

# Measurement

# Outline

- GDP
  - Product
  - Expenditure
  - Income
- Government budget
- National saving
- National wealth
- Real variables
  - Chain-weighted GDP
  - Price indices and inflation
- Nominal and real interest rates
- Major Economic Problems

# Gross Domestic Product

## GDP – product approach

GDP is the market value of final goods and services newly produced within a nation during a fixed period to time (usually a year)

- Market value
- Final goods and services (sum value added because it automatically excludes intermediate goods)
- Newly produced
- GDP – output produced within a nation
- GNP – output produced by domestically-owned factors of production
- GDP = GNP – NFP (net factor payments from abroad)

# GDP – expenditure approach

- Measures total spending on final goods and services produced within a nation during a specified period of time
- Consumption (C)
- Investment (I)
- Government purchases of goods and services (G)
- Exports – imports = net exports (NX)

# GDP - Income approach

- Sums income generated by production (includes profits and taxes paid to the gov)
- Private disposable income equals

$GDP + NFP + TR$  (transfer payments from gov) +  $INT$  (interest payments from govt) –  $T$  (taxes paid to gov)

- Government net income =  $T - TR - INT$

Private disposable income + gov net income  
=  $GDP + NFP = GNP$

# Approaches Equivalent

Any output produced (product approach) is purchased by someone (expenditure approach) and results in income to someone (income approach)

# Government Budget Deficit

- $\text{Deficit} = G + \text{TR} + \text{INT} - T$ 
  - $G$  = expenditures of current real goods and services
  - $\text{TR}$  = transfer payments
  - $\text{INT}$  = interest payments on debt
  - $T$  = tax revenue
- $\text{Primary Deficit} = G + \text{TR} - T$
- Government saving – negative of the deficit, i.e. government surplus

# Saving

- Private Saving = private disposable income – consumption

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

- Government Saving = net gov income – gov purchases of goods and services

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

- National Saving = Private saving + gov saving

$$S = S_{pvt} + S_{govt} = Y + NFP - C - G$$

# Uses of Saving

$$\left\{ \begin{array}{l} S = S_{pvt} + S_{govt} = Y + NFP - C - G \\ Y = C + I + G + NX \end{array} \right.$$

$$S = NFP + I + NX$$

$$CA = NX + NFP$$

$$S = I + CA$$

# National Wealth

- Domestic physical assets (capital and land) plus net foreign assets (foreign physical and financial assets minus foreign physical and financial liabilities)
- Wealth changes due to
  - capital gains and losses
  - national saving ( $I + CA$ )

# Nominal and Real Variables

- Nominal = dollar values
- Real; adjust for price changes; reflect only quantity changes

# Nominal and Real GDP

Quantity	Year 1	Year 2	% Change
Food	10	11	10%
IT	4	6	50%

Price			
Food	\$2	\$3	50%
IT	\$6	\$4	-33%

Nominal GDP	\$44	\$57	29.55%
Real GDP (1)	44	58	31.82%
Real GDP (2)	46	57	23.91%

# Chain-Weighted Real GDP

- Pick a year to start (2000) and let real GDP in this year equal 1
- Compute growth rate of real GDP between 2000 and 2001 using initial year as base
- Compute growth rate of real GDP using final year as base
- Average growth rates
- Chain-weighted real GDP for 2001 is base year GDP (=1) multiplied by average (gross) growth rate
- Repeat for 2002, etc.

# Price Indices

- Measures average level of prices for specified set of goods and services, relative to the prices in a base year
- $\text{GDP deflator} = 100 \times \text{nominal GDP} / \text{real GDP}$
- CPI = monthly index of consumer prices of basket of goods relative to a base year

# Inflation

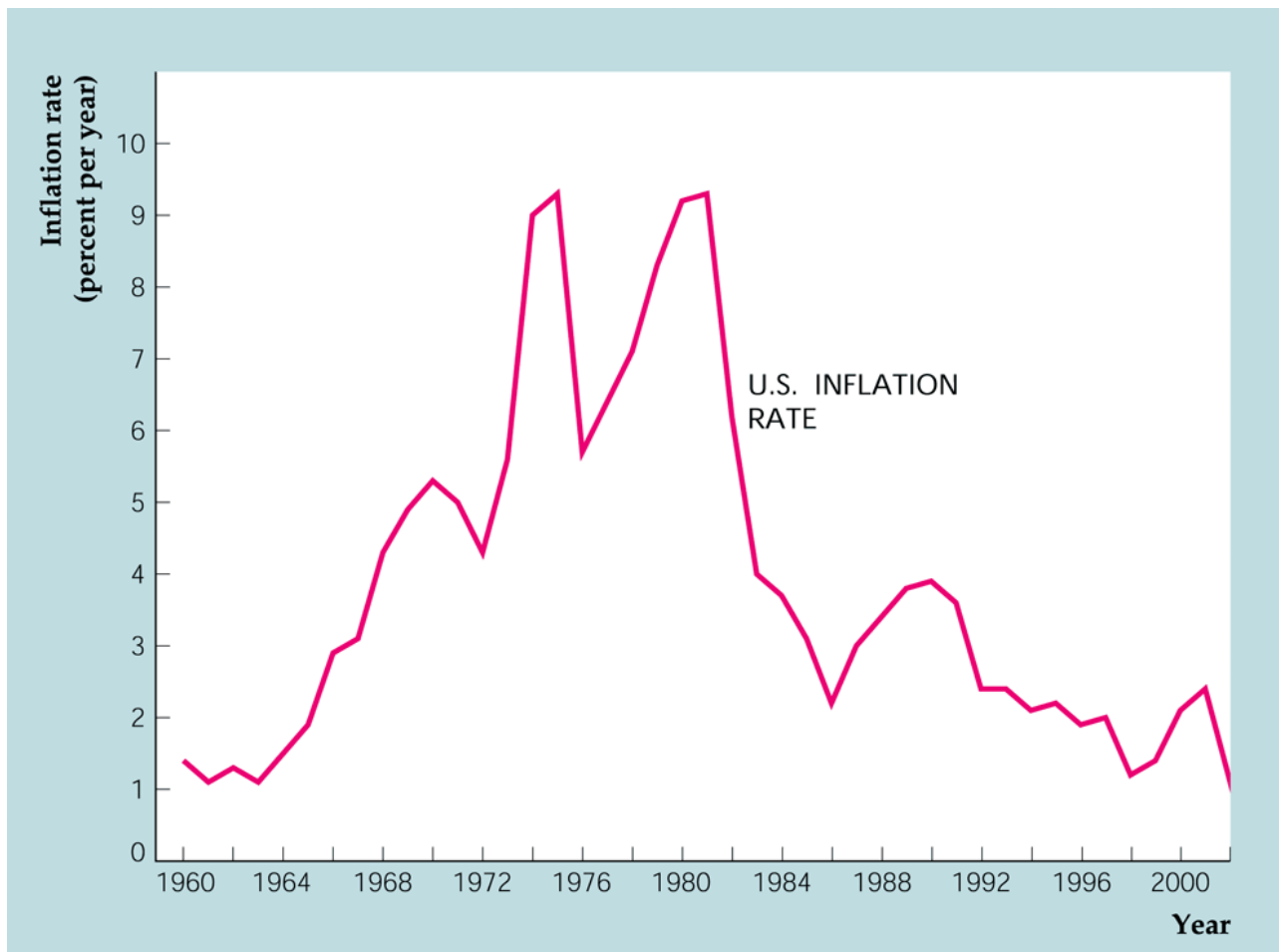
- Definition

$$\pi_{t+1} = (P_{t+1} - P_t) / P_t = \Delta P_{t+1} / P_t$$

where P is a price index

- CPI and inflation bias
  - Substitution bias
  - Quality adjustment bias

# Figure 2.1 The inflation rate in the United States, 1960–2002



# Real and Nominal Interest Rates

- Nominal interest rate = dollar value of return to asset
- Real interest rate = purchasing power of return to asset

$$i - \pi$$

- Expected real interest rate = expected purchasing power of return to asset

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

# Figure 2.2 Nominal and real interest rates in the United States, 1960–2002

