

R17 Gross domestic product (GDP)

- **Gross domestic product (GDP)** is the total market value of the final goods and services produced in a country within a certain time period.
- **Include:**
 - ✓ Purchases of newly produced goods and services
 - ✓ Final goods and services
 - ✓ Goods and services provided by government at cost to government (e.g. the services provided by police and the judiciary, and goods such as roads and infrastructure improvements)
 - ✓ The value of owner-occupied housing, just as including the value of rental housing service.
 - **Exclude:**
 - ✓ The sale or resale of goods produce in precious period
 - ✓ Transfer payments made by the government (e.g. unemployment, retirement, and welfare benefits)
 - ✓ In-process goods
 - ✓ The value of labor not sold (e.g. homeowner's repairs to his own home)
 - ✓ By-products of production (e.g. environmental damage)
 - ✓ Underground economy
 - ✓ Barter transaction (e.g. neighbors exchanging services with each other)
 - ✓ Illegal trade
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R17 Nominal and Real GDP and Per-Capita Real GDP

- **Nominal GDP** is simply GDP as we have described it under the expenditures approach: the total value of all goods and services produced by an economy, valued at current market prices. For an economy with N different goods and services, we can express nominal GDP as:

$$\begin{aligned}\text{nominal GDP}_t &= \sum_{i=1}^N P_{i,t} Q_{i,t} \\ &= \sum_{i=1}^N (\text{price of good } i \text{ in year } t) \times (\text{quantity of good } i \text{ produced in year } t)\end{aligned}$$

- **Real GDP** is calculated relative to a base year. By using base-year prices and current-year output quantities, real GDP growth reflects only increases in total output, not simply increases (or decreases) in the money value of total output.

$$\begin{aligned}\text{real GDP}_t &= \sum_{i=1}^N P_{i,t-5} Q_{i,t} \\ &= \sum_{i=1}^N (\text{price of good } i \text{ in year } t-5) \times (\text{quantity of good } i \text{ produced in year } t)\end{aligned}$$

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R17 GDP Deflator

- **Implicit price deflator for GDP (GDP deflator)** is a price index that can be used to convert nominal GDP into real GDP, taking out the effects of changes in the overall price level.

➤ GDP deflator for year $t = \frac{\sum_{i=1}^N P_{i,t} Q_{i,t}}{\sum_{i=1}^N P_{i,t-5} Q_{i,t}} \times 100$

$$= \frac{\text{nominal GDP in year } t}{\text{value of year } t \text{ output at year } t-5 \text{ prices}} \times 100$$

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R17 GDP Calculation

- GDP can be calculated as the sum of all the spending on newly produced goods and services, or as the sum of the income received as a result of producing these goods and services.
- Under the **expenditure approach**, GDP is calculated by summing the amounts spent on goods and services produced during the period.
 - Under the **income approach**, GDP is calculated by summing the amounts earned by households and companies during the period, including wage income, interest income, and business profits.
- For the whole economy, total expenditures and total income must be equal, so the two approaches should produce the same result.

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R17 GDP Calculation

- Using the **expenditure approach**, the major components of real GDP are consumption, investment, government spending, and net exports (exports minus imports). These components are summarized in the equation:

$$\text{GDP} = C + I + G + (X - M)$$

- Under the **income approach**, we have the following equation for GDP:

$$\text{GDP} = \text{national income} + \text{capital consumption allowance} \\ + \text{statistical discrepancy}$$

- **A capital consumption allowance (CCA)** measures the depreciation (i.e., wear) of physical capital from the production of goods and services over a period. CCA can be thought of as the amount that would have to be reinvested to maintain the productivity of physical capital from one period to the next.
- The **statistical discrepancy** is an adjustment for the difference between GDP measured under the income approach and the expenditure approach because they use different data.

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R17 Components of GDP

- To derive the aggregate demand curve, we need to understand the factors that determine each of the components of GDP:
- **Consumption** is a function of disposable income. An increase in personal income or a decrease in taxes will increase both consumption and saving. Additional disposable income will be consumed or saved. The proportion of additional income spent on consumption is called the marginal propensity to consume (MPC), and the proportion saved is the marginal propensity to save (MPS). $\text{MPC} + \text{MPS} = 1$
 - **Investment** is a function of expected profitability and the cost of financing. Expected profitability depends on the overall level of economic output. Financing costs are reflected in real interest rates, which are approximated by nominal interest rates minus the expected inflation rate.
 - **Government purchases** may be viewed as independent of economic activity to a degree, but tax revenue to the government, and therefore the fiscal balance, is clearly a function of economic output.
 - **Net exports** are a function of domestic disposable incomes (which affect imports), foreign disposable incomes (which affect exports), and relative prices of goods in foreign and domestic markets.

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R17 National Income, Personal Income, and Personal Disposable Income

- **National income** is the sum of the income received by all factors of production that go into the creation of final output.
 - national income = compensation of employees (wages and benefits)
 - + corporate and government enterprise profits before taxes
 - + interest income
 - + unincorporated business net income (business owners' incomes)
 - + rent
 - + indirect business taxes less subsidies*

**indirect taxes and subsidies that are included in final prices*, 產品中的稅主要包括 *sales taxes, fuel taxes, and import duties*; 要素生產中的稅主要包括 *property taxes and payroll taxes*.

- **Personal income** = national income - indirect business tax - corporate income tax - undistributed corporate profit + Transfer payment
 - **Personal disposable income** = personal income - personal taxes
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R17 Saving, Investment, the Fiscal Balance and the Trade Balance

- Total expenditures can be stated as $GDP = C + I + G + (X - M)$. ①
- Total income, which must equal total expenditures, can be stated as:

$$GDP = C + S + T \quad \text{②}$$

where:

C = consumption spending

S = household and business savings

T = net taxes (taxes paid minus transfer payments received)

$$\text{①} = \text{②} \rightarrow S = I + (G - T) + (X - M)$$

Fiscal balance

Trade balance

Also we can get: $(G - T) = (S - I) - (X - M)$

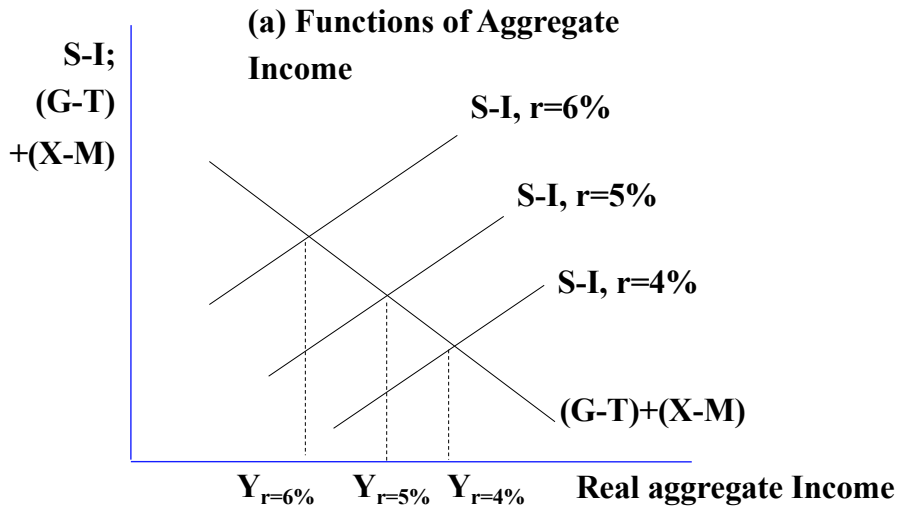
- A government deficit ($G - T > 0$) must be financed by some combination of a trade deficit ($X - M < 0$) or an excess of private saving over private investment ($S - I > 0$).
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R17 IS Curves

➤ The IS Curve

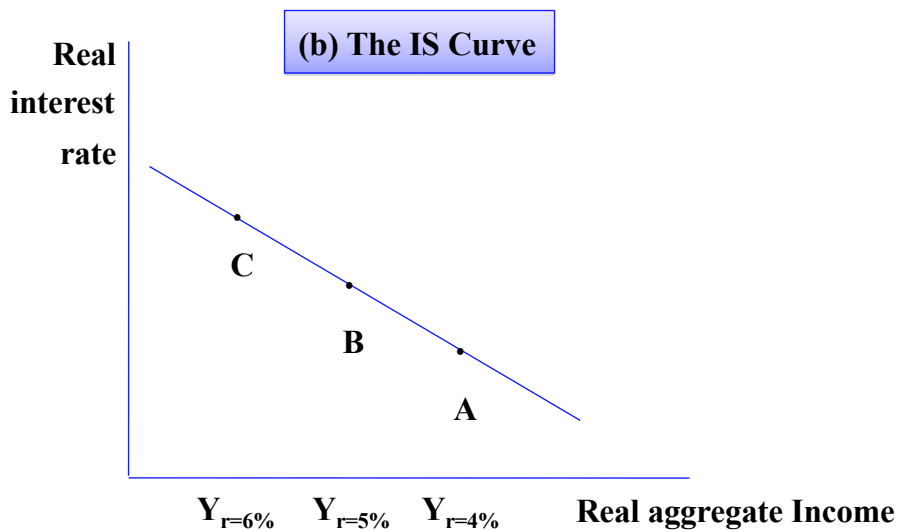
- From the fundamental relationship among saving, investment, the fiscal balance and the trade balance, $S = I + (G - T) + (X - M)$, and subtracting I from both sides, we get: $(S - I) = (G - T) + (X - M)$



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R17 IS Curves

➤ The IS Curve



If income and expenditure are to remain in equilibrium, there must be an *inverse relationship between the real interest rate and income*. In economics, this relationship is called the IS curve, because investment (I) and savings (S) are the primary variables that adjust to maintain the balance between expenditure and income.

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