

# Chapter 2

## Measurement

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### Measurement versus Theory

- Measurements of the performance of the economy.  
GDP, prices, savings, wealth, capital and labor.
- Build simple models to explain how the economy works.

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### Notation

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|----------------|---|-----------------|----|
| ■ GDP          | Y | ■ Imports       | IM |
| ■ Price level  | P | ■ Exchange Rate | ER |
| ■ Consumption  | C | ■ Net Exports   | NX |
| ■ Investment   | I | ■ Saving        | S  |
| ■ Gov Spending | G | ■ Capital       | K  |
| ■ Taxes        | T | ■ Employment    | E  |
| ■ Exports      | X | ■ Unemployment  | UE |

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## Measuring Gross Domestic Product GDP

The dollar value of the final output produced during a given period of time within the borders of the United States.

Published on a quarterly basis.

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## Three approaches to measuring GDP

- Value Added Approach (Product Approach)
- Income Approach
- Expenditure Approach

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## Example Economy

### Economic Agents

- Corn producer
- Hog producer
- Consumers
- Government

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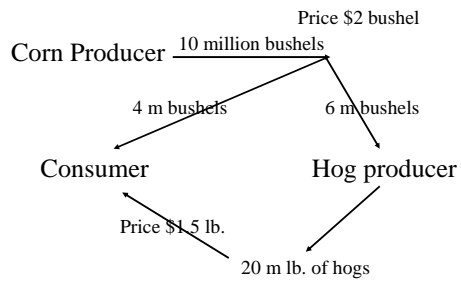
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## Setup



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## Table 2-1 Corn Producer

Total revenue	\$20 million
Wages	\$5 million
Interest on loan	\$0.5 million
Taxes	\$1.5 million

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## Table 2-2 Hog Producer

Total revenue	\$30 million
Cost of feed corn	\$12 million
Wages	\$4 million
Taxes	\$3 million

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### Table 2-3 After-Tax Profits

After-tax profits  
 = Total Revenue – Wages – Interest – Cost of Intermediate inputs - Taxes

Corn producer	\$13 million
Hog producer	\$11 million

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### Table 2-4 Government

\$ 4.5 m from producers and \$ 1 m from consumers

Tax revenue	\$5.5 million
Wages	\$5.5 million

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### Table 2-5 Consumers

\$ 5 m (Corn) + \$ 4 m (Hog) + \$ 5.5 m (Gov)

Wage income	\$14.5 million
Interest income	\$0.5 million
Taxes	\$1 million
Profits distributed by producers	\$24 million

Sum from Table 2.3 After-Tax Profits

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**Table 2-6 GDP – Product Approach**  
How much value do you add to the final product?

The sum of value added goods and services in production across all productive units in the economy

Value added—corn	\$20 million
Value added—hogs	\$18 million
Value added—government	\$5.5 million
<b>GDP</b>	<b>\$43.5 million</b>

← Evaluate the bridge at the cost of inputs

Table 2-2 Hog Producer

**Value added** = Value of final goods – value of intermediate goods  
**EXPLAIN WHY?**

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**Table 2-7 GDP – Expenditure Approach**  
How much did you spend?

The total spending on all final goods and services production in the economy

Consumption	\$38 million
Investment	0
Government expenditures	\$5.5 million
Net exports	0
<b>GDP</b>	<b>\$43.5 million</b>

Include Inventory

Purchased the bridge at \$ 5.5 m

\$ 8 m on Corn + \$ 30 m on Hogs

**Total Expenditure = C + I + G + NX**

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**Table 2-8 GDP – Income Approach**  
How much did you earn?

Add up all incomes received by economic agents contributing to production

Wage income	\$14.5 million
After-tax profits	\$24 million
Interest income	\$0.5 million
Taxes	\$4.5 million
<b>GDP</b>	<b>\$43.5 million</b>

Taxes paid by producers

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All approaches are equal

Total output is ultimately sold.

**Total Output is also Total Income.**

**Income-Expenditure Identity**

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

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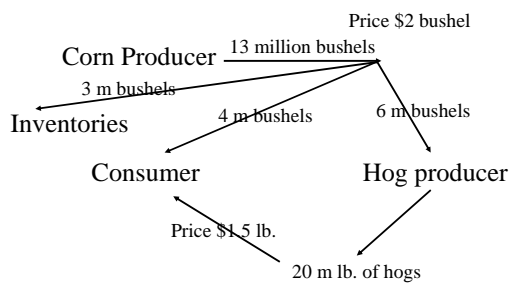
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Inventories: Redo the same example with 3 million bushels of Corn kept as inventories



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Table 2-9 Components of GDP Expenditure Approach

Component of GDP	\$ Billions	% of GDP
GDP	\$9,299.2	100%
Consumption	6,268.7	67.4
Durables	761.3	8.2
Nondurables	1,845.5	19.8
Services	3,661.9	38.8
Investment	1,650.1	17.7
Fixed investment	1,606.8	17.3
Nonresidential	1,203.1	12.9
Residential	403.8	4.3
Inventory investment	43.3	0.5
Net exports	-254.0	-2.7
Exports	990.2	10.6
Imports	1,244.2	13.4
Government expenditures	1,634.4	17.6
Federal defense	365.0	3.9
Federal nondefense	203.5	2.2
State and local	1,065.8	11.5

Source: Survey of Current Business, December 2000.

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## ASSIGNMENT

- Consider an economy with a widget producer, consumers and a government. The widget producer, produces 100 millions widgets which sell at a market price of \$5 per widget. 70 million widgets are purchased by consumers, 10 million are sold to the government and the remainder is stored as inventory. The widget producer pays \$150 million in wages and \$40 million in taxes. Consumers pay \$30 million in taxes. The government spends all tax revenues to hire workers and purchase widgets as an intermediate good into the production of public infrastructure. The widgets total \$50 million and wages total \$20 million. Calculate GDP using the product approach, expenditure approach and income approach.

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