The Measurement and Structure of the National Economy

Agenda

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

National Income Accounting

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

National Income Accounting

- 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.
National Income Accounting

• 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).

National Income Accounting

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

  \[ \text{Total Production} = \text{Total Income} = \text{Total Expenditure} \]

Gross Domestic Product

• 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.

Gross Domestic Product

• Market value: allows adding together unlike items by valuing them at their market prices.
Gross Domestic Product

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

Gross Domestic Product

• **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.

Gross Domestic Product

• **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.

Gross Domestic Product

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

• 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 \( (NX) \)

\[
Y = C + I + G + NX
\]

➢ This is known as the income-expenditure identity.

• 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.
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.
  
  ➢ 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.

Table 2.1 Expenditure Approach to GDP, 2005

<table>
<thead>
<tr>
<th>Category</th>
<th>Billions of dollars</th>
<th>Percent of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal consumption expenditures (C)</td>
<td>6,746.7</td>
<td>30.0</td>
</tr>
<tr>
<td>Consumer durables</td>
<td>2,035.7</td>
<td>9.2</td>
</tr>
<tr>
<td>Non-durables</td>
<td>4,711.0</td>
<td>20.8</td>
</tr>
<tr>
<td>Government purchases of goods and services</td>
<td>3,154.4</td>
<td>14.3</td>
</tr>
<tr>
<td>Gross Private fixed investment (I)</td>
<td>2,195.6</td>
<td>10.0</td>
</tr>
<tr>
<td>Business fixed investment</td>
<td>1,329.9</td>
<td>6.1</td>
</tr>
<tr>
<td>Residential structures</td>
<td>306.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Equipment and software</td>
<td>594.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Residential investment</td>
<td>735.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Government purchases of goods and services</td>
<td>238.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Federal</td>
<td>977.7</td>
<td>4.5</td>
</tr>
<tr>
<td>Non-federal</td>
<td>190.8</td>
<td>0.9</td>
</tr>
<tr>
<td>State and Local</td>
<td>1,080.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Net exports (X)</td>
<td>-720.1</td>
<td>-3.3</td>
</tr>
<tr>
<td>Exports</td>
<td>4,201.2</td>
<td>19.4</td>
</tr>
<tr>
<td>Imports</td>
<td>2,937.7</td>
<td>13.6</td>
</tr>
<tr>
<td>Total (GDP)</td>
<td>14,857.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: Numbers may not add to totals shown owing to rounding.
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.

• 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

<table>
<thead>
<tr>
<th></th>
<th>Billions of dollars</th>
<th>Percent of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensation of employees</td>
<td>7115</td>
<td>57.0</td>
</tr>
<tr>
<td>Proprietors’ income</td>
<td>939</td>
<td>7.5</td>
</tr>
<tr>
<td>Rental income of persons</td>
<td>75</td>
<td>0.5</td>
</tr>
<tr>
<td>Corporate profits</td>
<td>1018</td>
<td>0.8</td>
</tr>
<tr>
<td>Net interest</td>
<td>498</td>
<td>4.0</td>
</tr>
<tr>
<td>Taxes on production and imports</td>
<td>840</td>
<td>6.8</td>
</tr>
<tr>
<td>Business current transfer payments</td>
<td>80</td>
<td>0.6</td>
</tr>
<tr>
<td>Current surplus of government enterprises</td>
<td>-11</td>
<td>-0.1</td>
</tr>
<tr>
<td>Total (equals national income)</td>
<td>10992</td>
<td>87.2</td>
</tr>
<tr>
<td>Plus Statistical discrepancy</td>
<td>55</td>
<td>0.4</td>
</tr>
<tr>
<td>Exports Net National Product (NNP)</td>
<td>10947</td>
<td>87.7</td>
</tr>
<tr>
<td>Plus Consumption of fixed capital</td>
<td>1974</td>
<td>12.0</td>
</tr>
<tr>
<td>Exports Gross National Product (GNP)</td>
<td>12921</td>
<td>100.3</td>
</tr>
<tr>
<td>Less Factor income received from rest of world</td>
<td>580</td>
<td>-4.1</td>
</tr>
<tr>
<td>Plus Payments of factor income to rest of world</td>
<td>474</td>
<td>3.6</td>
</tr>
<tr>
<td>Exports Gross Domestic Product (GDP)</td>
<td>13487</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: Numbers may not add to totals shown owing to rounding.

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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).

  \[ Y + NFP + TR + INT – T \]
Gross Domestic Product

• The income approach to measuring GDP:
  ➢ Government sector income:
    • Government sector net income = taxes – transfers – interest payments:
      \[ T - TR - INT \]

Gross Domestic Product

• The income approach to measuring GDP:
  ➢ Private sector + government sector income = GNP:
    \[ \left[ Y + NFP + TR + INT - T \right] + \left[ T - TR - INT \right] \]
    = GDP + NFP
    = GNP

Saving and Wealth

• 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.

Saving and Wealth

• Measures of aggregate saving:
  ➢ Private saving = private disposable income – consumption.
    \[ S_{pvt} = (Y + NFP - T + TR + INT) - C \]
Saving and Wealth

• 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.

Saving and Wealth

• Measures of aggregate saving: National saving.
  ➢ National saving = private saving + government saving.
    \[ S = S_{priv} + S_{govt} \]
Saving and Wealth

• The uses of aggregate saving:
  \[ S = Y + NFP - C - G \]
  \[ Y = C + I + G + NX \]
  so:

  \[ S = I + (NX + NFP) \]
  or

  \[ S = I + CA \]

  where \( CA = NX + NFP \) = current account balance.

Saving and Wealth

• The uses of private saving:

  \[ S = I + CA \]

  and

  \[ S = S_{pvt} + S_{govt} \]

  then:

  \[ S_{pvt} = I + (-S_{govt}) + CA \]

Saving and Wealth

• 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).

Saving and Wealth

• 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.
Saving and Wealth

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

Saving and Wealth

• 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.

Saving and Wealth

• Relating saving and wealth:
  ➢ Changes in national wealth are due to:
    • Change in value of existing assets and liabilities.
    • National saving \( S = I + C4 \).

Real GDP

• 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.
### 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.

### 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 = \(100 \times \text{nominal GDP/real GDP}\).
  - Note that in the base year \(P = 100\).

### Inflation

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

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

\[
r = i - \pi
\]

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

**Figure 2.5 Nominal and real interest rates**

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.
Next Time

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