

Intermediate Macroeconomics

Chapter 2  
Measuring the Macroeconomy

Measuring the Macroeconomy

1. Measuring Total Output
2. How to Measure GDP
3. Measuring Price Changes

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1. Measuring Total Output

- Monetary Measure of Value
- GDP versus GNP
- Omissions from GDP - does not measure social welfare

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1. Measuring Total Output  
Monetary measure of value

**Quantity times Price equals Market Value**

Cars 1,000 x \$20,000 = \$20,000,000

Dolls 10,000 x \$ 10 = \$ 100,000

**Total Value of Output** = \$20,100,000

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1. Measuring Total Output  
GDP versus GNP

- **Nominal Gross Domestic Product (GDP)** - the market value of final goods and services **produced by a nation** during a specific period, usually 1 year.
- **Nominal Gross National Product (GNP)** - the market value of final goods and services **produced by labor and property supplied by the residents of a nation** during a specific period, usually 1 year.

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1. Measuring Total Output  
Omissions from GDP

GDP is a poor measure of social welfare:

- Leisure
- Home and volunteer labor (non market production)
- Depletion of nonrenewable resources
- Unregulated pollution
- Distribution of income
- Differences in preferences

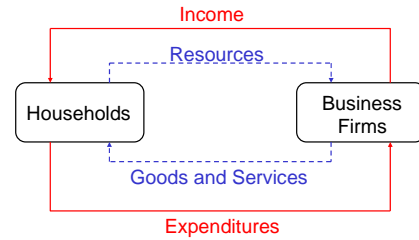
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## 2. How to Measure GDP

- Expenditure Approach
- Income Approach

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## 2. How to Measure GDP Circular flow of income and expenditures



Solid Lines - Flow of Money  
Dashed lines - Flow of Goods and Services

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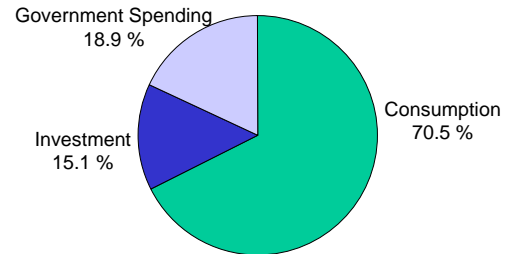
## 2. How to Measure GDP Expenditure approach

- $GDP = \text{Consumption Spending (C)} + \text{Private Domestic Investment (I)} + \text{Government Spending (G)} + \text{Exports - Imports (net exports, NX)}$
- $GDP = C + I + G + NX$

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## 2. How to Measure GDP Expenditure approach: Expenditure Shares

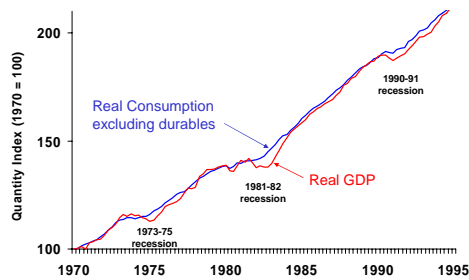
2003 U.S. Gross Domestic Product



Net Exports = - 4.5 % (not shown in slide)

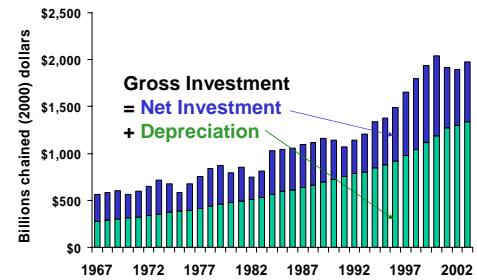
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## 2. How to Measure GDP Expenditure Approach: Consumption



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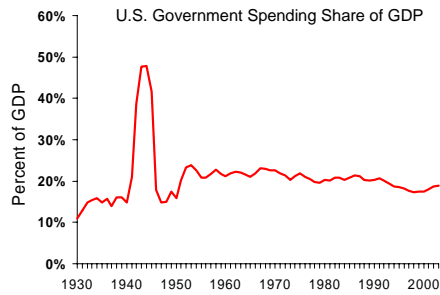
## 2. How to Measure GDP Expenditure Approach: Investment



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## 2. How to Measure GDP

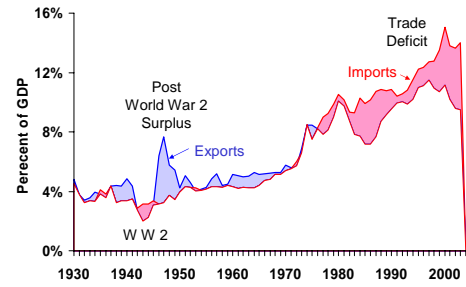
### Expenditure approach: Government



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## 2. How to Measure GDP

### Expenditure Approach: Net exports



Source: Bureau of Economic Analysis, www.bea.gov

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## 2. How to Measure GDP

### Income approach

- **National Income** = GDP (with corrections)
  - **Personal Income** = National Income (with corrections)
    - Personal Income
      - Personal income taxes
      - Social Security withholding
- = **Disposable Personal Income**

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## 3. Measuring Price Changes

- Nominal and Real GDP
- GDP Deflator
- Consumer Price Index
- GDP Deflator / CPI Differences
- Problems with Traditional Price Indexes
- Chain-weighted Price Index

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## 3. Measuring Price Changes

### Nominal and Real GDP

- **Nominal GDP**
  - Value of output measured at actual prices (current dollar output)
  - Does not correct for inflation
- **Real GDP**
  - Value of output based on prices of some base period ("constant" dollar output)
  - eliminates effect of inflation

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## 3. Measuring Price Changes

### Sample problem

	Average Prices			Quantity Sold	
	1992	1994	% Change	1992	1994
<b>Food</b>	\$ 12	\$ 14	17 %	4	5
<b>Housing</b>	9	10	11 %	3	3
<b>Fun</b>	4	5	25 %	3	4
<b>Machines</b>	20	20	0 %	2	2

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3. Measuring Price Changes  
Definition of Nominal GDP

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**Nominal GDP**

= Current year Quantities  
x Current year Prices

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3. Measuring Price Changes  
Sample problem: 1992 Nominal GDP

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= 1992 Quantities x 1992 Prices  
= 1992 Spending on  
Food Housing Fun Machines  
=  $4 \cdot \$12 + 3 \cdot \$9 + 3 \cdot \$4 + 2 \cdot \$20$   
=  $\$48 + \$27 + \$12 + \$40$   
=  **$\$127$**

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3. Measuring Price Changes  
Sample problem: 1994 Nominal GDP

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= 1994 Quantities x 1994 Prices  
= 1994 Spending on  
Food Housing Fun Machines  
=  $5 \cdot \$14 + 3 \cdot \$10 + 4 \cdot \$5 + 2 \cdot \$20$   
=  $\$70 + \$30 + \$20 + \$40$   
=  **$\$160$**

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3. Measuring Price Changes  
Definition of Real GDP

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**Real GDP**

= Current year Quantities  
x *Base year* Prices

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3. Measuring Price Changes  
Sample problem: 1992 Real GDP

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= 1992 Quantities x **1992 Prices**  
Food Housing Fun Machines  
=  $4 \cdot \mathbf{\$12} + 3 \cdot \mathbf{\$9} + 3 \cdot \mathbf{\$4} + 2 \cdot \mathbf{\$20}$   
=  $\$48 + \$27 + \$12 + \$40$   
=  **$\$127$**

Base year assumed to be 1992

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3. Measuring Price Changes  
Sample problem: 1994 Real GDP

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= 1994 Quantities x **1992 Prices**  
Food Housing Fun Machines  
=  $5 \cdot \mathbf{\$12} + 3 \cdot \mathbf{\$9} + 4 \cdot \mathbf{\$4} + 2 \cdot \mathbf{\$20}$   
=  $\$60 + \$27 + \$16 + \$40$   
=  **$\$143$**

Base year assumed to be 1992

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3. Measuring Price Changes  
Sample problem: GDP growth

- Growth in **Nominal** GDP  
=  $\frac{(160 - 127)}{127} \cdot 100 = 26\%$
- Growth in **Real** GDP  
=  $\frac{(143 - 127)}{127} \cdot 100 = 13\%$

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3. Measuring Price Changes  
Definition of GDP Deflator

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

or,

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP Deflator}} \times 100$$

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3. Measuring Price Changes  
Sample problem: GDP deflator

$$1992 \text{ GDP Deflator} = \frac{127}{127} \cdot 100 = 100.0$$

$$1994 \text{ GDP Deflator} = \frac{160}{143} \cdot 100 = 111.9$$

Base year assumed to be 1992

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3. Measuring Price Changes  
Inflation Rate from the GDP Deflator

Change in Average Level of Prices  
= Percent Change in GDP Deflator

Inflation from 1992 to 1994:

$$= \frac{(1994 \text{ Deflator} - 1992 \text{ Deflator})}{1992 \text{ Deflator}} \cdot 100$$

$$= \frac{(111.9 - 100.0)}{100.0} \cdot 100 = 11.9\%$$

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3. Measuring Price Changes  
Consumer Price Index

- Use base year ("market basket") of goods and compare the total cost of the market basket between two years.
- Market basket includes only goods and services consumed by households.
- Market basket includes imported goods and services.

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3. Measuring Price Changes  
Consumer Price Index

	Average Prices			Quantity Sold	
	1992	1994	% Change	1992	1994
<b>Food</b>	\$ 12	\$ 14	17 %	4	5
<b>Housing</b>	9	10	11 %	3	3
<b>Fun</b>	4	5	25 %	3	4
<b>Machines</b>	20	20	0 %	2	2

CPI:

- Machines not included.
- Base year quantities (market basket) rather than base year prices used.

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### 3. Measuring Price Changes Consumer Price Index

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$$\begin{aligned} &= 1992 \text{ Quantities} \times 1992 \text{ Prices} \\ &= 4 \cdot \$12 + 3 \cdot \$9 + 3 \cdot \$4 \\ &= \$48 + \$27 + \$12 \\ &= \$87 \\ &= 1992 \text{ Quantities} \times 1994 \text{ Prices} \\ &= 4 \cdot \$14 + 3 \cdot \$10 + 3 \cdot \$5 \\ &= \$56 + \$30 + \$15 \\ &= \$101 \end{aligned}$$

$$\begin{aligned} \text{CPI} &= (1994 / 1992) \times 100 \\ &= (101 / 87) = 116 \end{aligned}$$

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### 3. Measuring Price Changes GDP Deflator / CPI Differences

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- **GDP Deflator**
  - All goods included
  - Base-year prices
  - Quantities variable
  - Imports excluded
- **Consumer Price Index**
  - Includes only consumer goods
  - Base year quantities
  - Prices variable
  - Imports included

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### 3. Measuring Price Changes Problems with price indexes

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- Substitution bias - changes in relative prices
  - between goods (butter vs margarine)
  - between stores (small vs large discounters)
- Quality changes and new products
- Chain-weighted indexes

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