



# Gross Domestic Product (GDP)

## Chapter 8

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\* In preparing these notes I greatly benefited from Hubbard and O'Brien's *Macroeconomics* textbook and slides. These materials are subject to copyright and are being provided for the personal educational use by students enrolled in this course. Any other use, including further reproduction and distribution of the materials (whether in hard copy or electronic form, in whole or in parts) is strictly prohibited. As an example, you may not upload any part of these notes to any other web sites.

# Beginning Macro

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- All that we've learned up through Midterm 1 has focused on micro topics, meaning the decisions of individuals
- In macro, we want to think about how individual decision making affects the entire economy and vice-versa
- We start with **Gross Domestic Product (GDP)** which measures the total production in an economy
- GDP is the main way we will judge the productivity of a country and the well-being of it's citizens

# Gross Domestic Product

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- **Gross Domestic Product (GDP)** The market value of all final goods and services produced within a country in a given period of time.

# Gross Domestic Product

- **Gross Domestic Product (GDP)** The **market value** of all final goods and services produced within a country in a given period of time.
- Want to measure all goods in the same units
- $\text{Market Value} = \text{Price} \times \text{Quantity}$
- Instead of adding apples and oranges, add market value of apples and market value of oranges

# Gross Domestic Product

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- **Gross Domestic Product (GDP)** The market value of all **final goods and services** produced within a country in a given period of time.
- **Final Goods** Goods intended for the end user  
*Ex.* If a tire is sold to a consumer, it is a final good  
*Ex.* If a tire making machine is sold to a tire factory, it is a final good
- **Intermediate Goods** Used as a component when producing another good  
*Ex.* If a tire is sold to car company who puts it on a car they sell, it is an intermediate good

# Gross Domestic Product

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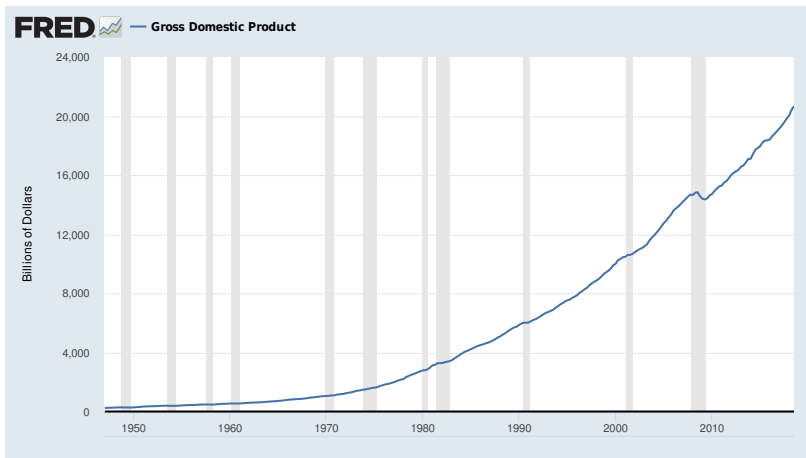
- **Gross Domestic Product (GDP)** The market value of all final goods and services produced **within a country** in a given period of time.
- Goods produced by a Japanese firm in the US are part of US GDP
- Services provided by a US firm in Japan are not part of US GDP
- We usually measure GDP of countries but we could also measure it for states, regions, etc.

# Gross Domestic Product

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- **Gross Domestic Product (GDP)** The market value of all final goods and services produced within a country **in a given period of time**.
- Period is usually a year or a quarter (3 months)
- We want to measure new goods produced
- Goods produced this year and sold in the future count towards this year's GDP
- Goods produced in the past and sold this year do not count towards this year's GDP

# US GDP 1947-2018





# Who Measures GDP

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- In the US, GDP is measured by the Bureau of Economic Analysis (BEA)
- Every quarter, the BEA publishes the National Income and Product Accounts (NIPA)

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- In the US, GDP is measured by the Bureau of Economic Analysis (BEA)
- Every quarter, the BEA publishes the National Income and Product Accounts (NIPA)
  - GDP and its components
  - GDP by state, metropolitan area
  - GDP by industry
  - International accounts (balance of payments)

# Measuring GDP

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- **Value Added** The market value a firm adds to a product

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- **Income Approach** Add up total income (including wages and company profits) generated by newly produced final goods and services

# Measuring GDP

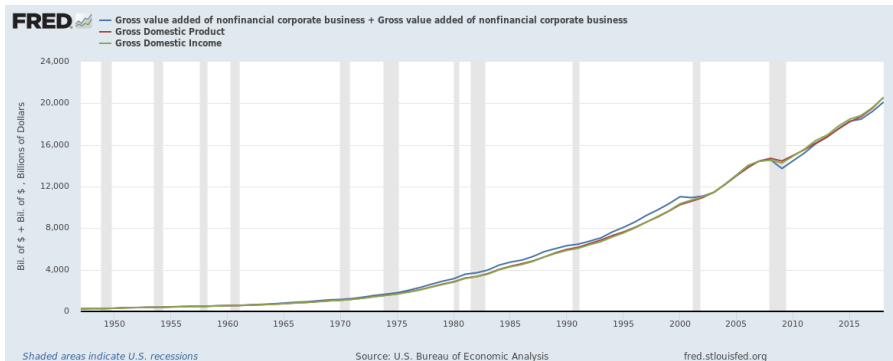
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- **Value Added** The market value a firm adds to a product
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These approaches should give the same GDP:

$$\text{GDP} = \text{Production} = \text{Expenditure} = \text{Income}$$

# US GDP: Value Added vs Expenditure vs Income





# What is and is not in GDP

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- Government spending on goods and services is part of GDP  
Ex. National Defense, NASA, Congressmen

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*Ex.* Unemployment Benefits, SNAP, Social Security
- GDP *does not* include selling of used goods
- GDP includes both rent paid on houses/property and imputed rent people would have paid on houses/property they own

# Any Questions?

# Value Added

We calculate **Value Added** by taking the price a good is sold for minus the intermediate goods used to make it

## Supply Chain for Cotton Shirts

Firm	Value of Product	Value Added
Cotton Farmer	Raw Cotton = \$2	
Textile Mill	Cotton Fabric = \$5	
Shirt Manufacturer	Cotton Shirt = \$15	
Retailer	Shirt in Store = \$30	
Total Value Added		

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Shirt Manufacturer	Cotton Shirt = \$15	$15 - 5 = \$10$
Retailer	Shirt in Store = \$30	$30 - 15 = \$15$
Total Value Added		$2 + 3 + 10 + 15 = \$30$

# Value Added

We calculate **Value Added** by taking the price a good is sold for minus the intermediate goods used to make it

Each shirt sold adds \$30 to GDP (if everything produced in US)

## Supply Chain for Cotton Shirts

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Cotton Farmer	Raw Cotton = \$2	$2 - 0 = \$2$
Textile Mill	Cotton Fabric = \$5	$5 - 2 = \$3$
Shirt Manufacturer	Cotton Shirt = \$15	$15 - 5 = \$10$
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# Multinational Supply Chains

Why can't we just add up the value of all final goods?

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# Multinational Supply Chains

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Imagine the textile mill and shirt company are foreign firms. Then the value added by these firms should not go towards GDP

In this case, each shirt adds to GDP

## Supply Chain for Cotton Shirts

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# Multinational Supply Chains

Why can't we just add up the value of all final goods?

Imagine the textile mill and shirt company are foreign firms. Then the value added by these firms should not go towards GDP

In this case, each shirt adds \$17 to GDP

## Supply Chain for Cotton Shirts

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Total Value Added		$2 + 3 + 10 + 15 = \$30$

## Example

Fill out the value added table for wooden floors below

How much does the flooring manufacturer add to GDP?

If the lumberjack and sawmill are in foreign countries, how much does each installation of wooden floors add to GDP?

### Supply Chain for Wooden Floors

Firm	Value of Product	Value Added
Lumberjack	Logs = \$10	
Sawmill	Wooden Planks = \$25	
Flooring Manufacturer	Wooden Floors = \$60	
Flooring Installer	Installation = \$75	
Total Value Added		



## Example

Fill out the value added table for wooden floors below

How much does the flooring manufacturer add to GDP?

If the lumberjack and sawmill are in foreign countries, how much does each installation of wooden floors add to GDP?

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Total Value Added		

## Example

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How much does the flooring manufacturer add to GDP? \$35

If the lumberjack and sawmill are in foreign countries, how much does each installation of wooden floors add to GDP?

### Supply Chain for Wooden Floors

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Lumberjack	Logs = \$10	$10 - 0 = \$10$
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Flooring Manufacturer	Wooden Floors = \$60	$60 - 25 = \$35$
Flooring Installer	Installation = \$75	$75 - 60 = \$15$
Total Value Added		\$75

## Example

Fill out the value added table for wooden floors below

How much does the flooring manufacturer add to GDP? \$35

If the lumberjack and sawmill are in foreign countries, how much does each installation of wooden floors add to GDP? \$50

### Supply Chain for Wooden Floors

Firm	Value of Product	Value Added
Lumberjack	Logs = \$10	$10 - 0 = \$10$
Sawmill	Wooden Planks = \$25	$25 - 10 = \$15$
Flooring Manufacturer	Wooden Floors = \$60	$60 - 25 = \$35$
Flooring Installer	Installation = \$75	$75 - 60 = \$15$
Total Value Added		\$75



# Any Questions?

# Using Value Added to Calculate GDP

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  1. All domestic value added by firms/industries

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  1. All domestic value added by firms/industries
  2. All value added by the government
- Government goods often do not have market value, so we instead use government spending on goods as value-added

# Using Value Added to Calculate GDP

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- To calculate GDP using the value added approach we add up
  1. All domestic value added by firms/industries
  2. All value added by the government
- Government goods often do not have market value, so we instead use government spending on goods as value-added
- Best illustrated with an example

# Example 1: Value Added

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Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

## Example 1: Value Added

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Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit

## Example 1: Value Added

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Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit
- b The ice cream parlor buys \$30 worth of milk from the dairy to make ice cream which it sells to consumers for \$90. It pays \$40 in wages and \$20 in rent, keeping the rest as profit



## Example 1: Value Added

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Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit
- b The ice cream parlor buys \$30 worth of milk from the dairy to make ice cream which it sells to consumers for \$90. It pays \$40 in wages and \$20 in rent, keeping the rest as profit
- c The government collects \$50 in taxes and pays \$50 in wages to food inspectors of the dairy and ice cream parlor

## Example 1: Value Added

Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit
- b The ice cream parlor buys \$30 worth of milk from the dairy to make ice cream which it sells to consumers for \$90. It pays \$40 in wages and \$20 in rent, keeping the rest as profit
- c The government collects \$50 in taxes and pays \$50 in wages to food inspectors of the dairy and ice cream parlor
- d Consumers buy \$70 worth of milk and \$90 worth of ice cream. They work at the dairy and ice cream parlor for wages, collect rent from the firms, own the profits of the firms, and pay \$50 worth of taxes

# Example 1: Value Added by Dairy

How much value is added by the dairy?

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

# Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers:

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

# Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

## Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70
- Intermediate goods sold to other firms:

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

## Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70
- Intermediate goods sold to other firms: +\$30

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

## Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70
- Intermediate goods sold to other firms: +\$30
- Intermediate goods used:

Value Added Table

	Dairy	Parlor	Government	GDP
Value				



## Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70
- Intermediate goods sold to other firms: +\$30
- Intermediate goods used: -\$0

Value Added Table

	Dairy	Parlor	Government	GDP
Value				

## Example 1: Value Added by Dairy

How much value is added by the dairy?

- Final goods sold to customers: +\$70
- Intermediate goods sold to other firms: +\$30
- Intermediate goods used: -\$0

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

# Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers:

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90
- Intermediate goods sold to other firms:

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90
- Intermediate goods sold to other firms: +\$0

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90
- Intermediate goods sold to other firms: +\$0
- Intermediate goods used:

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			



## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90
- Intermediate goods sold to other firms: +\$0
- Intermediate goods used: -\$30

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100			

## Example 1: Value Added by Parlor

How much value is added by the ice cream parlor

- Final goods sold to customers: +\$90
- Intermediate goods sold to other firms: +\$0
- Intermediate goods used: -\$30

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60		

# Example 1: Value Added by Government

How much value is added by the government

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60		

# Example 1: Value Added by Government

How much value is added by the government

- Government spending on goods and services:

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60		

## Example 1: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$50

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60		

# Example 1: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$50

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60	\$50	

## Example 1: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$50

Now can add everything up to calculate GDP

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60	\$50	

## Example 1: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$50

Now can add everything up to calculate GDP

Value Added Table

	Dairy	Parlor	Government	GDP
Value	\$100	\$60	\$50	\$210



## Example 2: Value Added

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Imagine a small island economy with a mine, a shovel factory, consumers and a government

## Example 2: Value Added

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Imagine a small island economy with a mine, a shovel factory, consumers and a government

- a The iron mine sells iron: \$40 to the factory and \$110 to foreign factories. It pays \$60 in wages and \$30 in rent, and buys \$50 dollars for new shovels as investment, keeping the rest as profit

## Example 2: Value Added

Imagine a small island economy with a mine, a shovel factory, consumers and a government

- a The iron mine sells iron: \$40 to the factory and \$110 to foreign factories. It pays \$60 in wages and \$30 in rent, and buys \$50 dollars for new shovels as investment, keeping the rest as profit
- b The shovel factory buys \$40 worth of iron from the mine and imports \$10 worth of wood to make shovels, selling \$50 to the mine and \$50 to consumers. It pays \$20 in wages, \$10 in interest on a loan, and \$10 in rent, keeping the rest as profit

## Example 2: Value Added

Imagine a small island economy with a mine, a shovel factory, consumers and a government

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- c The government collects \$80 in taxes and pays \$80 in wages to security forces on the island

## Example 2: Value Added

Imagine a small island economy with a mine, a shovel factory, consumers and a government

- a The iron mine sells iron: \$40 to the factory and \$110 to foreign factories. It pays \$60 in wages and \$30 in rent, and buys \$50 dollars for new shovels as investment, keeping the rest as profit
- b The shovel factory buys \$40 worth of iron from the mine and imports \$10 worth of wood to make shovels, selling \$50 to the mine and \$50 to consumers. It pays \$20 in wages, \$10 in interest on a loan, and \$10 in rent, keeping the rest as profit
- c The government collects \$80 in taxes and pays \$80 in wages to security forces on the island
- d Consumers buy \$50 of shovels and imports \$70 of food. They work at the mine and factory for wages, collect rent from the firms, own the profits of the firms, and pay \$80 worth of taxes

## Example 2: Value Added by Mine

How much value is added by the iron mine?

- Intermediate goods sold to domestic firms:
- Intermediate goods sold to foreign firms:
- Intermediate goods used:

Value Added Table

	Mine	Factory	Government	GDP
Value				

## Example 2: Value Added by Mine

How much value is added by the iron mine?

- Intermediate goods sold to domestic firms: +\$40
- Intermediate goods sold to foreign firms:
- Intermediate goods used:

Value Added Table

	Mine	Factory	Government	GDP
Value				

## Example 2: Value Added by Mine

How much value is added by the iron mine?

- Intermediate goods sold to domestic firms: +\$40
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	Mine	Factory	Government	GDP
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## Example 2: Value Added by Mine

How much value is added by the iron mine?

- Intermediate goods sold to domestic firms: +\$40
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Value Added Table

	Mine	Factory	Government	GDP
Value				

## Example 2: Value Added by Mine

How much value is added by the iron mine?

- Intermediate goods sold to domestic firms: +\$40
- Intermediate goods sold to foreign firms: +\$110
- Intermediate goods used: -\$0

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150			

## Example 2: Value Added by Factory

How much value is added by the shovel factory

- Final goods sold to consumers:
- Final goods sold to firms:
- Intermediate goods used:

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150			

## Example 2: Value Added by Factory

How much value is added by the shovel factory

- Final goods sold to consumers: +\$50
- Final goods sold to firms:
- Intermediate goods used:

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150			

## Example 2: Value Added by Factory

How much value is added by the shovel factory

- Final goods sold to consumers: +\$50
- Final goods sold to firms: +\$50
- Intermediate goods used:

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150			

## Example 2: Value Added by Factory

How much value is added by the shovel factory

- Final goods sold to consumers: +\$50
- Final goods sold to firms: +\$50
- Intermediate goods used: -\$50

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150			

## Example 2: Value Added by Factory

How much value is added by the shovel factory

- Final goods sold to consumers: +\$50
- Final goods sold to firms: +\$50
- Intermediate goods used: -\$50

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150	\$50		

## Example 2: Value Added by Government

How much value is added by the government

- Government spending on goods and services:

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150	\$50		



## Example 2: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$80

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150	\$50	\$80	

## Example 2: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$80

Now can add everything up to calculate GDP

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150	\$50	\$80	

## Example 2: Value Added by Government

How much value is added by the government

- Government spending on goods and services: +\$80

Now can add everything up to calculate GDP

Value Added Table

	Mine	Factory	Government	GDP
Value	\$150	\$50	\$80	\$280

# Any Questions?

# Using Expenditures to Calculate GDP

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- There are four major categories of expenditures

# Using Expenditures to Calculate GDP

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- There are four major categories of expenditures
  1. **Consumption (C)** Spending by households

# Using Expenditures to Calculate GDP

---

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# Using Expenditures to Calculate GDP

---

- There are four major categories of expenditures
  1. **Consumption (C)** Spending by households
  2. **Gross Investment (I)** Gross investment by firms and households
  3. **Government Spending (G)** Government consumption and gross investment



# Using Expenditures to Calculate GDP

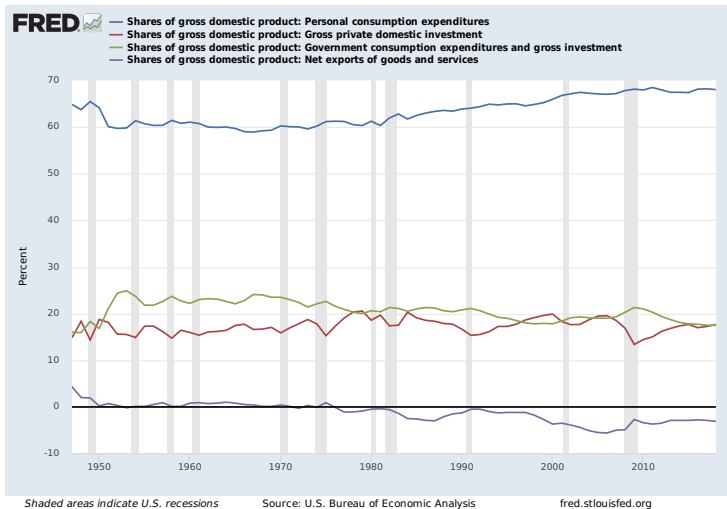
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- There are four major categories of expenditures
  1. **Consumption (C)** Spending by households
  2. **Gross Investment (I)** Gross investment by firms and households
  3. **Government Spending (G)** Government consumption and gross investment
  4. **Net Exports (NX)** Exports (EX) minus imports (IM) for all goods and services

# Using Expenditures to Calculate GDP

- There are four major categories of expenditures
  1. **Consumption (C)** Spending by households
  2. **Gross Investment (I)** Gross investment by firms and households
  3. **Government Spending (G)** Government consumption and gross investment
  4. **Net Exports (NX)** Exports (EX) minus imports (IM) for all goods and services
- This gives us the identity  $Y(GDP) = C + I + G + EX - IM$

# US GDP Expenditures



# Consumption

---

- In 2018, consumption made up 68% of US GDP

# Consumption

---

- In 2018, consumption made up 68% of US GDP
- **Services** Activities done for others, 69% of Consumption  
*Ex.* Accounting, lawn mowing, plumbing

# Consumption

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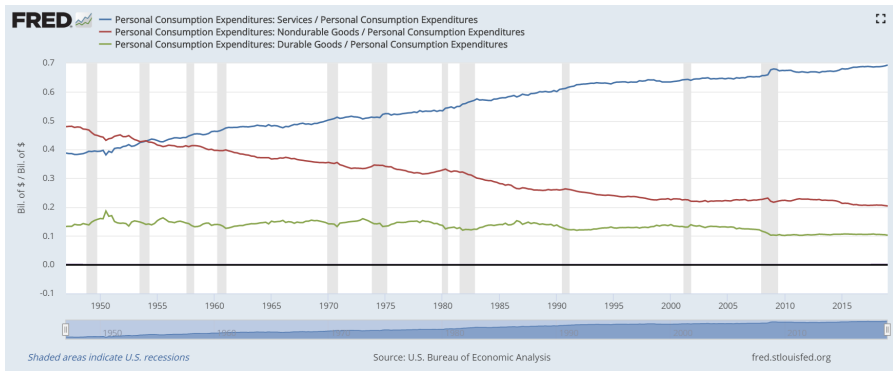
- In 2018, consumption made up 68% of US GDP
- **Services** Activities done for others, 69% of Consumption  
*Ex.* Accounting, lawn mowing, plumbing
- **Nondurable Goods** Goods that are consumed quickly, 21% of Consumption  
*Ex.* Food, clothes, cosmetics

# Consumption

---

- In 2018, consumption made up 68% of US GDP
- **Services** Activities done for others, 69% of Consumption  
*Ex.* Accounting, lawn mowing, plumbing
- **Nondurable Goods** Goods that are consumed quickly, 21% of Consumption  
*Ex.* Food, clothes, cosmetics
- **Durable Goods** Goods consumed over time (roughly 3+ years), 10% of Consumption  
*Ex.* Cars, furniture, cell phones

# US Consumption





# Investment

---

- In 2018, investment made up 18% of US GDP

# Investment

---

- In 2018, investment made up 18% of US GDP
- **Business Fixed Investment** Building new factories, buildings, and machinery, 76% of Investment

# Investment

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- In 2018, investment made up 18% of US GDP
- **Business Fixed Investment** Building new factories, buildings, and machinery, 76% of Investment
- **Residential Investment** Building new houses, 22% of Investment

# Investment

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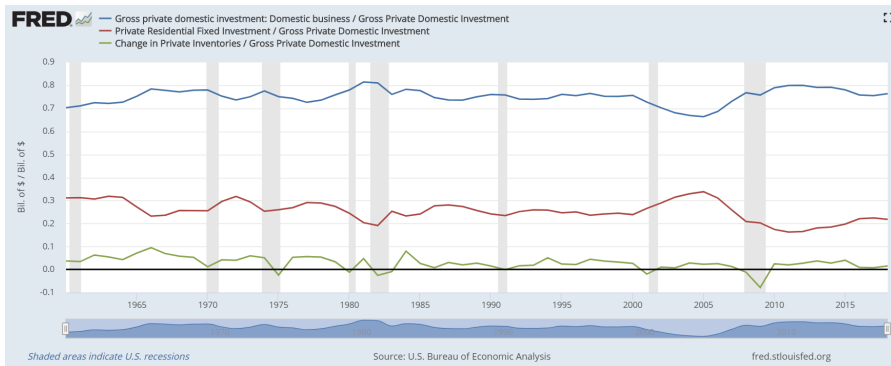
- In 2018, investment made up 18% of US GDP
- **Business Fixed Investment** Building new factories, buildings, and machinery, 76% of Investment
- **Residential Investment** Building new houses, 22% of Investment
- **Changes in Business Inventories** Goods produced this year but not sold minus goods produced in previous years and sold this year, 2% of Investment

# Investment

---

- In 2018, investment made up 18% of US GDP
- **Business Fixed Investment** Building new factories, buildings, and machinery, 76% of Investment
- **Residential Investment** Building new houses, 22% of Investment
- **Changes in Business Inventories** Goods produced this year but not sold minus goods produced in previous years and sold this year, 2% of Investment
- *Does not* include financial investments such as stocks or bonds. Think of these as the way firms pay for investment

# US Investment



# Government

---

- In 2018, government spending made up 17% of US GDP

# Government

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- In 2018, government spending made up 17% of US GDP
- **Federal** Spending by the national government, 37% of Government  
*Ex.* Tanks, national park rangers' salaries, EPA

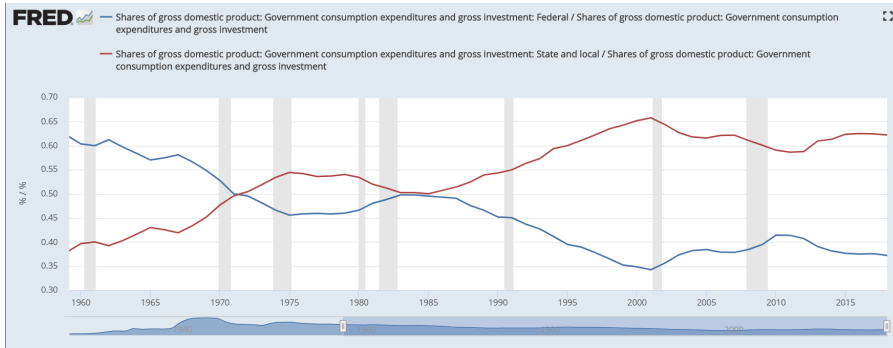


# Government

---

- In 2018, government spending made up 17% of US GDP
- **Federal** Spending by the national government, 37% of Government  
*Ex. Tanks, national park rangers' salaries, EPA*
- **State and Local** Spending by state and local governments, 72% of Government  
*Ex. Schools, trash collection, police*

# US Government Spending



# Net Exports

---

- In 2018, net exports made up -3% of US GDP

# Net Exports

---

- In 2018, net exports made up -3% of US GDP
- **Exports** Goods and services sold to other countries, 12% of GDP

# Net Exports

---

- In 2018, net exports made up -3% of US GDP
- **Exports** Goods and services sold to other countries, 12% of GDP
- **Imports** Goods and services bought from other countries, 15% of GDP

# Net Exports

---

- In 2018, net exports made up -3% of US GDP
- **Exports** Goods and services sold to other countries, 12% of GDP
- **Imports** Goods and services bought from other countries, 15% of GDP
- Does importing decrease GDP?

# Net Exports

---

- In 2018, net exports made up -3% of US GDP
- **Exports** Goods and services sold to other countries, 12% of GDP
- **Imports** Goods and services bought from other countries, 15% of GDP
- Does importing decrease GDP? No

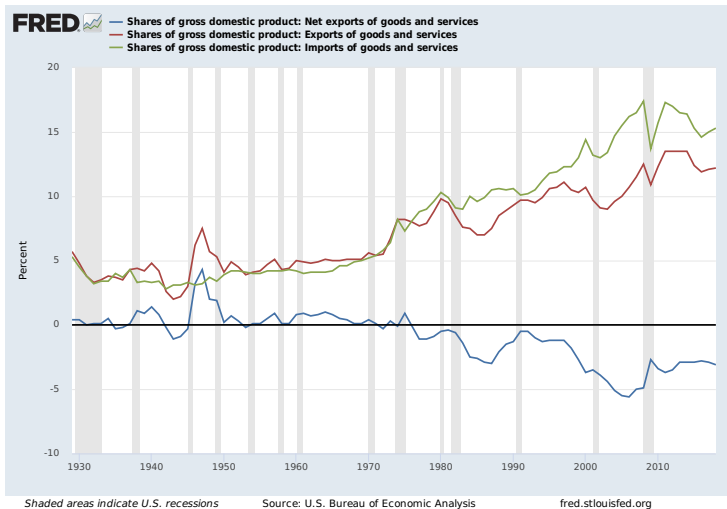
Ex. Imagine I buy a car built in Japan, it is not part of US GDP. The car becomes part of my consumption, so it adds to C. In order for the car not to count towards US GDP, it must be subtracted from net exports, so it subtracts from NX.

# Net Exports

- In 2018, net exports made up -3% of US GDP
- **Exports** Goods and services sold to other countries, 12% of GDP
- **Imports** Goods and services bought from other countries, 15% of GDP
- Does importing decrease GDP? No  
*Ex.* Imagine I buy a car built in Japan, it is not part of US GDP. The car becomes part of my consumption, so it adds to C. In order for the car not to count towards US GDP, it must be subtracted from net exports, so it subtracts from NX.
- Importing goods leaves GDP unchanged



# US Net Exports



## Example 1: Expenditures

Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit
- b The ice cream parlor buys \$30 worth of milk from the dairy to make ice cream which it sells to consumers for \$90. It pays \$40 in wages and \$20 in rent, keeping the rest as profit
- c The government collects \$50 in taxes and pays \$50 in wages to food inspectors of the dairy and ice cream parlor
- d Consumers buy \$70 worth of milk and \$90 worth of ice cream. They work at the dairy and ice cream parlor for wages, collect rent from the firms, own the profits of the firms, and pay \$50 worth of taxes

# Example 1: Consumption Expenditures

How much is spent on consumption?

Expenditures Table

	C	I	G	EX	IM	GDP
Value						

# Example 1: Consumption Expenditures

How much is spent on consumption?

- Consumption of milk:

Expenditures Table

	C	I	G	EX	IM	GDP
Value						

# Example 1: Consumption Expenditures

How much is spent on consumption?

- Consumption of milk: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value						

# Example 1: Consumption Expenditures

How much is spent on consumption?

- Consumption of milk: +\$70
- Consumption of ice cream:

Expenditures Table

C	I	G	EX	IM	GDP
Value					

# Example 1: Consumption Expenditures

How much is spent on consumption?

- Consumption of milk: +\$70
- Consumption of ice cream: +\$90

Expenditures Table

	C	I	G	EX	IM	GDP
Value						

# Example 1: Consumption Expenditures

How much is spent on consumption?

- Consumption of milk: +\$70
- Consumption of ice cream: +\$90

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					



# Example 1: Investment Expenditures

How much is spent on investment?

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					

# Example 1: Investment Expenditures

How much is spent on investment?

- Investment by dairy:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					

# Example 1: Investment Expenditures

How much is spent on investment?

- Investment by dairy: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					

# Example 1: Investment Expenditures

How much is spent on investment?

- Investment by dairy: +\$0
- Investment by parlor:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					

# Example 1: Investment Expenditures

How much is spent on investment?

- Investment by dairy: +\$0
- Investment by parlor: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160					

# Example 1: Investment Expenditures

How much is spent on investment?

- Investment by dairy: +\$0
- Investment by parlor: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0				

# Example 1: Government Expenditures

How much is spent by the government on goods and services?

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0				

# Example 1: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0				



## Example 1: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services: +\$50

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0				

# Example 1: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services: +\$50

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

# Example 1: Net Exports Expenditures

How much is spent on Net Exports?

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

# Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

# Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

## Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

# Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50			

# Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50	\$0	\$0	



## Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50	\$0	\$0	

## Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50	\$0	\$0	\$210

## Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

How does it compare to the Value-Added Calculation?

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50	\$0	\$0	\$210

## Example 1: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$0
- Total Imports: +\$0

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

How does it compare to the Value-Added Calculation? Same

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$160	\$0	\$50	\$0	\$0	\$210

## Example 2: Expenditures

Imagine a small island economy with a mine, a shovel factory, consumers and a government

- a The iron mine sells iron: \$40 to the factory and \$110 to foreign factories. It pays \$60 in wages and \$30 in rent, and buys \$50 dollars for new shovels as investment, keeping the rest as profit
- b The shovel factory buys \$40 worth of iron from the mine and imports \$10 worth of wood to make shovels, selling \$50 to the mine and \$50 to consumers. It pays \$20 in wages, \$10 in interest on a loan, and \$10 in rent, keeping the rest as profit
- c The government collects \$80 in taxes and pays \$80 in wages to security forces on the island
- d Consumers buy \$50 of shovels and imports \$70 of food. They work at the mine and factory for wages, collect rent from the firms, own the profits of the firms, and pay \$80 worth of taxes

## Example 2: Consumption Expenditures

How much is spent on consumption?

- Consumption of shovels:
- Consumption of food:

Expenditures Table

	C	I	G	EX	IM	GDP
Value						

## Example 2: Consumption Expenditures

How much is spent on consumption?

- Consumption of shovels: +\$50
- Consumption of food:

Expenditures Table

C	I	G	EX	IM	GDP
Value					

## Example 2: Consumption Expenditures

How much is spent on consumption?

- Consumption of shovels: +\$50
- Consumption of food: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value						



## Example 2: Consumption Expenditures

How much is spent on consumption?

- Consumption of shovels: +\$50
- Consumption of food: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120					

## Example 2: Investment Expenditures

How much is spent on investment?

- Investment by mine:
- Investment by factory:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120					

## Example 2: Investment Expenditures

How much is spent on investment?

- Investment by mine: +\$50
- Investment by factory:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120					

## Example 2: Investment Expenditures

How much is spent on investment?

- Investment by mine: +\$50
- Investment by factory: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120					

## Example 2: Investment Expenditures

How much is spent on investment?

- Investment by mine: +\$50
- Investment by factory: +\$0

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50				

## Example 2: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50				

## Example 2: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services: +\$80

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50				

## Example 2: Government Expenditures

How much is spent by the government on goods and services?

- Government spending on goods and services: +\$80

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80			



## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports:
- Total Firm Imports:
- Total Consumer Imports:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80			

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports:
- Total Consumer Imports:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80			

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports:

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80			

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80			

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80	\$110		

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports: +\$70

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80	\$110	\$80	

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports: +\$70

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80	\$110	\$80	

## Example 2: Net Exports Expenditures

How much is spent on Net Exports?

- Total Exports: +\$110
- Total Firm Imports: +\$10
- Total Consumer Imports: +\$70

Now add everything up to calculate  $GDP = C + I + G + EX - IM$

Expenditures Table

	C	I	G	EX	IM	GDP
Value	\$120	\$50	\$80	\$110	\$80	\$280



# Any Questions?

# Using Income to Calculate GDP

---

What constitutes income? There are four main categories

# Using Income to Calculate GDP

---

What constitutes income? There are four main categories

- **Labor Income** Workers' compensation from their jobs

*Ex.* Wages, salary, and health insurance

# Using Income to Calculate GDP

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What constitutes income? There are four main categories

- **Labor Income** Workers' compensation from their jobs  
*Ex.* Wages, salary, and health insurance
- **Rent** Income of property owners  
*Ex.* Landlords to households or businesses and copyright royalties

# Using Income to Calculate GDP

---

What constitutes income? There are four main categories

- **Labor Income** Workers' compensation from their jobs  
*Ex.* Wages, salary, and health insurance
- **Rent** Income of property owners  
*Ex.* Landlords to households or businesses and copyright royalties
- **Interest** Income from lending money to firms

# Using Income to Calculate GDP

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What constitutes income? There are four main categories

- **Labor Income** Workers' compensation from their jobs  
*Ex.* Wages, salary, and health insurance
- **Rent** Income of property owners  
*Ex.* Landlords to households or businesses and copyright royalties
- **Interest** Income from lending money to firms
- **Firm Profits** Firms' revenues minus costs and taxes. Includes profits reinvested in the firm and inventories

# Using Income to Calculate GDP

What constitutes income? There are four main categories

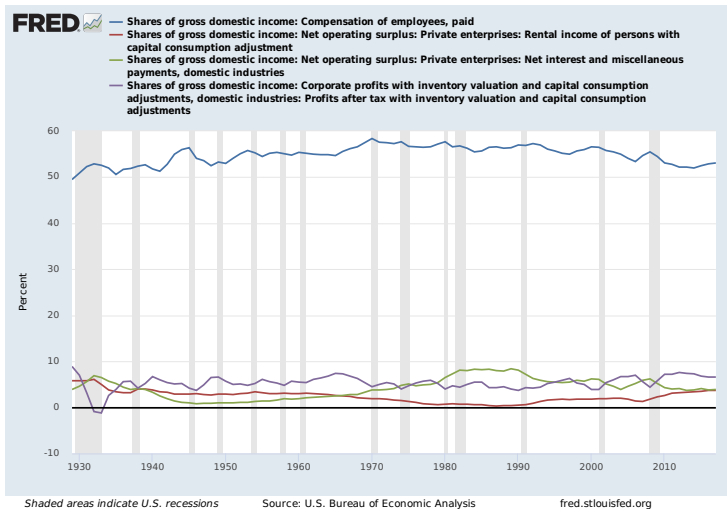
- **Labor Income** Workers' compensation from their jobs  
*Ex.* Wages, salary, and health insurance
- **Rent** Income of property owners  
*Ex.* Landlords to households or businesses and copyright royalties
- **Interest** Income from lending money to firms
- **Firm Profits** Firms' revenues minus costs and taxes. Includes profits reinvested in the firm and inventories

These categories add up to give **National Income (NI)**.

$GDP = NI + \text{Indirect Business Taxes} + \text{Depreciation}$

Also call this **Gross Domestic Income (GDI)**

# US GDP Income





## Example 1: Income

Imagine a small closed economy with a dairy, an ice cream parlor, consumers and a government

- a The dairy sells milk: \$70 to consumers and \$30 to the ice cream parlor. It pays \$50 in wages and \$40 in rent, keeping the rest as profit
- b The ice cream parlor buys \$30 worth of milk from the dairy to make ice cream which it sells to consumers for \$90. It pays \$40 in wages and \$20 in rent, keeping the rest as profit
- c The government collects \$50 in taxes and pays \$50 in wages to food inspectors of the dairy and ice cream parlor
- d Consumers buy \$70 worth of milk and \$90 worth of ice cream. They work at the dairy and ice cream parlor for wages, collect rent from the firms, own the profits of the firms, and pay \$50 worth of taxes

# Example 1: Labor Income

How much was earned by workers?

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

# Example 1: Labor Income

How much was earned by workers?

- Wages from dairy:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

# Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50
- Wages from parlor:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50
- Wages from parlor: +\$40

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50
- Wages from parlor: +\$40
- Wages from government:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50
- Wages from parlor: +\$40
- Wages from government: +\$50

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					



## Example 1: Labor Income

How much was earned by workers?

- Wages from dairy: +\$50
- Wages from parlor: +\$40
- Wages from government: +\$50

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

# Example 1: Rent

How much was earned in rent?

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

## Example 1: Rent

How much was earned in rent?

- Rent from dairy:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

# Example 1: Rent

How much was earned in rent?

- Rent from dairy: +\$40

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

## Example 1: Rent

How much was earned in rent?

- Rent from dairy: +\$40
- Rent from parlor:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

## Example 1: Rent

How much was earned in rent?

- Rent from dairy: +\$40
- Rent from parlor: +\$20

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140				

## Example 1: Rent

How much was earned in rent?

- Rent from dairy: +\$40
- Rent from parlor: +\$20

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			

# Example 1: Interest

How much was earned in interest?

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			



# Example 1: Interest

How much was earned in interest?

- Interest from dairy:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			

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How much was earned in interest?

- Interest from dairy: +\$0

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			

## Example 1: Interest

How much was earned in interest?

- Interest from dairy: +\$0
- Interest from parlor:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			

## Example 1: Interest

How much was earned in interest?

- Interest from dairy: +\$0
- Interest from parlor: +\$0

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60			

## Example 1: Interest

How much was earned in interest?

- Interest from dairy: +\$0
- Interest from parlor: +\$0

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		

# Example 1: Profits

How much was earned in profits?

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		



## Example 1: Profits

How much was earned in profits?

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Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$
- Profit of parlor:  $\$90 - \$30 - \$40 - \$20 = +\$0$

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0		

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$
- Profit of parlor:  $\$90 - \$30 - \$40 - \$20 = +\$0$

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0	\$10	

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$
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Now can add everything up to calculate GDP

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0	\$10	

## Example 1: Profits

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Now can add everything up to calculate GDP

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0	\$10	\$210

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$
- Profit of parlor:  $\$90 - \$30 - \$40 - \$20 = +\$0$

Now can add everything up to calculate GDP

How does it compare to the Expenditures Calculation?

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0	\$10	\$210

## Example 1: Profits

How much was earned in profits?

- Profit of dairy:  $\$70 + \$30 - \$50 - \$40 = +\$10$
- Profit of parlor:  $\$90 - \$30 - \$40 - \$20 = +\$0$

Now can add everything up to calculate GDP

How does it compare to the Expenditures Calculation? Same

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$140	\$60	\$0	\$10	\$210

## Example 2: Income

Imagine a small island economy with a mine, a shovel factory, consumers and a government

- a The iron mine sells iron: \$40 to the factory and \$110 to foreign factories. It pays \$60 in wages and \$30 in rent, and buys \$50 dollars for new shovels as investment, keeping the rest as profit
- b The shovel factory buys \$40 worth of iron from the mine and imports \$10 worth of wood to make shovels, selling \$50 to the mine and \$50 to consumers. It pays \$20 in wages, \$10 in interest on a loan, and \$10 in rent, keeping the rest as profit
- c The government collects \$80 in taxes and pays \$80 in wages to security forces on the island
- d Consumers buy \$50 of shovels and imports \$70 of food. They work at the mine and factory for wages, collect rent from the firms, own the profits of the firms, and pay \$80 worth of taxes



## Example 2: Labor Income

How much was earned by workers?

- Wages from mine:
- Wages from factory:
- Wages from government:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 2: Labor Income

How much was earned by workers?

- Wages from mine: +\$60
- Wages from factory:
- Wages from government:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 2: Labor Income

How much was earned by workers?

- Wages from mine: +\$60
- Wages from factory: +\$20
- Wages from government:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 2: Labor Income

How much was earned by workers?

- Wages from mine: +\$60
- Wages from factory: +\$20
- Wages from government: +\$80

Income Table

	Labor	Rent	Interest	Profit	GDP
Value					

## Example 2: Labor Income

How much was earned by workers?

- Wages from mine: +\$60
- Wages from factory: +\$20
- Wages from government: +\$80

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160				

## Example 2: Rent

How much was earned in rent?

- Rent from mine:
- Rent from factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160				

## Example 2: Rent

How much was earned in rent?

- Rent from mine: +\$30
- Rent from factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160				

## Example 2: Rent

How much was earned in rent?

- Rent from mine: +\$30
- Rent from factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160				



## Example 2: Rent

How much was earned in rent?

- Rent from mine: +\$30
- Rent from factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40			

## Example 2: Interest

How much was earned in interest?

- Interest from mine:
- Interest from factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40			

## Example 2: Interest

How much was earned in interest?

- Interest from mine: +\$0
- Interest from factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40			

## Example 2: Interest

How much was earned in interest?

- Interest from mine: +\$0
- Interest from factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40			

## Example 2: Interest

How much was earned in interest?

- Interest from mine: +\$0
- Interest from factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10		

## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits):
- Profits of factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10		

## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits): +\$60
- Profits of factory:

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10		

## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits): +\$60
- Profits of factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10		



## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits): +\$60
- Profits of factory: +\$10

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10	\$70	

## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits): +\$60
- Profits of factory: +\$10

Now can add everything up to calculate GDP

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10	\$70	

## Example 2: Profits

How much was earned in profits?

- Profits of mine (including re-invested profits): +\$60
- Profits of factory: +\$10

Now can add everything up to calculate GDP

Income Table

	Labor	Rent	Interest	Profit	GDP
Value	\$160	\$40	\$10	\$70	\$280

# Any Questions?

# GDP Growth

- Imagine Athens produces concert tickets, football tickets, and chicken each year as shown in the table below

Athens Production

Product	2017		2018		2019	
	Quantity	Price	Quantity	Price	Quantity	Price
Concert Tickets	50	\$30	60	\$35	60	\$40
Football Tickets	30	\$50	35	\$60	35	\$70
Chicken	150	\$10	175	\$15	175	\$20
GDP						

# GDP Growth

- Imagine Athens produces concert tickets, football tickets, and chicken each year as shown in the table below
- What is Athens' GDP each year?

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Product	2017		2018		2019	
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Chicken	150	\$10	175	\$15	175	\$20
GDP	\$4,500					

# GDP Growth

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Product	2017		2018		2019	
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Concert Tickets	50	\$30	60	\$35	60	\$40
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Chicken	150	\$10	175	\$15	175	\$20
GDP		\$4,500		\$6,825		



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Product	2017		2018		2019	
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Concert Tickets	50	\$30	60	\$35	60	\$40
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# GDP Growth

- Imagine Athens produces concert tickets, football tickets, and chicken each year as shown in the table below
- What is Athens' GDP each year?
- Did Athens' GDP grow each year?

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Product	2017		2018		2019	
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Concert Tickets	50	\$30	60	\$35	60	\$40
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# GDP Growth

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- What is Athens' GDP each year?
- Did Athens' GDP grow each year? Yes

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Product	2017		2018		2019	
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Concert Tickets	50	\$30	60	\$35	60	\$40
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# GDP Growth

- Imagine Athens produces concert tickets, football tickets, and chicken each year as shown in the table below
- What is Athens' GDP each year?
- Did Athens' GDP grow each year? Yes
- Did Athens' production grow each year?

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Product	2017		2018		2019	
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Concert Tickets	50	\$30	60	\$35	60	\$40
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GDP		\$4,500		\$6,825		\$8,350

# GDP Growth

- Imagine Athens produces concert tickets, football tickets, and chicken each year as shown in the table below
- What is Athens' GDP each year?
- Did Athens' GDP grow each year? Yes
- Did Athens' production grow each year? No

Athens Production

Product	2017		2018		2019	
	Quantity	Price	Quantity	Price	Quantity	Price
Concert Tickets	50	\$30	60	\$35	60	\$40
Football Tickets	30	\$50	35	\$60	35	\$70
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# Nominal vs Real

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- **Nominal** Measured in terms of money  
*Ex.* If milk costs \$2 and bread costs \$4, these are nominal prices

# Nominal vs Real

- We want GDP to measure production in an economy. But because it uses market prices, it measures prices of goods as well as production of goods
- **Nominal** Measured in terms of money  
*Ex.* If milk costs \$2 and bread costs \$4, these are nominal prices
- **Real** Measured in terms of goods  
*Ex.* If milk costs 1 milk and bread costs 2 milk, these are real prices



# Nominal GDP vs Real GDP

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- **Nominal GDP (NGDP)** Calculated with current prices and production of final goods and services. What we have been measuring so far

# Nominal GDP vs Real GDP

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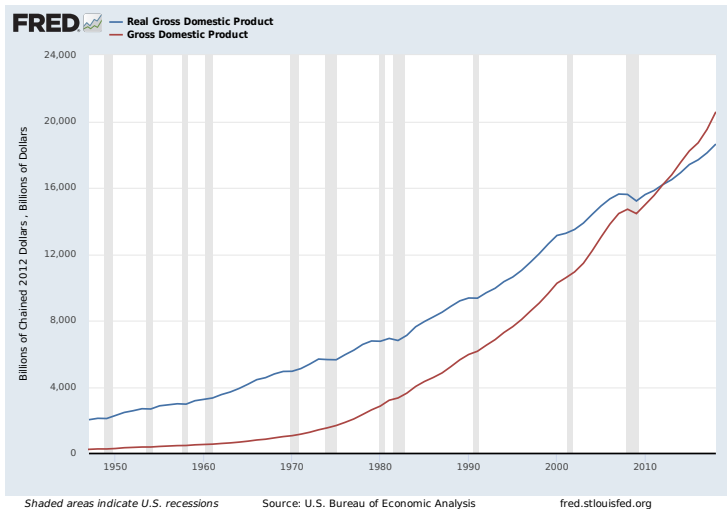
- **Nominal GDP (NGDP)** Calculated with current prices and production of final goods and services. What we have been measuring so far
- **Real GDP (RGDP)** Denote 1 year as a base year. Calculated with prices from the base year and production from the current year

# Nominal GDP vs Real GDP

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- **Nominal GDP (NGDP)** Calculated with current prices and production of final goods and services. What we have been measuring so far
- **Real GDP (RGDP)** Denote 1 year as a base year. Calculated with prices from the base year and production from the current year
- We usually only care about production, so we focus on real GDP. Because prices tend to rise over time, real GDP tends to be larger than nominal GDP before the base year and smaller afterwards

# US Nominal vs Real GDP



# Calculating Real GDP

Calculate Real GDP for Athens with 2017 as the base year

## Athens Production

Product	2017		2018		2019	
	Quantity	Price	Quantity	Price	Quantity	Price
Concert Tickets	50	\$30	60	\$35	60	\$40
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GDP		\$4,500		\$6,825		\$8,350
Real GDP						

# Calculating Real GDP

Calculate Real GDP for Athens with 2017 as the base year

$$\text{Real GDP}_{\text{year}} = \text{Price}_{2017} * \text{Production}_{\text{year}}$$

## Athens Production

Product	2017		2018		2019	
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GDP		\$4,500		\$6,825		\$8,350
Real GDP		\$4,500				

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GDP		\$4,500		\$6,825		\$8,350
Real GDP		\$4,500		\$5,300		



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Chicken	150	\$10	175	\$15	175	\$20
GDP		\$4,500		\$6,825		\$8,350
Real GDP		\$4,500		\$5,300		\$5,300

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500		
2018	\$6,825	\$5,300		
2019	\$8,350	\$5,300		

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

$$\text{GDP Growth}_{\text{this year}} = \frac{\text{GDP}_{\text{this year}} - \text{GDP}_{\text{last year}}}{\text{GDP}_{\text{last year}}} \times 100$$

## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500		
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## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500	-	
2018	\$6,825	\$5,300		
2019	\$8,350	\$5,300		

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

$$\text{GDP Growth}_{\text{this year}} = \frac{\text{GDP}_{\text{this year}} - \text{GDP}_{\text{last year}}}{\text{GDP}_{\text{last year}}} \times 100$$

## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500	-	
2018	\$6,825	\$5,300	52%	
2019	\$8,350	\$5,300		

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

$$\text{GDP Growth}_{\text{this year}} = \frac{\text{GDP}_{\text{this year}} - \text{GDP}_{\text{last year}}}{\text{GDP}_{\text{last year}}} \times 100$$

## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500	-	
2018	\$6,825	\$5,300	52%	
2019	\$8,350	\$5,300	22%	

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

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## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500	-	-
2018	\$6,825	\$5,300	52%	18%
2019	\$8,350	\$5,300	22%	

# GDP and RGDP Growth

Calculate GDP growth and real GDP growth

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## Athens Production

Year	GDP	RGDP	GDP Growth	RGDP Growth
2017	\$4,500	\$4,500	-	-
2018	\$6,825	\$5,300	52%	18%
2019	\$8,350	\$5,300	22%	0%



# Price Level

---

- **Price Level** The average price of goods and services in the economy

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- **GDP Deflator** A measure of the price level

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# Price Level

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$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$
- **Inflation** Percent growth of price level from year to year
- We can use the GDP deflator to calculate inflation in the economy

# GDP Deflator and Inflation

Calculate the GDP deflator and inflation

## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500		
2018	\$6,825	\$5,300		
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# GDP Deflator and Inflation

Calculate the GDP deflator and inflation

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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
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2017	\$4,500	\$4,500	100	
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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	
2018	\$6,825	\$5,300	129	
2019	\$8,350	\$5,300		



# GDP Deflator and Inflation

Calculate the GDP deflator and inflation

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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	
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2019	\$8,350	\$5,300	158	

# GDP Deflator and Inflation

Calculate the GDP deflator and inflation

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

$$\text{Inflation}_{\text{this year}} = \frac{\text{GDP Deflator}_{\text{this year}} - \text{GDP Deflator}_{\text{last year}}}{\text{GDP Deflator}_{\text{last year}}} \times 100$$

## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	
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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	-
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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	-
2018	\$6,825	\$5,300	129	29%
2019	\$8,350	\$5,300	158	

# GDP Deflator and Inflation

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## Athens Production

Year	GDP	RGDP	GDP Deflator	Inflation
2017	\$4,500	\$4,500	100	-
2018	\$6,825	\$5,300	129	29%
2019	\$8,350	\$5,300	158	22%

# Example 1

France produces the goods in the table below. The base year is 2010. Find GDP and RGDP, their growth rates, the GDP deflator, and inflation each year

France Production

Item	2008		2009		2010	
	Q	P	Q	P	Q	P
Baguettes	300	\$5	320	\$7	330	\$10
Berets	150	\$25	120	\$20	140	\$30
Mime Performances	40	\$50	60	\$60	80	\$65
Scarves	100	\$20	110	\$20	120	\$25
Nominal GDP						
Real GDP (base year 2010)						

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Mime Performances	40	\$50	60	\$60	80	\$65
Scarves	100	\$20	110	\$20	120	\$25
Nominal GDP	\$9,250					
Real GDP (base year 2010)						

# Example 1

France produces the goods in the table below. The base year is 2010. Find GDP and RGDP, their growth rates, the GDP deflator, and inflation each year

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Item	2008		2009		2010	
	Q	P	Q	P	Q	P
Baguettes	300	\$5	320	\$7	330	\$10
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Scarves	100	\$20	110	\$20	120	\$25
Nominal GDP	\$9,250		\$10,440			
Real GDP (base year 2010)						



# Example 1

France produces the goods in the table below. The base year is 2010. Find GDP and RGDP, their growth rates, the GDP deflator, and inflation each year

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	Q	P	Q	P	Q	P
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Scarves	100	\$20	110	\$20	120	\$25
Nominal GDP	\$9,250		\$10,440		\$15,700	
Real GDP (base year 2010)						

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Nominal GDP	\$9,250		\$10,440		\$15,700	
Real GDP (base year 2010)	\$12,600					

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Nominal GDP	\$9,250		\$10,440		\$15,700	
Real GDP (base year 2010)	\$12,600		\$13,450			

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Nominal GDP	\$9,250		\$10,440		\$15,700	
Real GDP (base year 2010)	\$12,600		\$13,450		\$15,700	

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP			
% Growth Real GDP			
GDP Deflator			
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-		
% Growth Real GDP			
GDP Deflator			
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	
% Growth Real GDP			
GDP Deflator			
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP			
GDP Deflator			
Inflation			



# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-		
GDP Deflator			
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-	7%	
GDP Deflator			
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-	7%	17%
GDP Deflator			
Inflation			

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	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
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% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-	7%	17%
GDP Deflator	73		
Inflation			

# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-	7%	17%
GDP Deflator	73	78	
Inflation			

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% Growth Real GDP	-	7%	17%
GDP Deflator	73	78	100
Inflation			

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GDP Deflator	73	78	100
Inflation	-		

# Example 1 Answers

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% Growth Real GDP	-	7%	17%
GDP Deflator	73	78	100
Inflation	-	7%	



# Example 1 Answers

## Example 1 Answers

	2008	2009	2010
Nominal GDP	\$9,250	\$10,440	\$15,700
Real GDP (base year 2010)	\$12,600	\$13,450	\$15,700
% Growth Nominal GDP	-	13%	50%
% Growth Real GDP	-	7%	17%
GDP Deflator	73	78	100
Inflation	-	7%	28%

# Any Questions?

# Production Not in GDP

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*Ex.* Babysitters, market for illegal drugs

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- Most important thing this leaves out is homemaking: cooking, cleaning, and caretaking
- **Underground Economy** Goods bought and sold concealed from the government  
*Ex.* Babysitters, market for illegal drugs
- In US, this at most 10% GDP, some countries, especially developing ones, it could be more than 50% GDP

# GDP Flaws

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- **GDP Does Not Account for Crime** Crime reduces well-being, but may increase GDP from spending on police or security
- **GDP Ignores Distribution** GDP measures size of the pie but not how it is divided

# Other Measures of Production and Income

- **Gross National Product (GNP)** Value of production owned by citizens of a country

*Ex.* If Ford owns a car factory in Mexico, each car goes to Mexican GDP but US GNP

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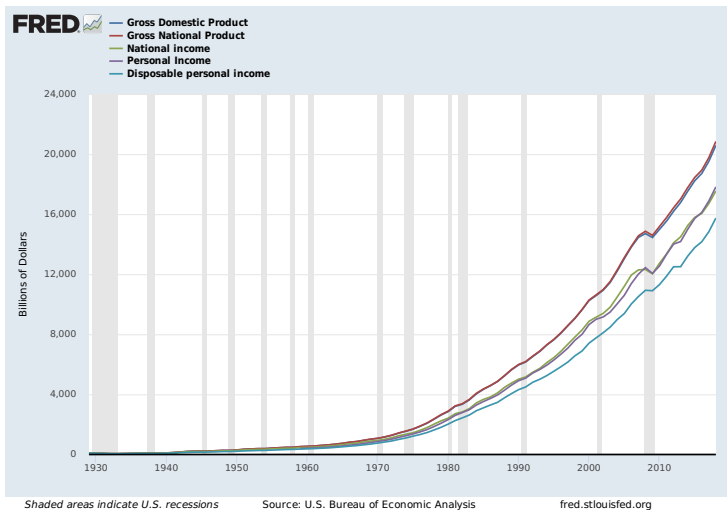
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- **Personal Income (PI)** Income received by households, including labor income, shareholder profits, and government transfer payments
- **Disposable Personal Income (DPI)** What people can actually spend

$DPI = PI - \text{Household Taxes}$

# US Production and Income





# Measuring Inequality

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- **Perfectly Equal Society** Everyone has same amount of income/wealth,  $Gini=0$

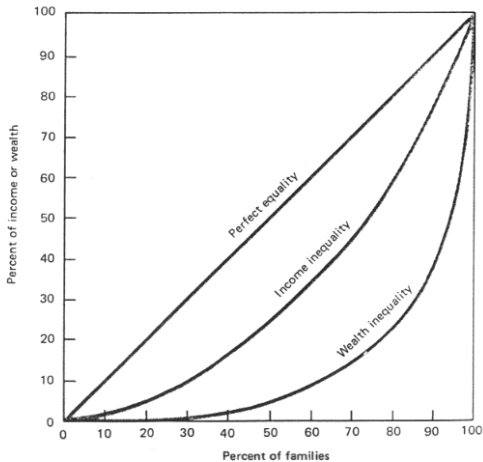
# Measuring Inequality

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- **Gini Coefficient** Measures income/wealth dispersion, how unequal is society. Defined as the area between the Lorenz curve and the  $45^\circ$  line over the total area under the  $45^\circ$  line
- **Perfectly Equal Society** Everyone has same amount of income/wealth,  $\text{Gini}=0$
- **Perfectly Unequal Society** One person has all income/wealth,  $\text{Gini}=1$

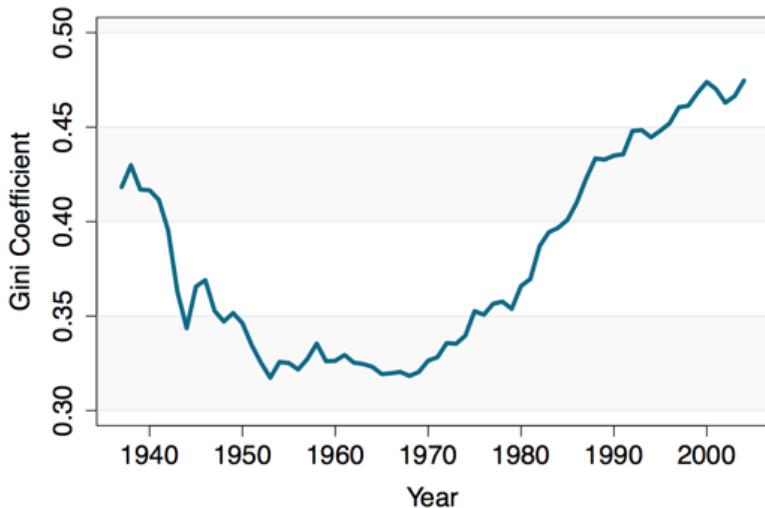
# Lorenz Curve

**Figure 2-5**

Lorenz curves on wealth and income inequality, 1983. These curves are estimates from data presented in Table 2-7.



# US Income GINI



# Any Questions?