

Topic 2:

## Macroeconomic Data

(chapter 2)

revised 9/15/09

CHAPTER 2 The Data of Macroeconomics

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### Learning objectives

In this chapter, you will learn about how we define and measure:

- Gross Domestic Product (GDP)
- the Consumer Price Index (CPI)
- the Unemployment Rate

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### Gross Domestic Product

Two definitions:

1. Total \_\_\_\_\_ on domestically-produced final goods and services
2. Total \_\_\_\_\_ earned by domestically-located factors of production

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## Why expenditure = income

In every transaction,  
the buyer's expenditure  
becomes the seller's income.

Thus, the sum of all  
expenditure equals  
the sum of all income.

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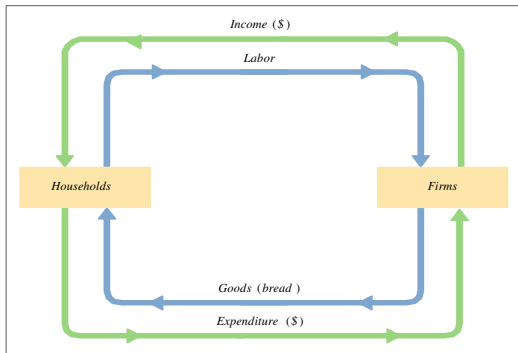
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## The Circular Flow



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## Consumption (C)

def:



Includes:

- **durable goods**  
last a long time  
ex: cars, home appliances
- **non-durable goods**  
last a short time  
ex: food, clothing
- **services**  
work done for consumers  
ex: dry cleaning, air travel.

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### U.S. Consumption, 2001

	\$ billions	% of GDP
Consumption	\$7,064.5	69.2%
Durables	858.3	8.4
Nondurables	2,055.1	20.1
Services	4,151.1	40.7

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### Investment (I)

def1:

def2:

Includes:

- **business fixed investment**  
 spending on plant and equipment that firms will use to produce other goods & services
- **residential fixed investment**  
 spending on housing units by consumers and landlords
- **inventory investment**  
 the change in the value of all firms' inventories

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### U.S. Investment, 2001

	\$ billions	% of GDP
Investment	\$1,633.9	16.0%
Business fixed	1,246.0	12.2
Residential fixed	446.3	4.4
Inventory	-58.4	-0.6

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### Investment vs. Capital

- Capital is one of the factors of production. At any given moment, the economy has a certain overall stock of capital.
- Investment is spending on \_\_\_\_ capital.

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### Investment vs. Capital

Example (*assumes no depreciation*):

- 1/1/2002: economy has \$500b worth of capital
- during 2002: investment = \$37b
- 1/1/2003: economy will have \$537b worth of capital

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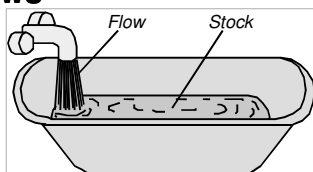
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### Stocks vs. Flows



More examples:

<i>stock</i>	<i>flow</i>
a person's wealth	a person's saving
# of people with college degrees	# of new college graduates
the govt. debt	the govt. budget deficit

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## Government spending (G)

▪ G includes ....

▪ G excludes...

(e.g. unemployment insurance payments),  
because they do not represent spending on  
goods and services

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## Government spending, 2001

	\$ billions	% of GDP
Gov spending	\$1,839.5	18.0%
Federal	615.7	6.0
Non-defense	216.6	2.1
Defense	399.0	3.9
State & local	1,223.8	12.0

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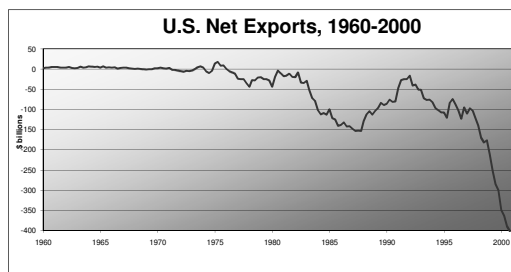
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## Net exports (NX = EX - IM)

def:



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### An important identity

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

where

$$Y = \text{GDP} =$$

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

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### A question for you:

Suppose a firm

- produces \$10 million worth of final goods
- but only sells \$9 million worth.

Does this violate the  
expenditure = output identity?

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### Why output = expenditure

- Unsold output goes into inventory, and is counted as "inventory investment"...  
...whether the inventory buildup was intentional or not.
- In effect, we are assuming that firms purchase their unsold output.

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**GDP:**  
**An important and versatile concept**

We have now seen that GDP measures

- total income
- total output
- total expenditure
- the sum of value-added at all stages in the production of final goods

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**GNP vs. GDP**

▪ Gross **National** Product (GNP):

▪ Gross **Domestic** Product (GDP):

$$(GNP - GDP) = (\text{factor payments from abroad}) - (\text{factor payments to abroad})$$

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**Discussion Question:**

What explains why GNP differs from GDP for some of the following countries?

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**(GNP – GDP) as a percentage of GDP  
for selected countries, 1997.**

U.S.A.	0.1%
Bangladesh	3.3
Brazil	-2.0
Canada	-3.2
Chile	-8.8
Ireland	-16.2
Kuwait	20.8
Mexico	-3.2
Saudi Arabia	3.3
Singapore	4.2

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**Real vs. Nominal GDP**

- GDP is the value of all final goods and services produced.
- **Nominal GDP** measures these values...
  
- **Real GDP** measure these values...

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**Real GDP controls for inflation**

Changes in nominal GDP can be due to:

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Changes in real GDP can only be due to changes in quantities, because real GDP is constructed using constant base-year prices.

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**Practice problem**

	2002		2003	
	P	Q	P	Q
good A	\$1	10	\$2	15
good B	\$10	3	\$15	4

- Compute nominal GDP in 2002 and 2003
- Compute real GDP in each year using 2002 as the base year.

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**Answers to practice problem**

- Nominal GDP *multiply Ps & Qs from same year*  
2002:  
2003:
- Real GDP *multiply each year's Qs by 2002 Ps*  
2002:  
2003:
- So in real terms, GDP...

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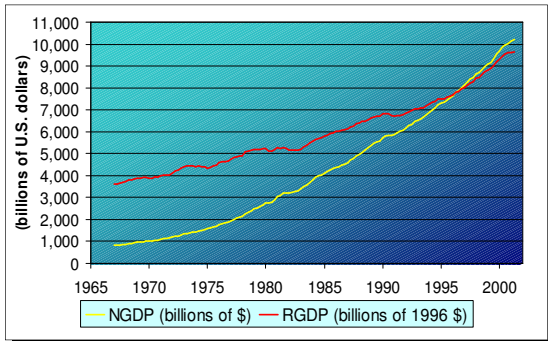
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**U.S. Real & Nominal GDP, 1967-2001**




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## GDP Deflator

- The **inflation rate** is the percentage increase in the overall level of prices.
- One measure of the price level is the **GDP Deflator**, defined as...

GDP deflator =

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## Understanding the GDP deflator

*Example with 3 goods*

For good  $i = 1, 2, 3$

$P_{it}$  = the market price of good  $i$  in month  $t$

$Q_{it}$  = the quantity of good  $i$  produced in month  $t$

$NGDP_t$  = Nominal GDP in month  $t$

$RGDP_t$  = Real GDP in month  $t$

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## Understanding the GDP deflator

$$\text{GDP deflator} = 100 \times \frac{NGDP_t}{RGDP_t} = 100 \times \frac{P_{1t}Q_{1t} + P_{2t}Q_{2t} + P_{3t}Q_{3t}}{RGDP_t}$$

$$= 100 \times \left[ \left( \frac{Q_{1t}}{RGDP_t} \right) P_{1t} + \left( \frac{Q_{2t}}{RGDP_t} \right) P_{2t} + \left( \frac{Q_{3t}}{RGDP_t} \right) P_{3t} \right]$$

The GDP deflator is a weighted average of \_\_\_\_\_.

*The weight on each price reflects that good's relative importance in GDP.*

*Note that the weights \_\_\_\_\_.*

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### Working with percentage changes

*USEFUL TRICK #1* For any variables  $X$  and  $Y$ ,  
the percentage change in  $(X \times Y)$   
 $\approx$  the percentage change in  $X$   
+ the percentage change in  $Y$

EX: If your hourly wage rises 5%  
and you work 7% more hours,  
then your wage income rises approximately 12%.

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### Working with percentage changes

*USEFUL TRICK #2*  
the percentage change in  $(X/Y)$   
 $\approx$  the percentage change in  $X$   
- the percentage change in  $Y$

EX: GDP deflator =  $100 \times \text{NGDP} / \text{RGDP}$ .  
If NGDP rises 9% and RGDP rises 4%,  
then the inflation rate is approximately 5%.

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### Consumer Price Index (CPI)

- A measure of \_\_\_\_\_.
- Published by the **Bureau of Labor Statistics (BLS)**
- Used to
  - track changes in the typical household's cost of living
  - adjust many contracts for inflation (*i.e.* "COLAs")
  - allow comparisons of dollar figures from different years

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### How the BLS constructs the CPI

1. Survey consumers to determine composition of the typical consumer's "basket" of goods.
2. Every month, collect data on prices of all items in the basket; compute cost of basket
3. CPI in any month equals

$$100 \times$$

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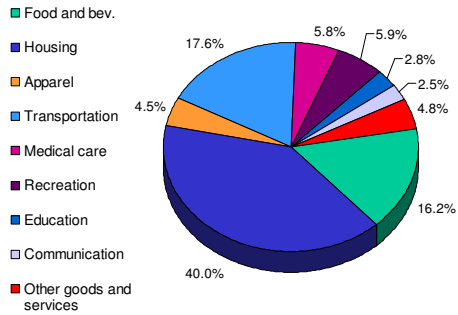
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### The composition of the CPI's "basket"



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### Understanding the CPI

*Example with 3 goods*

For good  $i = 1, 2, 3$

$C_i$  = the amount of good  $i$  in the CPI's basket

$P_{it}$  = the price of good  $i$  in month  $t$

$E_t$  = the cost of the CPI basket in month  $t$

$E_b$  = cost of the basket in the base period

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## Understanding the CPI

$$\text{CPI in month } t = 100 \times \frac{E_t}{E_b} = 100 \times \frac{P_{1t}C_1 + P_{2t}C_2 + P_{3t}C_3}{E_b}$$

$$= 100 \times$$

*The CPI is a weighted average of \_\_\_\_\_.*

*The weight on each price reflects that good's relative importance in the CPI's basket.*

*Note that the weights remain \_\_\_\_\_.*

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## Reasons why the CPI may overstate inflation

- **Substitution bias:** The CPI uses fixed weights, so it \_\_\_\_\_.
- **Introduction of new goods:** The introduction of new goods makes consumers better off and, in effect, increases the real value of the dollar. But \_\_\_\_\_.
- **Unmeasured changes in quality:** Quality improvements increase the value of the dollar, but are often not fully measured.

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## The CPI's bias

- The Boskin Panel's "best estimate": The CPI overstates the true increase in the cost of living by 1.1% per year.
- Result: the BLS has refined the way it calculates the CPI to reduce the bias.
- It is now believed that the CPI's bias is slightly less than 1% per year.

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### CPI vs. GDP deflator

prices of capital goods

- GDP deflator:
- CPI:

prices of imported consumer goods

- CPI:
- GDP deflator:

the basket of goods

- CPI:
- GDP deflator:

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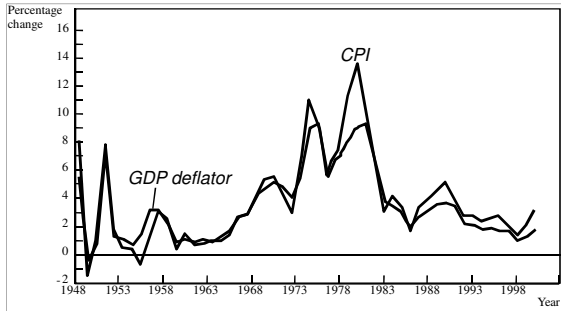
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### Two measures of inflation



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### Measuring Unemployment: Categories of the population

- **employed**  
\_\_\_\_\_
- **unemployed**  
\_\_\_\_\_
- **labor force**  
the amount of labor available for producing goods and services; all employed plus unemployed persons
- **not in the labor force**  
not employed, not looking for work.

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**Two important labor force concepts**

- **unemployment rate**  
percentage of the labor force that is unemployed
- **labor force participation rate**  
the fraction of the adult population that 'participates' in the labor force

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**Compute percentage changes in labor force statistics**

Suppose

- the population increases by 1%
- the labor force increases by 3%
- the number of unemployed persons increases by 2%

Compute the percentage changes in  
the labor force participation rate:  
the unemployment rate:

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**Okun's Law (Observation)**

- Employed workers help produce GDP, while unemployed workers do not. So one would expect

\_\_\_\_\_

\_\_\_\_\_.

- This relationship is clear in the data...

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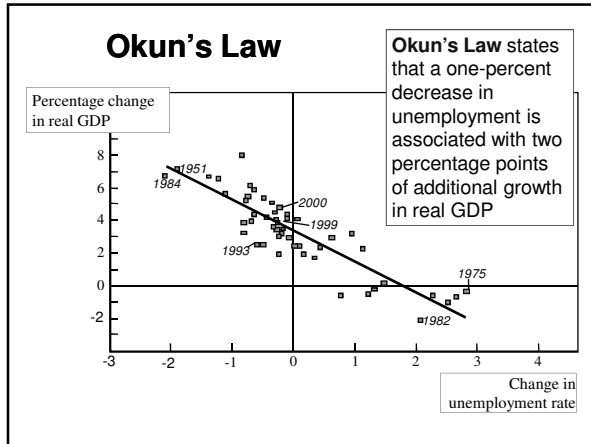
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### Chapter Summary

1. Gross Domestic Product (GDP) measures both total income and total expenditure on the economy's output of goods & services.
2. Nominal GDP values output at current prices; real GDP values output at constant prices. Changes in output affect both measures, but changes in prices only affect nominal GDP.
3. GDP is the sum of consumption, investment, government purchases, and net exports.

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### Chapter Summary

4. The overall level of prices can be measured by either
  - the Consumer Price Index (CPI), the price of a fixed basket of goods purchased by the typical consumer
  - the GDP deflator, the ratio of nominal to real GDP
5. The unemployment rate is the fraction of the labor force that is not employed. When unemployment rises, the growth rate of real GDP falls.

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