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## The Measurement and Structure of the National Economy

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## Agenda

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- National Income Accounting
  - Gross Domestic Product
  - Saving and Wealth
  - Real GDP, Price Indexes, and Inflation
  - Interest Rates
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## National Income Accounting

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- The national income and product accounts are an accounting framework used to measure current economic activity or GDP.
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## National Income Accounting

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- 3 different approaches give identical results:
    - **Product approach:** the dollar amount of output produced.
    - **Income approach:** the dollar incomes generated by production.
    - **Expenditure approach:** the dollar amount spent by purchasers.
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## National Income Accounting

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- Why the three approaches are equivalent:
  - Any output produced (product approach) is purchased by someone (expenditure approach) and results in income to someone (income approach).

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## National Income Accounting

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- Therefore, the fundamental identity of national income accounting is:

$$\begin{aligned} &\text{Total Production} \\ &= \\ &\text{Total Income} \\ &= \\ &\text{Total Expenditure} \end{aligned}$$

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## Gross Domestic Product

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- The **Product Approach** to measuring GDP:
  - GDP (gross domestic product) is the market value of final goods and services newly produced within a nation during a fixed period of time.

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## Gross Domestic Product

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- **Market value:** allows adding together unlike items by valuing them at their market prices.

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## Gross Domestic Product

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- **Newly produced:** counts only things produced in the given period; excludes things produced during an earlier time period.

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## Gross Domestic Product

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- **Final goods and services:** those goods and services that are not used up in the production process, i.e., are not intermediate goods.
  - Intermediate goods and services are those used up in the production of other goods and services in the same period that they themselves were produced.
  - Adding up value added works because it automatically excludes intermediate goods.

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## Gross Domestic Product

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- **Final goods and services: Two caveats**
  - Capital goods are used to produce other goods but are final goods because they are not completely used up in the same period that they are produced.
  - Inventory investment—the amount that inventories of unsold finished goods, goods in process, and raw materials have changed during the period—is also treated as a final good.

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## Gross Domestic Product

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- **GNP vs. GDP**
  - GNP (gross national product) is the output produced by domestically owned factors of production.
  - GDP is the output produced within a nation.  
 **$GDP = GNP - NFP$**
  - NFP are the net factor payments from abroad.

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## Gross Domestic Product

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- The **Expenditure Approach** to measuring GDP.
  - Measures total spending on final goods and services produced within a nation during a specified period of time.

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## Gross Domestic Product

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- The expenditure approach to measuring GDP:
  - Four main categories of spending:
    1. consumption (*C*),
    2. investment (*I*),
    3. government purchases of goods and services (*G*), and
    4. net exports (*NX*)

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## Gross Domestic Product

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- The expenditure approach to measuring GDP:

$$Y = C + I + G + NX$$

- This is known as the income-expenditure identity.

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## Gross Domestic Product

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- The expenditure approach to measuring GDP:

- Consumption: spending by domestic households on final goods and services (including imports).
  - About 2/3 of U.S. GDP.
  - Three categories:
    - Consumer durables.
    - Nondurable goods.
    - Services.

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## Gross Domestic Product

- The expenditure approach to measuring GDP:
  - Investment: spending for new capital goods (fixed investment) plus inventory investment.
    - About 1/6 of U.S. GDP.
    - Three categories:
      - Business (or nonresidential) fixed investment.
      - Residential fixed investment.
      - Inventory investment.

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## Gross Domestic Product

- The expenditure approach to measuring GDP:
  - Government purchases of goods and services: spending by the government on goods or services.
    - About 1/5 of U.S. GDP.
    - Mostly by state and local, not federal, governments.

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## Gross Domestic Product

- The expenditure approach to measuring GDP:
  - Net exports: exports minus imports.
    - Exports are goods produced in the country that are purchased by foreigners.
    - Imports are goods produced abroad that are purchased by residents in the country.

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**Table 2.1 Expenditure Approach to GDP, 2005**

	Billions of dollars	Percent of GDP
<b>Personal consumption expenditures (C)</b>	<b>8745.7</b>	<b>70.0</b>
Consumer durables	1026.5	8.2
Nondurable goods	2564.4	20.5
Services	5154.9	41.3
<b>Gross private domestic investment (I)</b>	<b>2105.0</b>	<b>16.9</b>
Business fixed investment	1329.8	10.6
Nonresidential structures	335.1	2.7
Equipment and software	994.7	8.0
Residential investment	756.3	6.1
Inventory investment	18.9	0.2
<b>Government purchases of goods and services (G)</b>	<b>2362.9</b>	<b>18.9</b>
Federal	877.7	7.0
National defense	587.1	4.7
Nondefense	290.6	2.3
State and local	1485.2	11.9
<b>Net exports (NX)</b>	<b>-726.5</b>	<b>-5.8</b>
Exports	1301.2	10.4
Imports	2027.7	16.2
<b>Total (equals GDP) (Y)</b>	<b>12487.1</b>	<b>100.0</b>

Note: Numbers may not add to totals shown owing to rounding.  
Source: Bureau of Economic Analysis Web site, www.bea.gov; Table 1.1.5, May 31, 2006.

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## Gross Domestic Product

- The **Income Approach** to measuring GDP:
  - Measures the income generated by production, including profits and taxes paid to the government.
    - National income = compensation of employees (including benefits) + proprietors' income + rental income of persons + corporate profits + net interest + taxes on production and imports + business current transfer payments + current surplus of government enterprises.

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## Gross Domestic Product

- The income approach to measuring GDP:
  - National income + statistical discrepancy = net national product (NNP).
  - NNP + depreciation (the value of capital that wears out in the period) = GNP.
  - $GNP - NFP = GDP$

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**Table 2.2** Income Approach, 2005

	Billions of dollars	Percent of GDP
Compensation of employees	7113	57.0
Proprietor's income	939	7.5
Rental income of persons	73	0.6
Corporate profits	1332	10.8
Net interest	498	4.0
Taxes on production and imports	848	6.8
Business current transfer payments	80	0.6
Current surplus of government enterprises	-11	-0.1
Total (equals National Income)	10892	87.2
Plus Statistical discrepancy	55	0.4
Equals Net National Product (NNP)	10947	87.7
Plus Consumption of fixed capital	1574	12.6
Equals Gross National Product (GNP)	12521	100.3
Less Factor income received from rest of world	508	4.1
Plus Payments of factor income to rest of world	474	3.8
Equals Gross Domestic Product (GDP)	12487	100.0

Note: Numbers may not add to totals shown owing to rounding.  
Source: Bureau of Economic Analysis Web site, www.bea.gov, Tables 1.7.5 and 1.12, May 31, 2006.

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## Gross Domestic Product

- The income approach to measuring GDP:
  - Private sector income:
    - Private sector disposable income = private sector income earned at home ( $Y$  or GDP) and abroad ( $NFP$ ) + payments from the government sector (transfers,  $TR$ , and interest on government debt,  $INT$ ) – taxes paid to government ( $T$ ).

$$Y + NFP + TR + INT - T$$

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## Gross Domestic Product

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- The income approach to measuring GDP:
  - Government sector income:
    - Government sector net income = taxes – transfers – interest payments:

$$T - TR - INT$$

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## Gross Domestic Product

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- The income approach to measuring GDP:
  - Private sector + government sector income = GNP:

$$\begin{aligned} & [ Y + NFP + TR + INT - T ] \\ & + [ T - TR - INT ] \\ & = GDP + NFP \\ & = GNP \end{aligned}$$

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## Saving and Wealth

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- **Wealth:** assets minus liabilities.
  - National wealth = sum of all household, business, and government wealth within the nation.
    - Saving by individuals, businesses, and government partially determines wealth.
  - Saving = current income – current spending.

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## Saving and Wealth

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- Measures of aggregate saving:
  - Private saving = private disposable income – consumption.

$$S_{pvt} = (Y + NFP - T + TR + INT) - C$$

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## Saving and Wealth

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- Measures of aggregate saving:
  - Government saving = net government income – government purchases of goods and services.

$$S_{govt} = (T - TR - INT) - G$$

- Government saving =  
Government receipts – government outlays =  
Government budget surplus.

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## Saving and Wealth

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- Measures of aggregate saving: National saving.
  - National saving = private saving + government saving.

$$S = S_{pvt} + S_{govt}$$

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## Saving and Wealth

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- Measures of aggregate saving: National saving.

$$\begin{aligned} S &= S_{pvt} + S_{govt} \\ &= \\ [Y + NFP - T + TR + INT - C] \\ &+ \\ [T - TR - INT - G] \end{aligned}$$

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## Saving and Wealth

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- Measures of aggregate saving: National saving.

$$\begin{aligned} S &= S_{pvt} + S_{govt} \\ &= Y + NFP - C - G \\ &= GNP - C - G \end{aligned}$$

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## Saving and Wealth

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- The uses of aggregate saving:

➤  $S = Y + NFP - C - G$  and  $Y = C + I + G + NX$ , so:

$$S = I + (NX + NFP)$$

or

$$S = I + CA$$

- where  $CA = NX + NFP =$  current account balance.

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## Saving and Wealth

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- The uses of private saving:

➤ If  $S = I + CA$  and  $S = S_{pvt} + S_{govt}$ , then:

$$S_{pvt} = I + (-S_{govt}) + CA$$

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## Saving and Wealth

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- The uses of private saving:

$$S_{pvt} = I + (-S_{govt}) + CA$$

➤ This uses-of-saving identity shows that private saving is used in three ways:

- To fund investment ( $I$ ).
- To fund a government budget deficit ( $-S_{govt}$ ).
- To fund a current account surplus ( $CA$ ).

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## Saving and Wealth

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- Relating saving and wealth:

➤ Stocks and flows:

- Stock variables are measured at a point in time.
- Flow variables are measured per unit of time.
  - Flow variables often equal rates of change of stock variables.

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## Saving and Wealth

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- Relating saving and wealth:
  - Stocks and flows:
    - Wealth is a stock.
    - Saving is a flow.

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## Saving and Wealth

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- Relating saving and wealth:
  - A country's **national wealth** is the sum of its:
    - Domestic physical assets and
    - Net foreign assets.
      - foreign assets minus foreign liabilities.

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## Saving and Wealth

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- Relating saving and wealth:
  - Changes in national wealth are due to:
    - Change in value of existing assets and liabilities.
    - National saving ( $S = I + CA$ ).

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## Real GDP

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- Real GDP:
  - Nominal variables are measured in dollar terms.
    - Problem: Do changes in nominal values reflect changes in prices or quantities?
  - Real variables: adjust for price changes to reflect only quantity changes.

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## Real GDP

- Real GDP:
  - Nominal GDP is the dollar value of an economy's final output measured at current market prices.
  - Real GDP is an estimate of the value of an economy's final output, adjusting for changes in the overall price level.

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## Price Indexes

- Price Indexes:
  - A price index measures the average level of prices for some specified set of goods and services, relative to the prices in a specified base year.
  - GDP deflator =  $100 \times \text{nominal GDP} / \text{real GDP}$ .
    - Note that in the base year  $P = 100$ .

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## Inflation

- Inflation:
  - The inflation rate is calculated from a price index:
$$\pi_t = (P_t - P_{t-1}) / P_{t-1} = \Delta P_t / P_{t-1}$$
  - Figure 2.4: The inflation rate in the U.S.

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**Figure 2.4** The Inflation Rate in the U.S.



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## Interest Rates

- Real vs. nominal interest rates:
  - Interest rate: a rate of return promised by a borrower to a lender.
  - Nominal interest rate ( $i$ ): rate at which the nominal value of an asset increases over time.
  - Real interest rate ( $r$ ): rate at which the real value of an asset increases over time.

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## Interest Rates

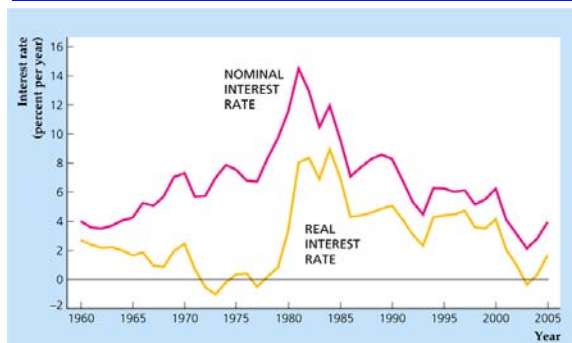
- Real vs. nominal interest rates:
  - Real interest rate is given by:

$$r = i - \pi$$

- Figure 2.5: Nominal and real interest rates in the United States.

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**Figure 2.5** Nominal and real interest rates



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## Interest Rates

- The expected real interest rate:

$$r = i - \pi^e$$

- where  $\pi^e$  is the expected inflation rate.
- If  $\pi = \pi^e$ , then the real interest rate = the expected real interest rate.

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## Next Time

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- Productivity, Output, and Employment
  - The Production Function
  - The Demand for Labor

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