| Sales of goods (corn, apples, etc.) | $1,000 | Costs of production: | |
| | | Wages | $ 800 |
| | | Rents | 100 |
| | | Interest | 25 |
| | | Profits (residual) | 75 |
| Total | $1,000 | Total | $1,000 |

**(b) National Product Account (millions of dollars)**

| Upper-Loop Flow of Product | | Lower-Loop Flow of Earnings | |
|---|---|---|---|
| Final output (10 × 1,000) | $10,000 | Costs or earnings: | |
| | | Wages (10 × 800) | $ 8,000 |
| | | Rents (10 × 100) | 1,000 |
| | | Interest (10 × 25) | 250 |
| | | Profits (10 × 75) | 750 |
| GDP total | $10,000 | GDP total | $10,000 |

**TABLE 20-1. Construction of National Product Accounts from Business Accounts**

# Removal of some restrictive assumptions: **the intermediate goods**

The economy is closed, there is no state intervention, but there is no perfect vertical integration: some companies buy factors of production from other companies (e.g. raw materials or semi-finished products).

GDP measures the value of **final** goods and services, ie **intermediate goods**, ie those used to produce other goods, are not included in the calculation.
In the **cost/income approach**, it is therefore necessary to include only the **added value** of the company, ie the difference between the sales and the purchases of materials and services purchased by other companies.
Therefore, only the costs of production factors that **do not involve payments to other companies** (eg wages, salaries, annuities, interest, profits and dividends) (written in the income statement of the companies) are considered.

Attention: intermediate goods are not durable goods, with a multi-year duration (such as machinery), whose value remains in the company (as capital) and which the company has purchased (investment) from other companies as a final good).

To **avoid double counting** of intermediate products, we calculate value added at each stage of production. This involves subtracting all the costs of materials and intermediate products bought from other businesses from total sales. Note that every intermediate-product item both appears in column (1) and is subtracted in the next stage of production in column (2). (By how much would we overestimate GDP if we counted all receipts, not just value added? The overestimate would be 186 cents per loaf).

**Bread Receipts, Costs, and Value Added (cents per loaf)**

| Stage of production | (1) Sales receipts | (2) *Less:* Cost of intermediate products | | (3) Value added (wages, profits, etc.) (3) = (1) − (2) |
|---|---|---|---|---|
| Wheat | 23 | 0 | = | 23 |
| Flour | 53 | 23 | = | 30 |
| Baked dough | 110 | 53 | = | 57 |
| Final product: bread | 190 | 110 | = | 80 |
| Total | 376 | 186 | | 190 (sum of value added) |

**TABLE 20-2.** GDP Sums Up Value Added at Each Production Stage

# Removal of some restrictive assumptions: **the investments**

Companies carry out investment activities in **durable goods** (construction, equipment, software), which contribute to the realization of the current and future production of the companies.

The resources allocated to these goods and their value must be considered in the GDP.

$$GDP = C + I$$

**Purchases =** the sum of the annual flow of final goods and services and investments of enterprises

**Costs/Income =** the costs of doing business / the earnings that households receive from firms (or summation of value added at each stage of production)

Note:
- Investments are paid with savings (part of income not used for consumption).
- Inventory, even if it is production not sold as a final good, is included in GDP as "investment in inventories", goods actually made during the year, available to companies, whose production required the payment of wages (counted in the income approach).

# Removal of some restrictive assumptions: **the economy is open and there is state intervention.**

GDP is equal to the sum of the money value of consumption (C), gross investments (I), government purchases of goods and services (G), net exports (X)

$$GDP = C + I + G + X$$

- citizens can purchase goods from abroad (M = imports)
- domestic companies can sell goods and services abroad (E = exports)
- Net exports are given by E - M = X
- G includes the expenditure of the PA to purchase consumer goods and to make investments. Transfer Payments are not considered (payments without counterpart; eg subsidies, pensions,…).

# Summary

| Product Approach | Earnings Approach |
|---|---|
| **Components of gross domestic product:** | **Earnings or income approach to gross domestic product:** |
| Consumption ($C$) | Compensation of labor (wages, salaries, and supplements) |
| + Gross private domestic investment ($I$) | + Corporate profits |
| + Government purchases ($G$) | + Other property income (rent, interest, proprietors' income) |
| + Net exports ($X$) | + Depreciation |
| | + Net production taxes |
| **Equals: Gross domestic product** | **Equals: Gross domestic product** |

**GDP** measures the money value of all goods and services produced in an economy in a given year. This production is carried out by companies and includes the final goods and services consumed by private individuals (without intermediate goods purchased by other companies), durable goods, which form the capital of private companies (=> investments, including inventories), goods purchased both as final consumption and as investment by the PA, goods exported abroad minus those imported.

Basically, all the annual production (**purchases**) of a nation is included in the value of GDP and this value in turn corresponds to the **earnings** or **income** paid for the production factors (which do not involve payments to other companies => **value added**), i.e. exactly the **costs** incurred by companies to achieve production, including for example the remuneration of the entrepreneur (profits): in this way the value of the production achieved (costs and value added / supply) always coincides with the production sold (expenditure / demand).

# Gross Domestic Product (GDP) vs. Gross National Product (GNP)

While **GDP** is the output produced with labor and capital located inside the country, **GNP** is the total output produced with labor or capital owned by residents.

For example, some of the U.S. GDP is produced in Honda plants that are owned by Japanese corporations operating in the U.S. The profits from these plants are included in U.S. GDP but not in U.S. GNP because Honda is a Japanese company.

Similarly, when an American economist flies to Japan to give a paid lecture, payment for that lecture would be included in Japanese GDP and in American GNP.

# Gross Domestic Product (GDP) vs. Net Domestic Product (NDP)

GDP includes gross investment, which is net investment plus depreciation (the decrease in monetary value of an asset over time, due to use or obsolescence). As a part of the investment is used during the years and will go to replace old or eliminated goods, a better measure would include only net investment in total output.

By subtracting depreciation from GDP we obtain **net domestic product** (NDP).

However depreciation is somewhat difficult to estimate, whereas gross investment can be estimated fairly accurately, thus we use commonly GDP instead of NDP.

# Real vs. Nominal GDP: "Deflating" GDP by a Price Index

We can measure the GDP for a particular year using the actual market prices of that year; this gives us the **nominal GDP**, or GDP at current prices ($\Sigma$ Pt * Qt). But we are usually more interested in determining what has happened to the **real GDP**, which is an index of the volume or quantity of goods and services produced. Real GDP is calculated by tracking the volume or quantity of production after removing the influence of changing prices or inflation.

REAL GDP measures GDP using a fixed or unchanged average price of a basket of goods and services. Changes in real GDP measure the actual, real growth of wealth produced ($\Sigma$ $P_0$ * $Q_t$).

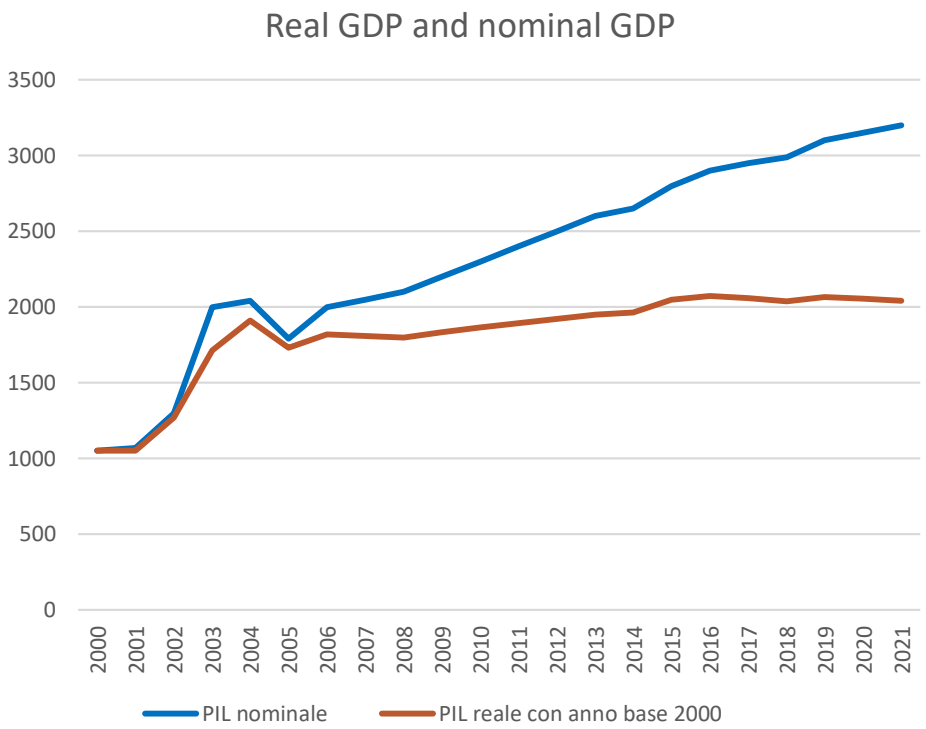
The difference between nominal GDP and real GDP is the price of GDP, sometimes called the **GDP deflator**: nominal GDP/real GDP = ($\Sigma$ Pt * Qt)/$\Sigma$ P0 * Qt)

The base year is the year in which we measure prices.

We can, for index purposes, set the price index for the first year (the base year) at P0=1. This means that output will be measured in prices of the base year.

# Real and nominal GDP: a numerical example

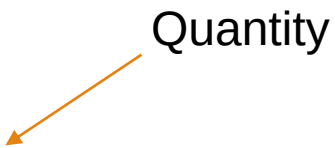
| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Years | Quantity produced in the economy (thousands of tons) | Current year price | Nomina GDP (1x2) | Real GDP – base year 2000 (1 x average price year 2000) | Deflator or Price Index (Current Year Price / Base Year Price) |
| 2000 | 35,00 | 30,00 | 1050 | 1050,00 | 1,0000 |
| 2001 | 35,08 | 30,50 | 1070 | 1052,46 | 1,0167 |
| 2002 | 42,35 | 30,70 | 1300 | 1270,36 | 1,0233 |
| 2003 | 57,14 | 35,00 | 2000 | 1714,29 | 1,1667 |
| 2004 | 63,75 | 32,00 | 2040 | 1912,50 | 1,0667 |
| 2005 | 57,74 | 31,00 | 1790 | 1732,26 | 1,0333 |
| 2006 | 60,61 | 33,00 | 2000 | 1818,18 | 1,1000 |
| 2007 | 60,29 | 34,00 | 2050 | 1808,82 | 1,1333 |
| 2008 | 60,00 | 35,00 | 2100 | 1800,00 | 1,1667 |
| 2009 | 61,11 | 36,00 | 2200 | 1833,33 | 1,2000 |
| 2010 | 62,16 | 37,00 | 2300 | 1864,86 | 1,2333 |
| 2011 | 63,16 | 38,00 | 2400 | 1894,74 | 1,2667 |
| 2012 | 64,10 | 39,00 | 2500 | 1923,08 | 1,3000 |
| 2013 | 65,00 | 40,00 | 2600 | 1950,00 | 1,3333 |
| 2014 | 65,43 | 40,50 | 2650 | 1962,96 | 1,3500 |
| 2015 | 68,29 | 41,00 | 2800 | 2048,78 | 1,3667 |
| 2016 | 69,05 | 42,00 | 2900 | 2071,43 | 1,4000 |
| 2017 | 68,60 | 43,00 | 2950 | 2058,14 | 1,4333 |
| 2018 | 67,95 | 44,00 | 2990 | 2038,64 | 1,4667 |
| 2019 | 68,89 | 45,00 | 3100 | 2066,67 | 1,5000 |
| 2020 | 68,48 | 46,00 | 3150 | 2054,35 | 1,5333 |
| 2021 | 68,09 | 47,00 | 3200 | 2042,55 | 1,5667 |




Nominal GDP grows faster than real GDP not as a result of an increase in the quantities produced in the economy, but as a result of the increase in prices from one year to the next (inflation).

# Real and nominal GDP: in-depth analysis of the formulas

Let's calculate real GDP from nominal GDP ...
Nominal GDP = Quantity x Current year price
Real GDP = Quantity x Base Year Price




=> Real GDP = (Nominal GDP / Current Year Price) x Base Year Price
=> Real GDP = Nominal GDP x (Base Year Price / Current Year Price)
=> Real GDP = Nominal GDP / (Current year price / Base year price)

(Current year price / Base year price) = GDP DEFLACTOR

=> Real GDP = Nominal GDP / DEFLACTOR

The DEFLACTOR is a Price Index Number given by (Current Year Price / Base Year Price). Its meaning can be explained in full starting from the example with base year 2000 (P = 30): we calculate the Index Number of prices for the year 2001 (P = 30.5) with the proportion:

30: 1 = 30.5: X => X = (30.5 x 1) / 30 = 1.0167

The X (index number) tells you how much is the 2001 price compared to the 2000 price (base year) and it is exactly the ratio [Current year price / Base year price] that is the DEFLACTOR of nominal GDP for that current year, useful to calculate real GDP

| Date | (1) Nominal GDP (current $, billion) | (2) Index number of prices (GDP deflator, 1929 = 1) | (3) Real GDP ($, billion, 1929 prices) $(3) = \frac{(1)}{(2)}$ |
|---|---|---|---|
| 1929 | 104 | 1.00 | $\frac{104}{1.00} = 104$ |
| 1933 | 56 | 0.74 | $\frac{56}{0.74} = 76$ |

**TABLE 20-4.** Real (or Inflation-Corrected) GDP Is Obtained by Dividing Nominal GDP by the GDP Deflator

# Nominal GDP and inflation

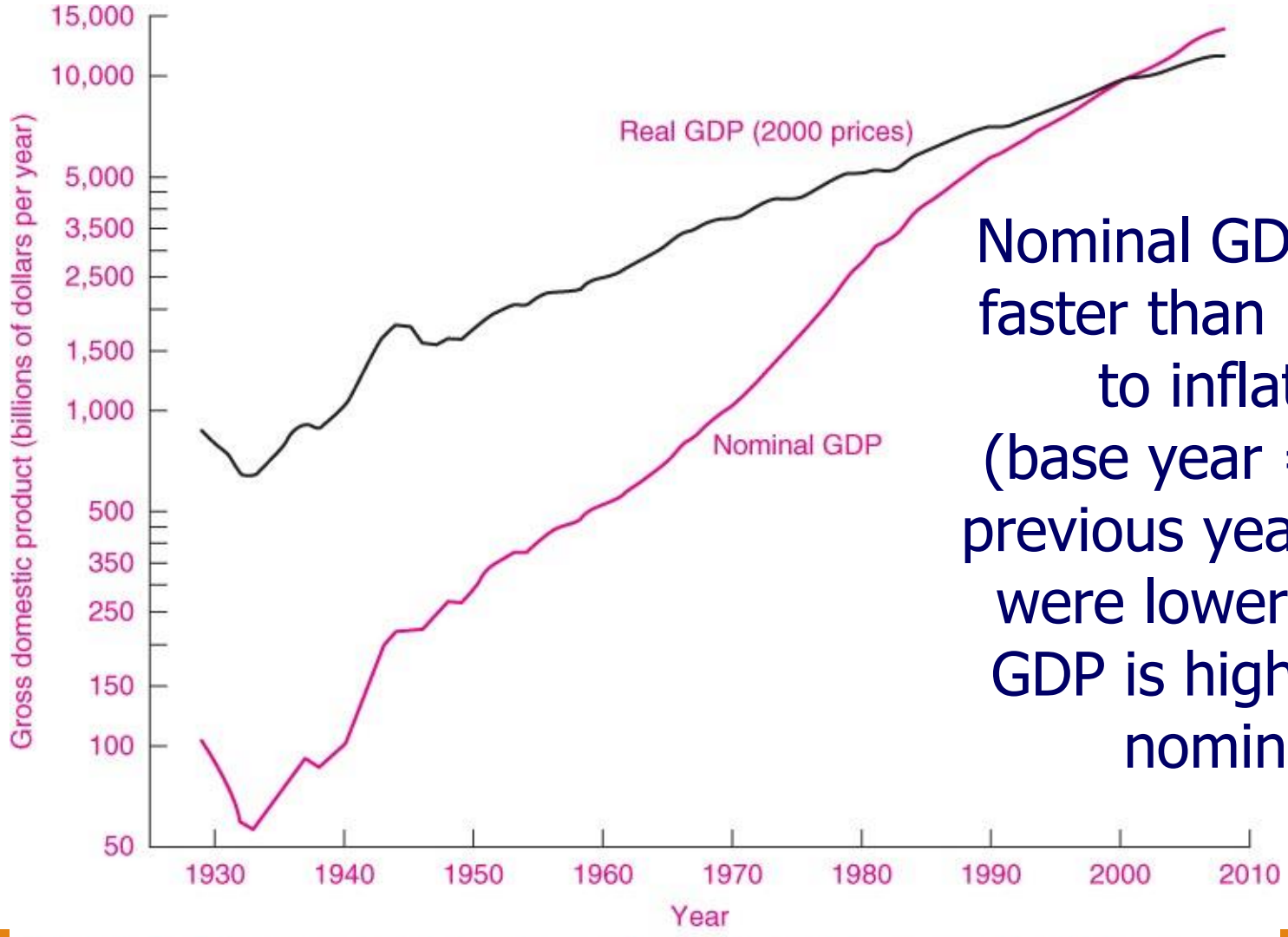



FIGURE 20-2. Nominal GDP Grows Faster than Real GDP because of Price Inflation

Nominal GDP grows faster than real due to inflation (base year = 2000; previous years prices were lower so real GDP is higher than nominal)

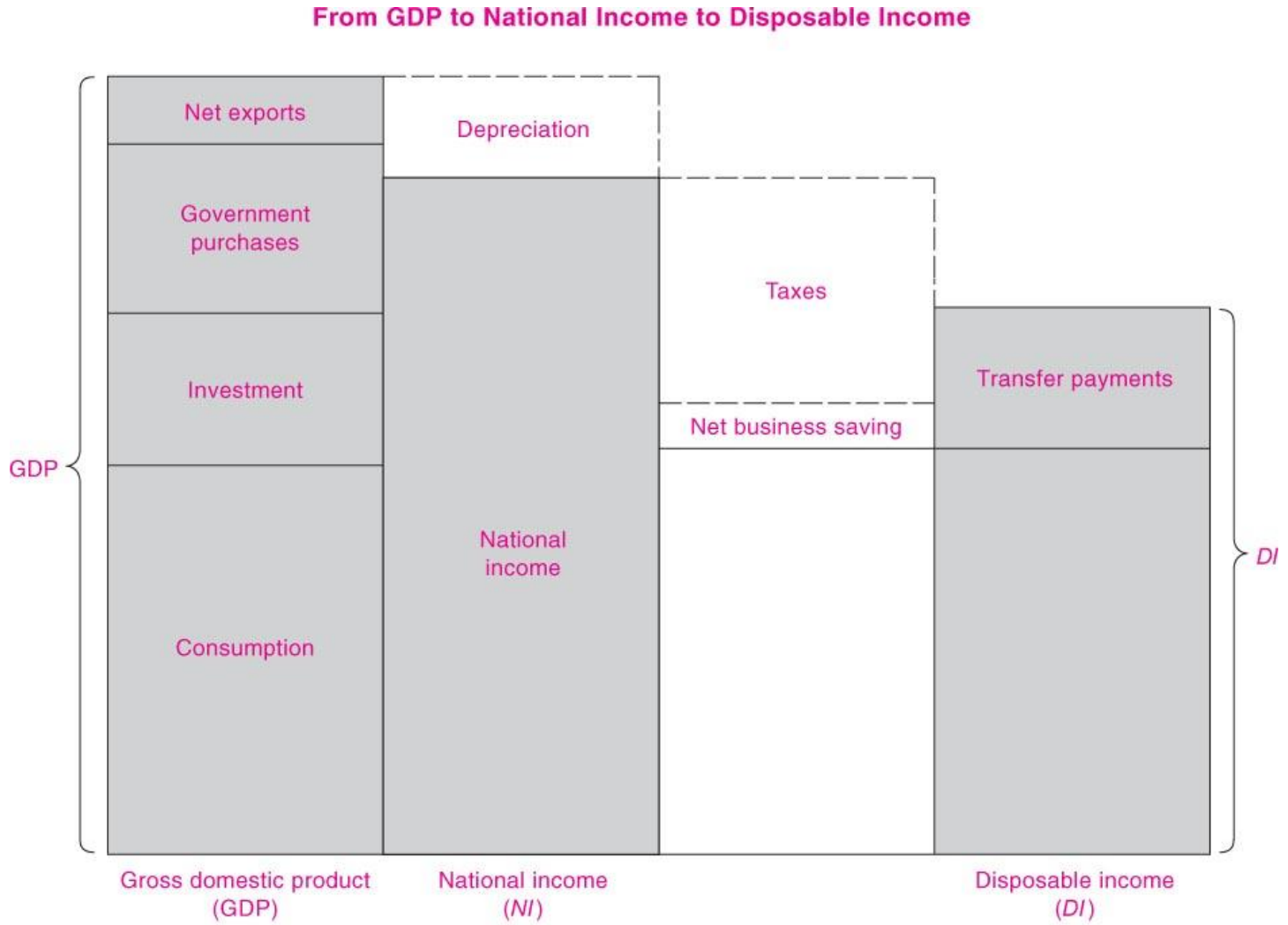



**FIGURE 20-4.** Starting with GDP, We Can Calculate National Income (*NI*) and Disposable Personal Income (*DI*)

Important income concepts are (1) GDP, which is total gross income to all factors; (2) national income, which is the sum of factor incomes and is obtained by subtracting depreciation from GDP; and (3) disposable personal income, which measures the total incomes of the household sector, including transfer payments but subtracting taxes (useful to understand variation of consumption (C) of AD)

# Price Index

A price index is a weighted average of the price of a basket of goods and services. In constructing price indexes, economists weight individual prices by the economic importance of each good. E.g. the **Consumer Price Index** (CPI) is the most widely used measure of the overall price level and measures the average price paid by urban consumers for a market basket of consumer goods and services.

**Basket of two goods (same weight)**

| month | price A | price B | Average price | Price Index |
|---|---|---|---|---|
| January | 40 | 20 | 30 | **100,0** |
| February | 40,5 | 22 | 31,25 | 104,2 |
| March | 43 | 21,2 | 32,1 | 107,0 |
| April | 42 | 23 | 32,5 | 108,3 |

# Inflation

Inflation is a rise in the general level of prices. The rate of inflation is defined as the rate of change of the general price level

Rate of inflation year $t = (Pt - Pt\text{-}1)/ Pt\text{-}1$

| Average price | Price INDEX | Rate of INFLATION |
|---|---|---|
| 30 | 100,0 | |
| 31,25 | 104,2 | 4,2 |
| 32,1 | 107,0 | 2,7 |
| 32,5 | 108,3 | 1,2 |