

Chapter 2

Measuring Macroeconomic Variables

Chapter Outline

- Measuring Macroeconomic Variables
 - National Income Accounting
 - Real and Nominal Measures
 - Calculating Growth Rates

Gross Domestic Product

- Gross Domestic Product (GDP) is a primary measure of aggregate economic activity
 - GDP is the market value of final goods and services produced within a nation during a fixed period of time

Measuring Activity: The National Income Accounts

- Economic activity in a given period can be measured in three ways:
 - Value of output produced
 - Income received by the producers of output
 - Spending by the purchasers of output

The Expenditure Approach to Measuring GDP

- Measure output as the sum of expenditures on products categorized as consumption, investment, government spending, and net exports:

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

Measuring GDP, Expenditure Approach, 2005 Update

Table 2.1

Expenditure Approach to Measuring GDP in the United States, 2005

	Billions of dollars	Percent of GDP
Personal consumption expenditures (C)	4745.7	70.0
Consumer durables	1098.5	16.3
Non-durable goods	2104.4	31.2
Services	1542.8	22.5
Gross private domestic investment (I)	1763.0	26.1
Business fixed investment	1274.6	18.8
Manufactures, structures	373.7	5.5
Equipment and software	895.7	13.3
Residential investment	488.4	7.2
Inventory investment	104.7	1.6
Government purchases of goods and services (G)	830.2	12.2
Total	6777.7	100.0
Business deficits	367.1	5.4
Reserve losses	228.0	3.4
State and local	148.8	2.2
Net exports (NX)	-756.5	-11.1
Exports	797.2	11.7
Imports	1553.7	22.8
Total (equals GDP) (Y)	15425.1	100.0

Note: Numbers may not add to totals shown owing to rounding.
 Source: Bureau of Economic Analysis, Department of Commerce, BEA, May 11, 2006.

The Income Approach to Measuring GDP

- National Income:
 - Compensation of employees
 - Proprietor's income
 - Rental income
 - Corporate profits
 - Net interest

Measuring GDP, Income Approach: 2005 Update

Table 2.2
Income Approach to Measuring GDP in the United States, 2005

	Billions of dollars	Percent of GDP
Compensation of employees	711.9	37.0
Proprietor's income	589	30.0
Rental income of persons	73	3.8
Corporate profits	185.2	9.5
Net interest	686	35.5
Taxes on production and imports	489	25.2
Business current transfer payments	49	2.5
Current surplus of government enterprises	-11	-0.6
Total (equals National Income)	1093.2	56.2
Plus Statistical Discrepancy	55	2.8
Equals Net National Product (NNP)	1084.9	56.7
Plus Consumption of fixed capital	1544	80.0
Equals Gross National Product (GNP)	1222.1	63.3
Less: Net income received from rest of world	528	27.6
Plus: Payments of factor incomes to rest of world	174	9.1
Equals Gross Domestic Product (GDP)	1248.7	64.8

Note: Numbers may not add in areas with only one decimal.
Source: Bureau of Economic Analysis Web Site, www.bea.gov, Tables 1.7.5 and 1.7.2, May 17, 2006.

Measuring GDP, Income Approach: 2005 Update

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Chapter 3: GDP: Accounting Closed Sectors

$$GDP = GNP = NNP$$

From: Gross Product and Gross National Product: Reconciling the Approach to GDP

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

Private Disposable Income

$$Y_{pd} = Y - NFP - TR + INT = Y$$

Net Government Income

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

Private Saving (Private Disposable Income less Government Saving)

$$S_{priv} = (Y - TR - INT) = G$$

Government Saving (Net Government Income less Government Spending)

$$S = S_{priv} + S_{gov}$$

$$S = Y - NFP - G = G$$

$$S = (C + I + G - NX) + NFP = C = G$$

$$S = I + CA$$

Savings: Causes for the Closed Economy

$$Y = C + I + G$$

$$S = Y - C = G$$

$$S = I$$

Real and Nominal Measures

- We measure GDP in terms of current market values
 - Prices change over time
- Real GDP
 - To compare GDP values over time, we want to distinguish changes due to output changes from those due to price changes

An Example

- Table 2.3 considers the calculation of nominal GDP in two years for an economy that produces just two goods.

Table 2.3 Production and Price Data

	Year 1	Year 2	Percentage Change from Year 1 to Year 2
Product Quantity			
Corn (bushels)	5	10	+100%
Wheat (bushels)	200	200	+0%
Price			
Corn (cents)	\$0.20	\$0.20	+0%
Wheat (cents)	\$0.30	\$0.30	+0%
Value			
Corn (dollars)	\$1,000	\$2,000	+100%
Wheat (dollars)	\$60,000	\$60,000	+0%
Total	\$61,000	\$62,000	+1.6%

Output Growth

- Growth rate of real output is calculated as a percentage rate of change:

$$GrowthRate = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100\%$$

Real Output: Alternative Base Years

	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Product Quantity						
Corn (bushels)	5	10	5	10	5	10
Wheat (bushels)	200	200	200	200	200	200
Price						
Corn (cents)	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20	\$0.20
Wheat (cents)	\$0.30	\$0.30	\$0.30	\$0.30	\$0.30	\$0.30
Value						
Corn (dollars)	\$1,000	\$2,000	\$1,000	\$2,000	\$1,000	\$2,000
Wheat (dollars)	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
Total	\$61,000	\$62,000	\$61,000	\$62,000	\$61,000	\$62,000

Chain-weighting

- Calculated Real GDP growth rates are dependent upon choice of a base year
- Chain weighting resolves this difficulty
 - Chain-weighting assumes that the correct growth rate going from year 1 to year 2 is an average of the two rates calculated in the upper and lower panels of Table 2.4.

GDP Deflator

- Define the GDP Deflator (a price index):

$$GDPDeflator = \frac{NominalGDP}{RealGDP} \times 100$$

- For the preceding data, the GDP deflator in year 2, when the base year is year 1, is

$$\frac{66,000}{62,000} \times 100 = 106.5$$

Inflation

- Inflation is an annualized percentage rate of change in the price level.
- Using the GDP deflator to measure the price level, and using the measures in the upper panel of Table 2.4, inflation over the time from year 1 to year 2 is measured as a percentage rate of change:

$$\frac{106.5 - 100}{100} \times 100\% = 6.5\%$$

Consumer Price Index



- The consumer price index (CPI) is another price index.
 - It differs in the goods included
 - Its measurement is based on measurement of the cost of a standard bundle of consumer goods over time

Interest Rate



- The rate of interest is a rate of return promised by a borrower to a lender.
 - There are many interest rates
 - Most interest rates move up and down together
 - In our theory, we will usually assume that there is a single interest rate

Real and Nominal Interest Rates



- Distinguishing Real and Nominal Interest Rates
 - A nominal rate of interest measures a percentage return in terms of dollars
 - A real rate of interest measures a percentage return in terms of goods (the real purchasing power of dollars).

Calculating a real rate of interest



- The real rate of interest is the nominal rate of interest minus the inflation rate.
- The expected real rate of interest is the nominal rate of interest minus the expected inflation rate.

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

The End

