
Trade-Offs, Production Possibilities, Comparative Advantage

Gains from Trade in a World Confronting Scarcity

Outline

1. Production Possibilities Frontier

2. Comparative Advantage

3. The Market System

- Textbook Readings: Ch. 2

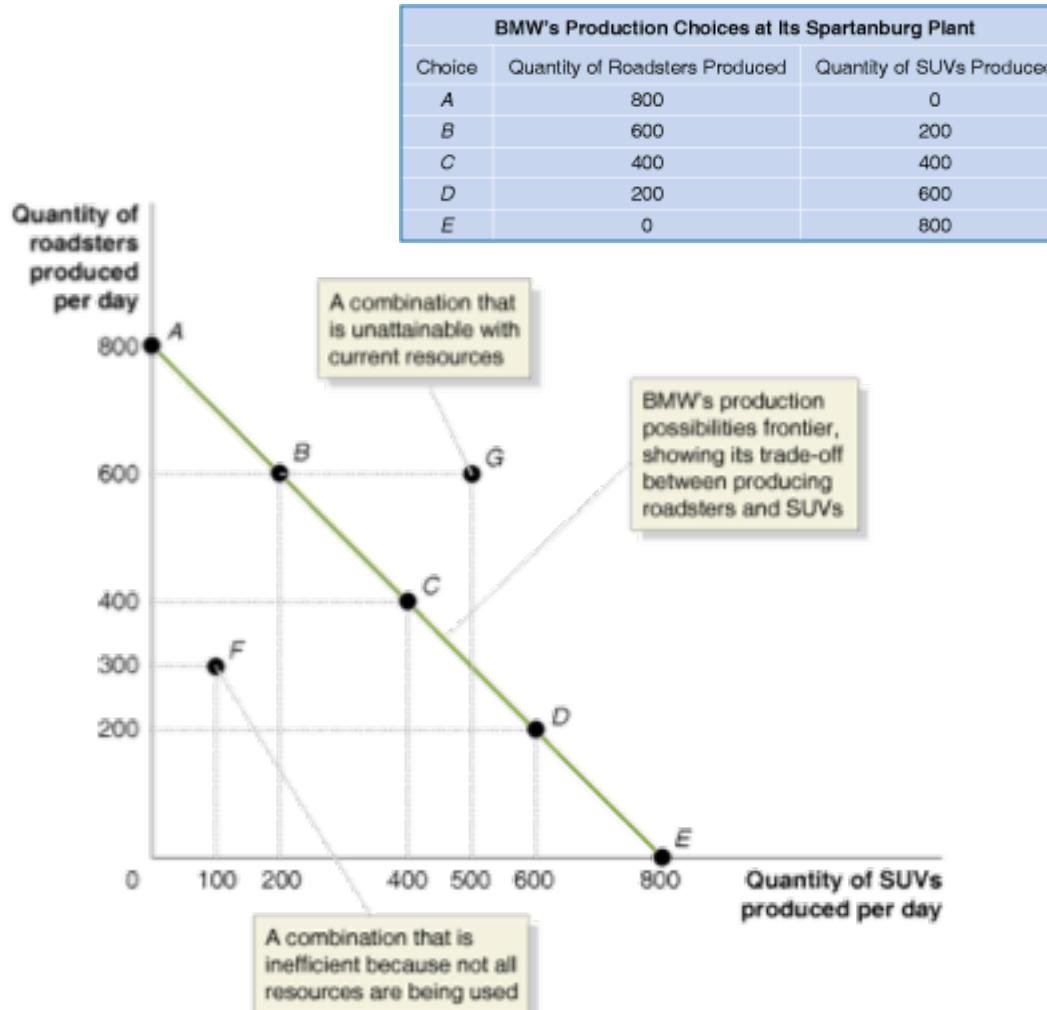
Scarcity

- **Limited** Resources vs **Unlimited** Wants
- **Scarcity:**
 - Unlimited wants **exceed** the limited resources available to fulfill those wants
- Scarcity requires **trade-offs**

Production Possibilities Frontier (PPF)

BMW's Production Possibilities Frontier

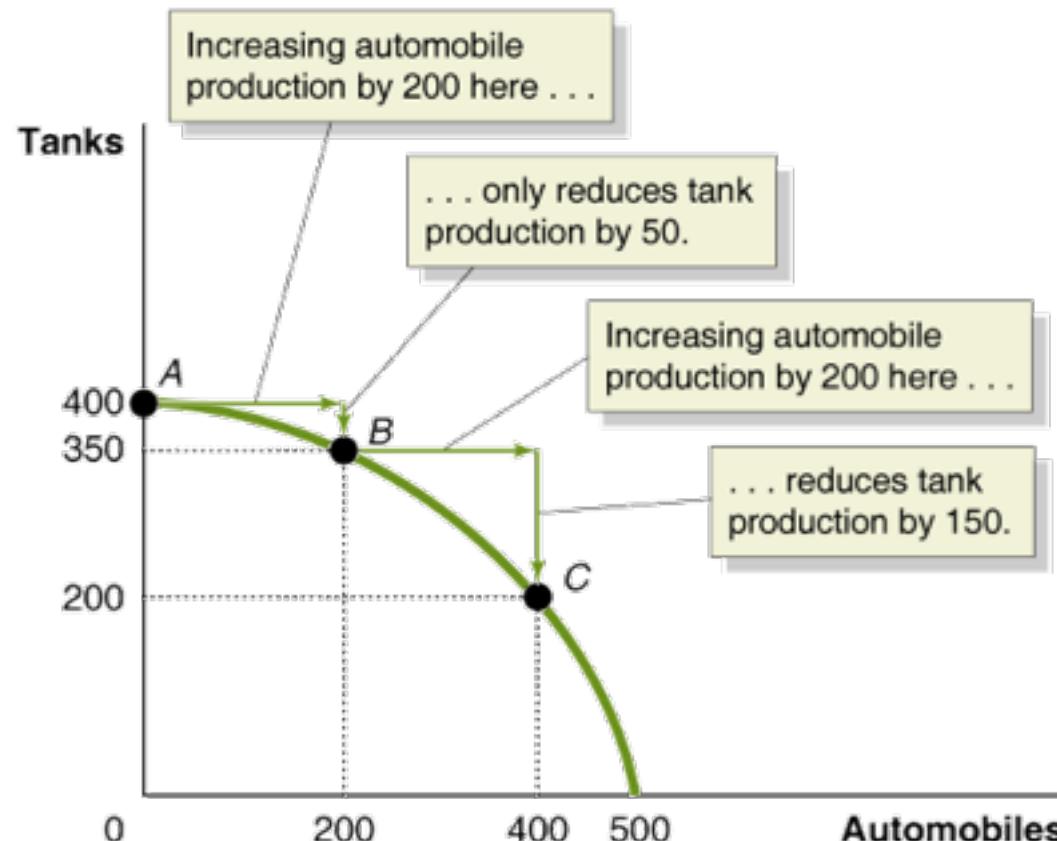
A curve showing the maximum attainable combinations of two products that may be produced with available resources and current technology.



PPF and Opportunity Costs

Increasing Marginal Opportunity Costs

As the economy moves down the production possibilities frontier, it experiences *increasing marginal opportunity costs* because increasing automobile production by a given quantity requires larger and larger decreases in tank production.



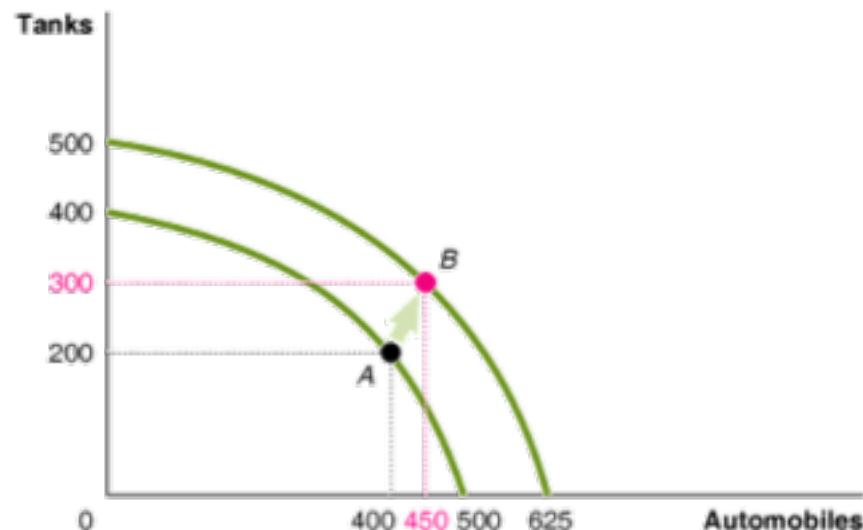
PPF

- Engineers: Establish optimal use of inputs
 - They insure we operate along PPF
- Economists: Assume optimal use of inputs
 - Evaluate tradeoffs along PPF
- Entrepreneurs: Revolutionize use of inputs
 - Shift the PPF outward

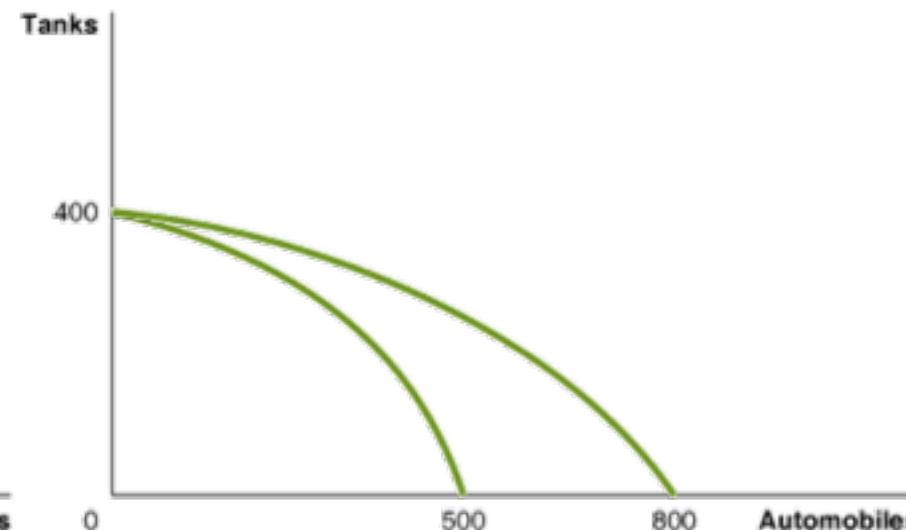
Shifting PPF Outward

- **Economic growth:** The ability of the economy to increase the production of goods and services
 - **Technology** is the key to growth

Economic Growth



(a) Shifting out the production possibilities frontier

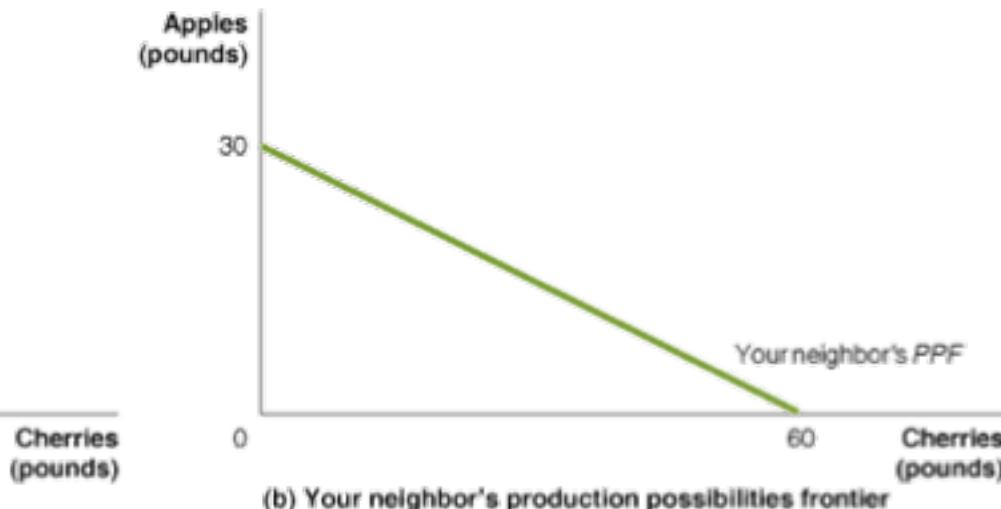
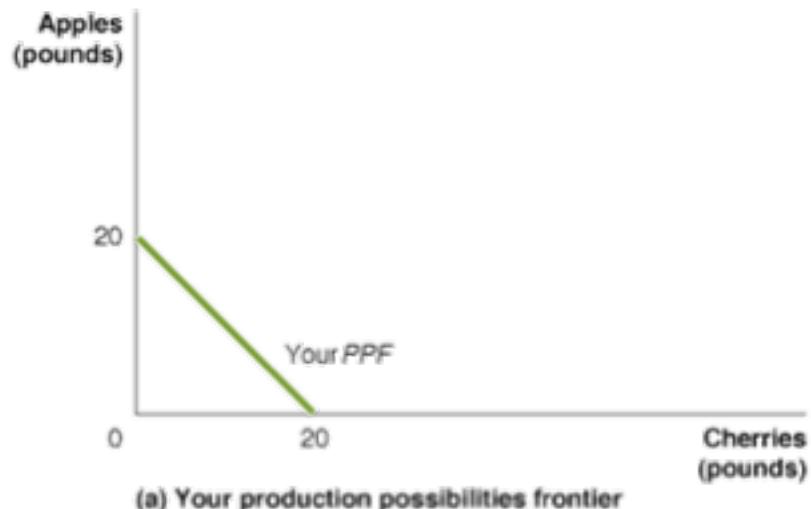


(b) Technological change in the automobile industry

Comparative Advantage and Trade

Production Possibilities for You and Your Neighbor, without Trade

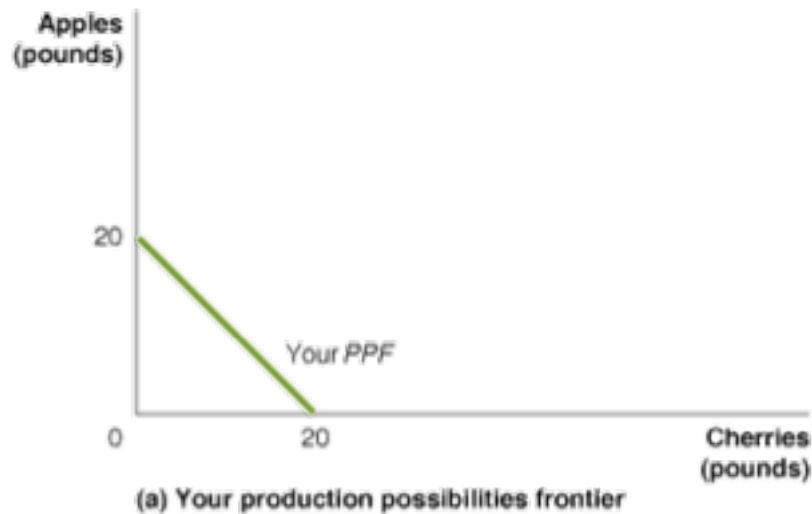
	You		Your Neighbor	
	Apples	Cherries	Apples	Cherries
Devote all time to picking apples	20 pounds	0 pounds	30 pounds	0 pounds
Devote all time to picking cherries	0 pounds	20 pounds	0 pounds	60 pounds



Absolute Advantage vs Comparative Advantage

- **Absolute advantage:** Ability to **produce more** of a good or service than competitors using the same amount of resources
- **Comparative advantage:** Ability to **produce** a good or service **at a lower opportunity cost** than competitors
 - **Opportunity cost:** Highest valued alternative that must be given up to do another activity

Opportunity Costs and Comparative Advantage



Opportunity Costs of Picking Apples and Cherries

	OPPORTUNITY COST OF PICKING 1 POUND OF APPLES	OPPORTUNITY COST OF PICKING 1 POUND OF CHERRIES
YOU	1 pound of cherries	1 pound of apples
YOUR NEIGHBOR	2 pounds of cherries	0.5 pound of apples

Absolute Advantage vs Comparative Advantage

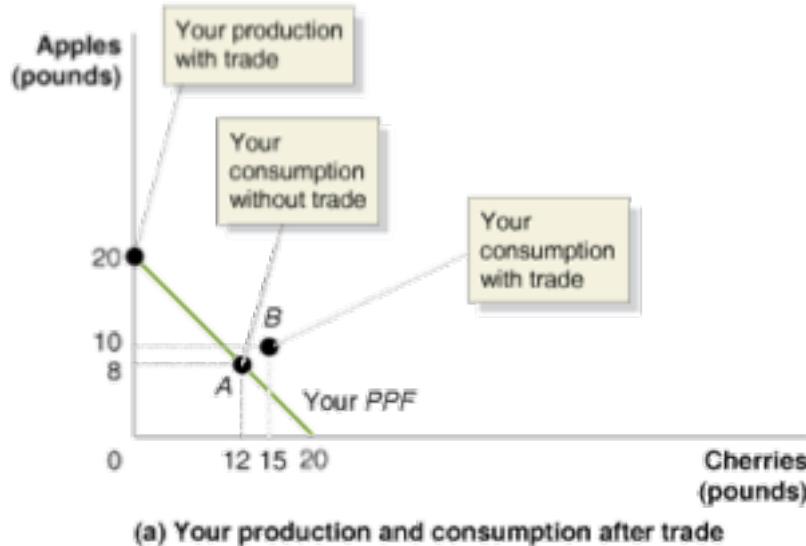
Opportunity Costs of Picking Apples and Cherries

	OPPORTUNITY COST OF PICKING 1 POUND OF APPLES	OPPORTUNITY COST OF PICKING 1 POUND OF CHERRIES
YOU	1 pound of cherries	1 pound of apples
YOUR NEIGHBOR	2 pounds of cherries	0.5 pound of apples

- Your neighbor has an absolute advantage in picking BOTH
- But only has a comparative advantage in picking cherries
- You have a comparative advantage in picking apples

Specialization and Gains from Trade

Gains from Trade



- Gains from trade exist **even if** one side is **inferior on all fronts**
- There will be **gains from trade** as long as each has a comparative advantage in different goods

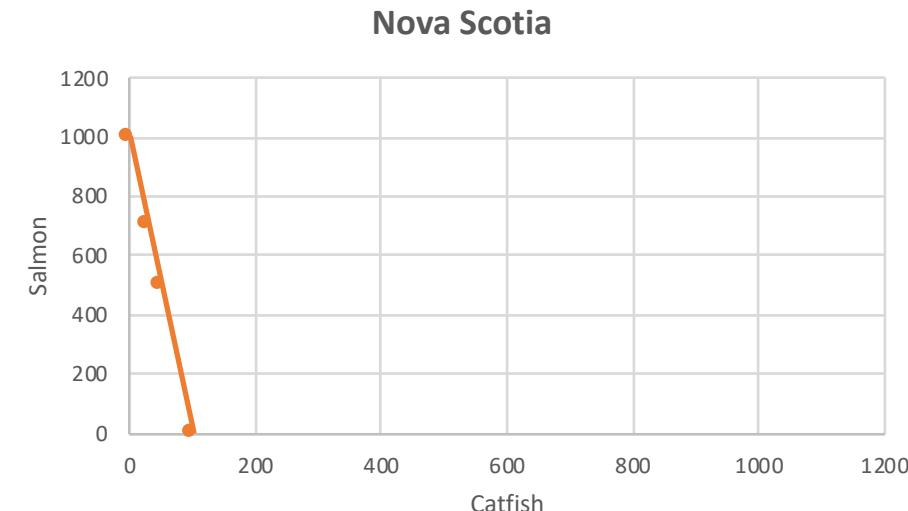
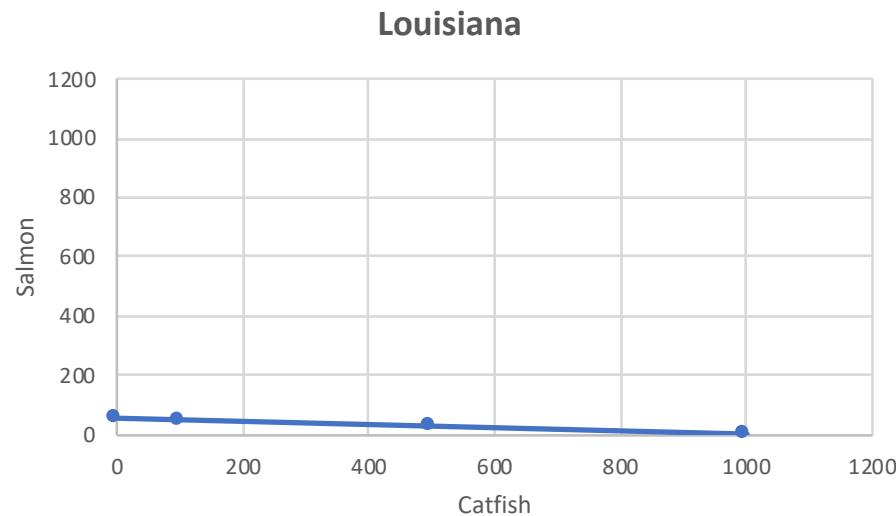
Comparative Advantage and Trade

- AA and CA are **different**
 - AA compares x's and y's
 - CA compares slopes
- Possible to have an **AA** in producing one good **without** having a **CA**
 - Your neighbor with apples
- Possible to have a **CA** in producing one good **without** having an **AA**
 - You with apples
- The basis for trade is CA not AA!

Another Example

Louisiana	
Catfish	Salmon
1000	0
500	25
100	45
0	50
20 Catfish = 1 Salmon	

Nova Scotia	
Catfish	Salmon
0	1000
30	700
50	500
100	0
1 Catfish = 10 Salmon	

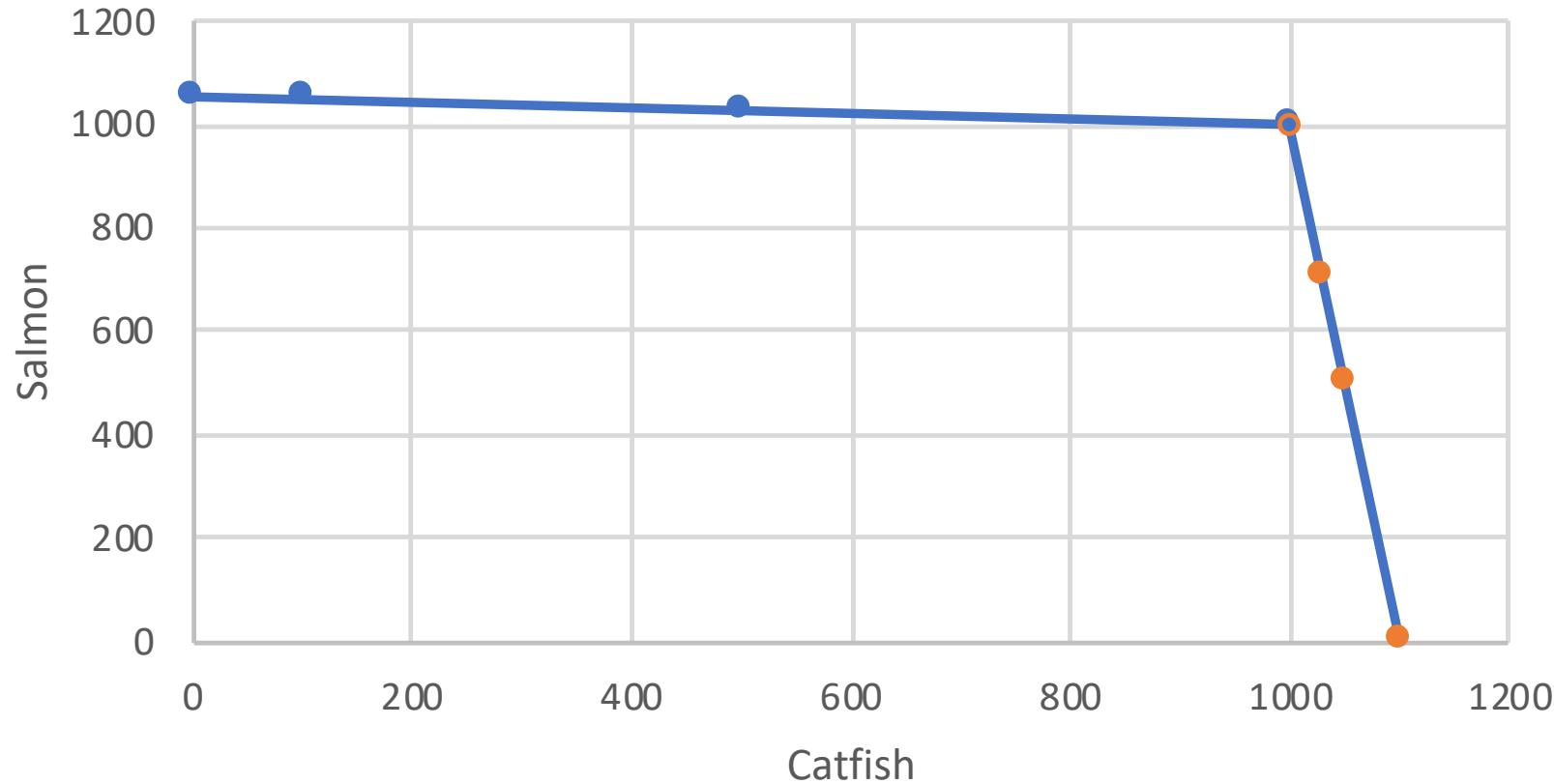


Constructing a Combined PPF

Louisiana		Nova Scotia	
Catfish	Salmon	Catfish	Salmon
1000	0	0	1000
500	25	30	700
100	45	50	500
0	50	100	0
Maximize		Maximize	
Catfish		Salmon	
Catfish	Salmon	Catfish	Salmon
1000	1000	1000	1000
1030	700	500	1025
1050	500	100	1045
1100	0	0	1050

Combined PPF

Louisiana + Nova Scotia



Both Sides Are Better Off

Before Trade

Louisiana: **25** Salmon/ **500** Catfish

Nova Scotia: **500** Salmon/**50** Catfish

With Specialization and Trade

Louisiana: 1,000 Catfish/half to Nova Scotia

Nova Scotia: 1,000 Salmon/half to Louisiana

After Trade

Louisiana: **500** Salmon/**500** Catfish

Nova Scotia: **500** Salmon/**500** Catfish

The Market System

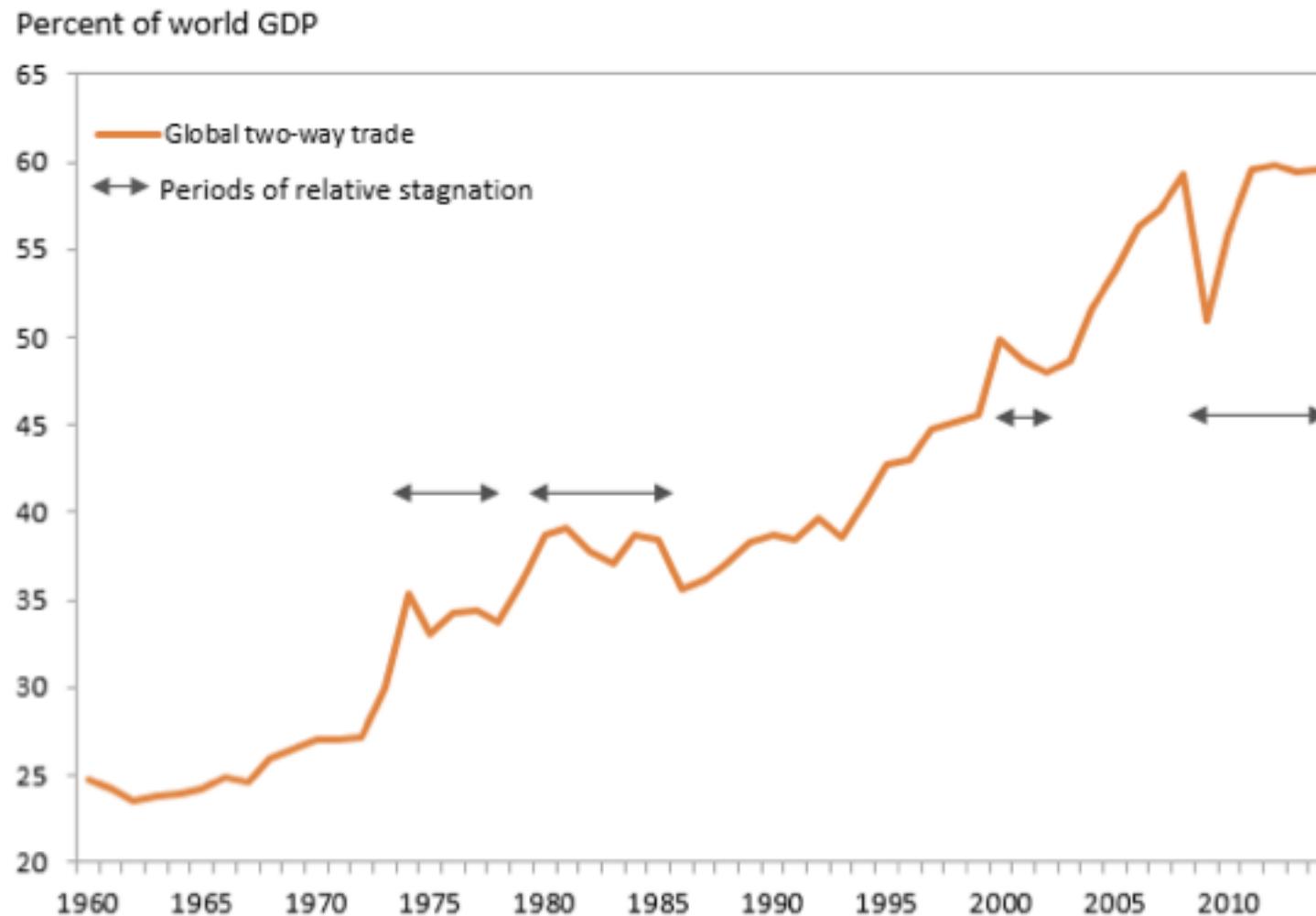
- Gains from trade are the pervasive **force** in free market economies
- The KEY: It is a **positive sum game**
- **Negotiation** can get you a bit more than the other side
- But free market forces are effective because **both sides gain!**

Is Free Trade Good for Everyone?

Suppose Nova Scotia has 55 workers

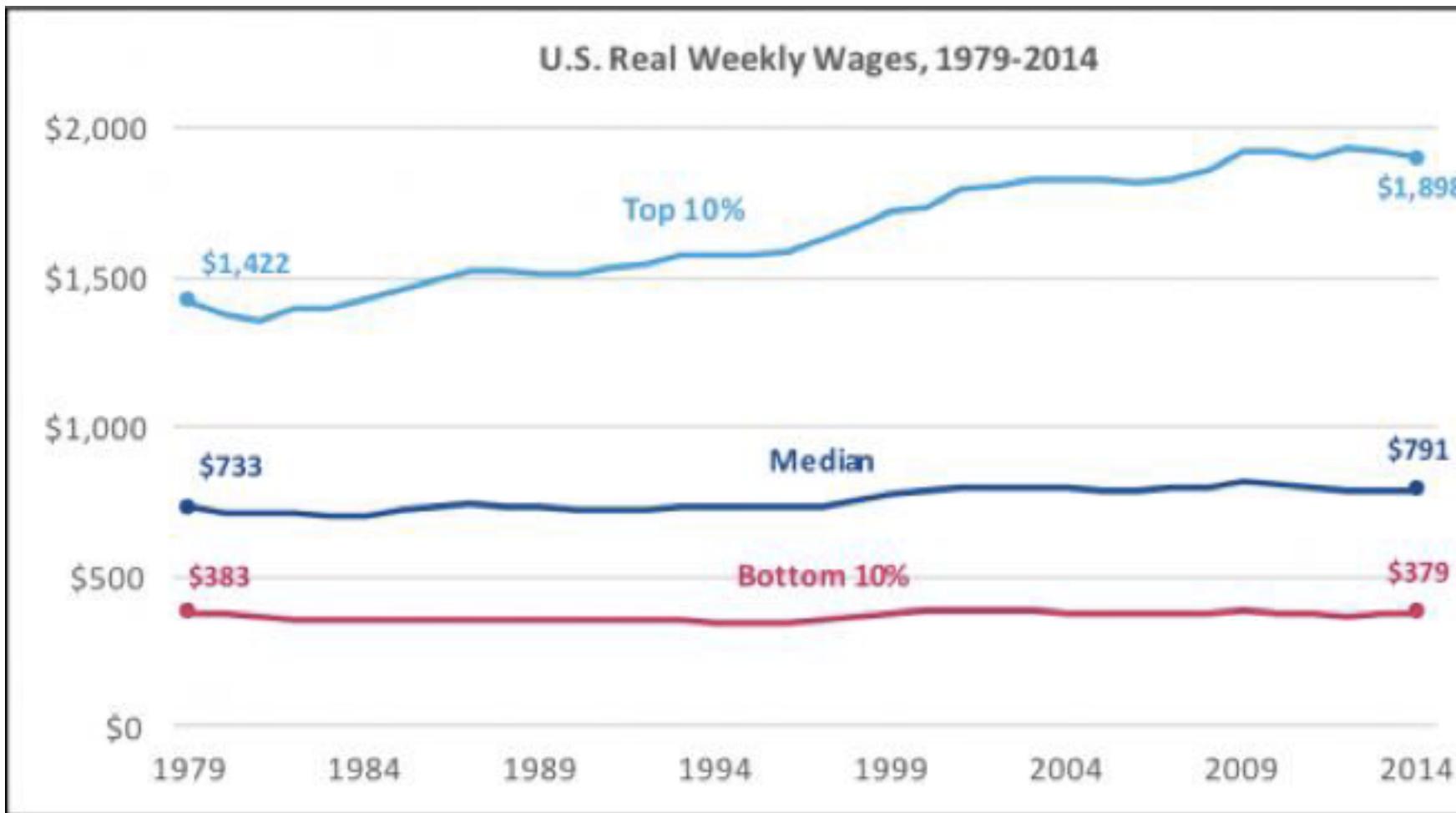
Before Trade	Catfish	Salmon	All Fish
Number produced	50	500	550
Labor input	30	25	55
Number consumed	50	500	550
% employed			100%
# of fish per worker	$50/55=0.9$	$500/55=9.1$	10
# of fish per person	0.9	9.1	10
After Trade	Catfish	Salmon	All fish
Number produced	0	1,000	1,000
Labor input	0	50	50
Number consumed	500	500	1,000
% employed			91%
# of fish per worker	$500/50=10$	10	20
# of fish per person	$500/55=9.1$	9.1	18.2

Global Trade of Goods and Services, 1960-2014



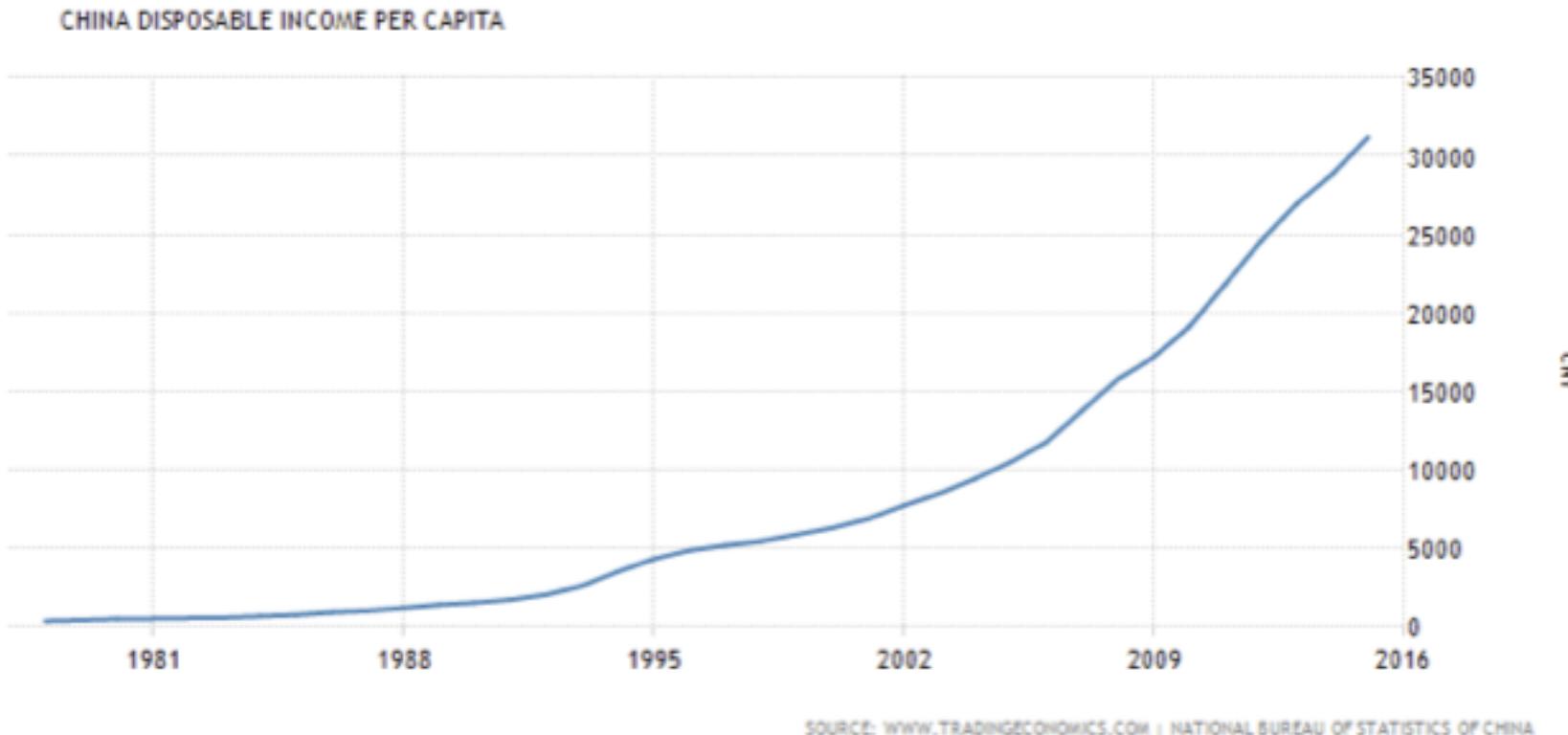
Source: "Why Has Traded Stopped Growing?" Peterson Institute for International Economics (3/23/16)

Not All Benefited Equally in the US



What About From A Worldwide Perspective?

- China's export boom created a great increase in income per capita



Dollar Values of Income Per Capita in China

	Renminbi/Dollar	Income per capita (Renminbi)	Income per Capita (Dollars)
1990	4.7	2,600	553
2000	8.3	6,900	831
2010	6.8	16,000	2,353
2016	6.7	32,000	4,805

Demand and Supply Analysis

Outline

1. Demand Curves
 2. Supply Curves
 3. Equilibrium Prices and Quantities
 4. Changes to the Equilibrium
- Textbook Readings: Ch. 3

How Prices are Determined?

- We will explore the **model of demand and supply**
 - This tool can shed light on a lot of interesting market dynamics
- Key assumption: **perfectly competitive market**
 - **Many** buyers and sellers
 - All products sold are **identical**
 - **No barriers** to firms entering the market
- Although assumptions are restrictive, useful model when competition among sellers is intense

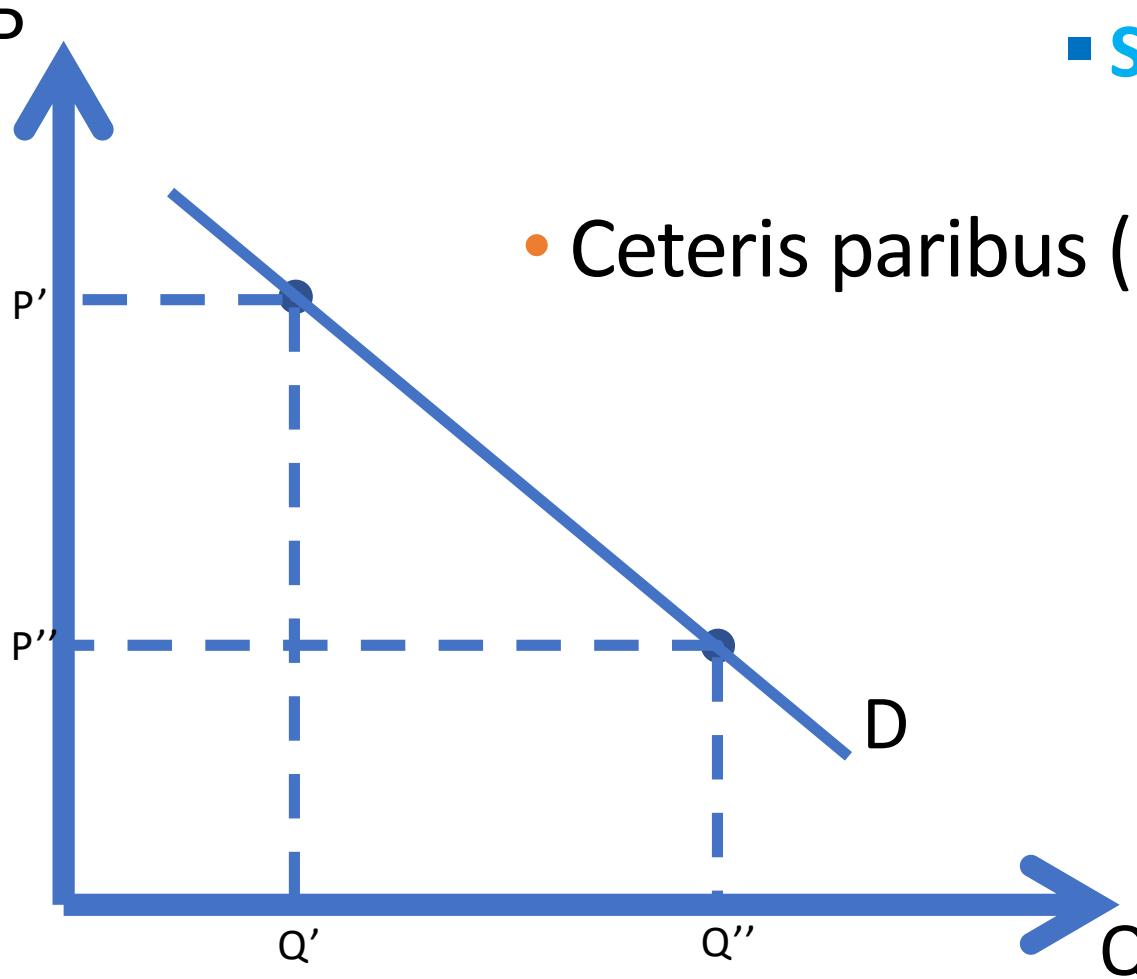
Demand Curves

- Demand curves relate prices to quantity consumed
 - They capture how consumer demand responds to prices
- Generally, lower prices lead to higher demand for goods

The Demand Side of the Market

- The demand curve is downward sloping

- **Substitution** effect
- **Income** effect



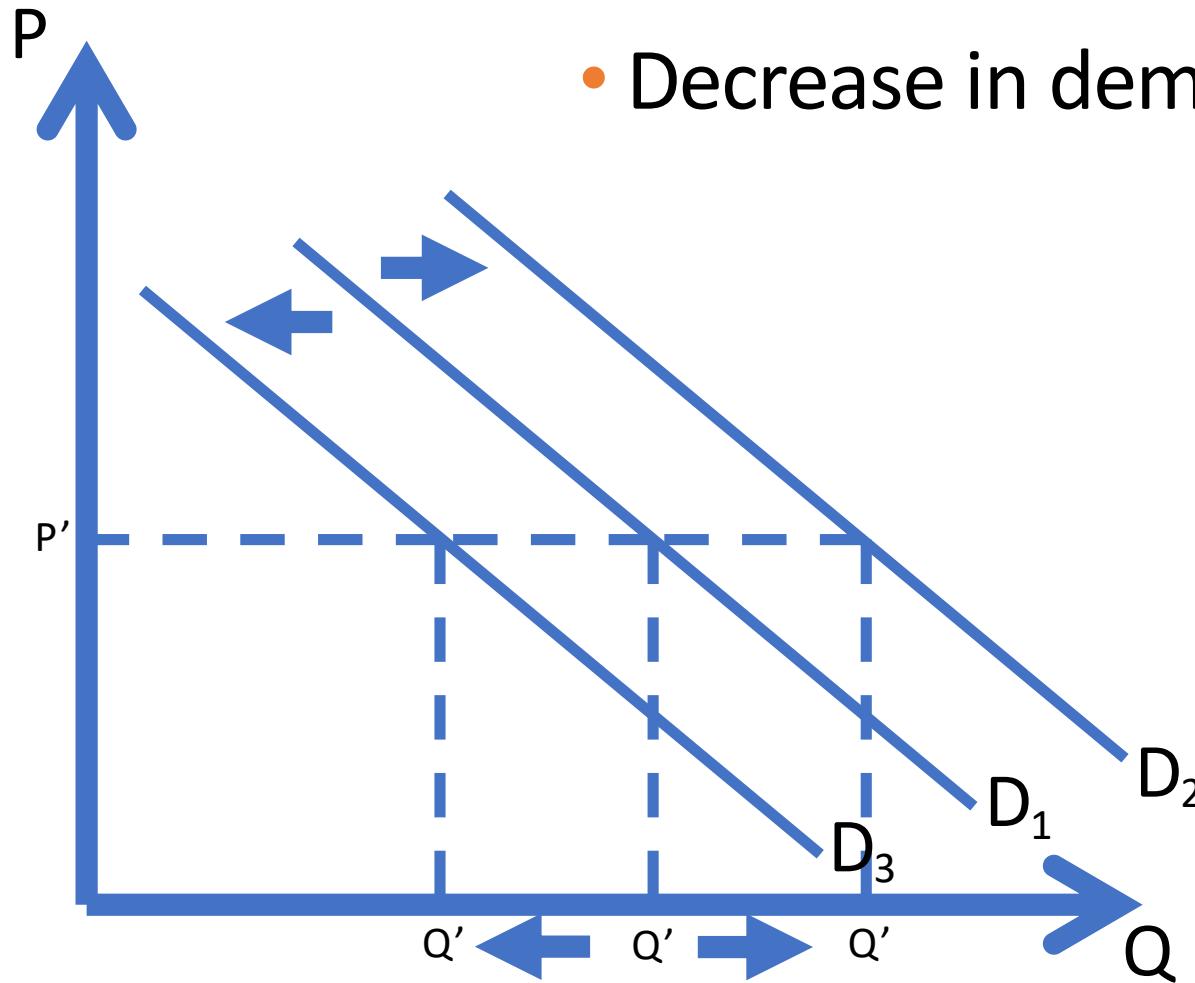
- Ceteris paribus (“all else equal”)

Variables that Shift Market Demand

- Many variables **other than price** can influence market demand
 - Change in **exogenous** factors cause demand curve to shift
- These five are the most important:
 - Income
 - Prices of related goods
 - Tastes
 - Population and demographics
 - Expected future prices

Demand Shocks

- Increase in demand: Right shift
- Decrease in demand: Left shift

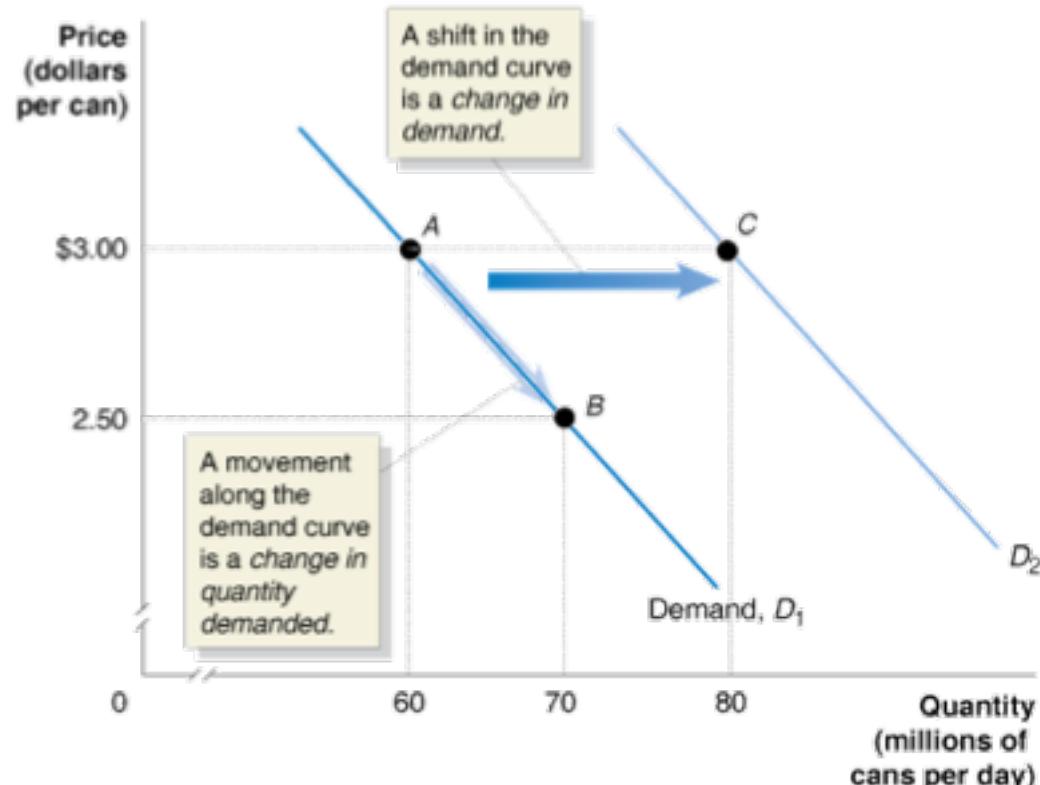


How Variables Shift Market Demand

An increase in ...	shifts the demand curve to the...
Income	
Price of a substitute good	
Price of a complementary good	
Tastes	
Population and demographics	
Expected future prices	

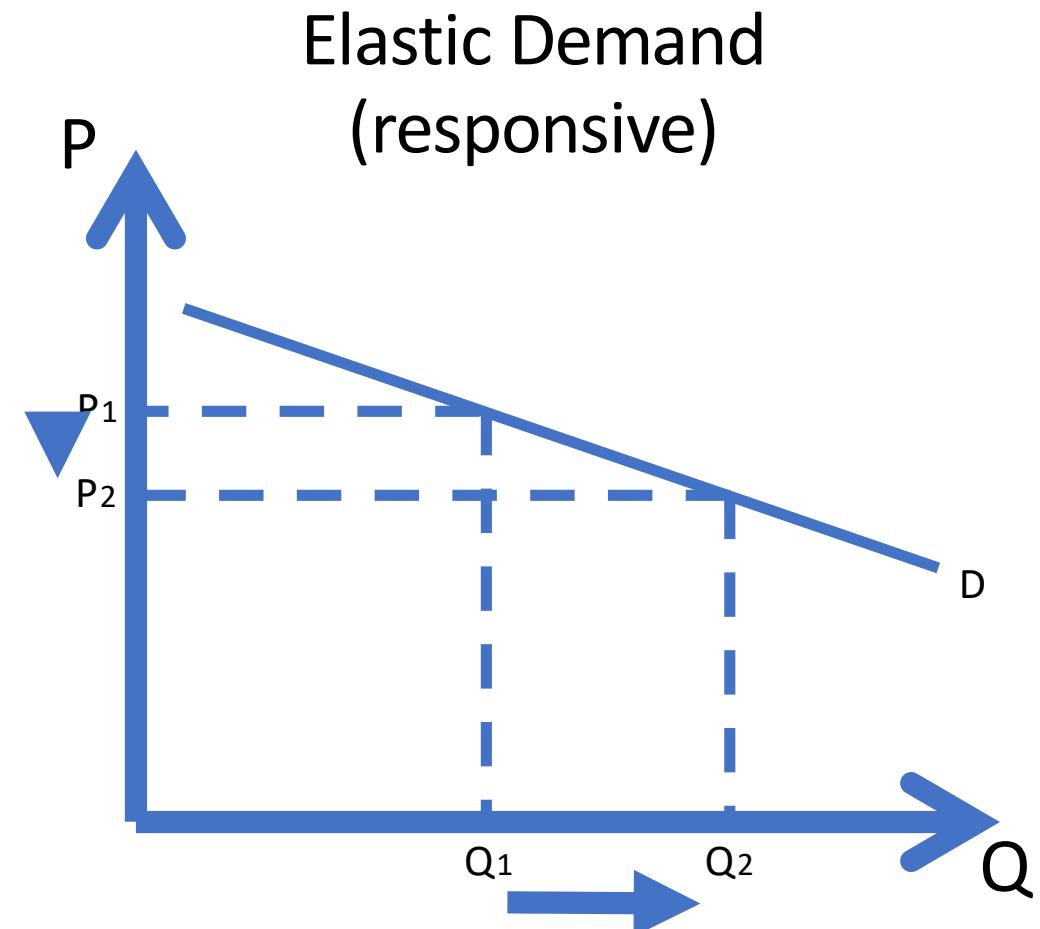
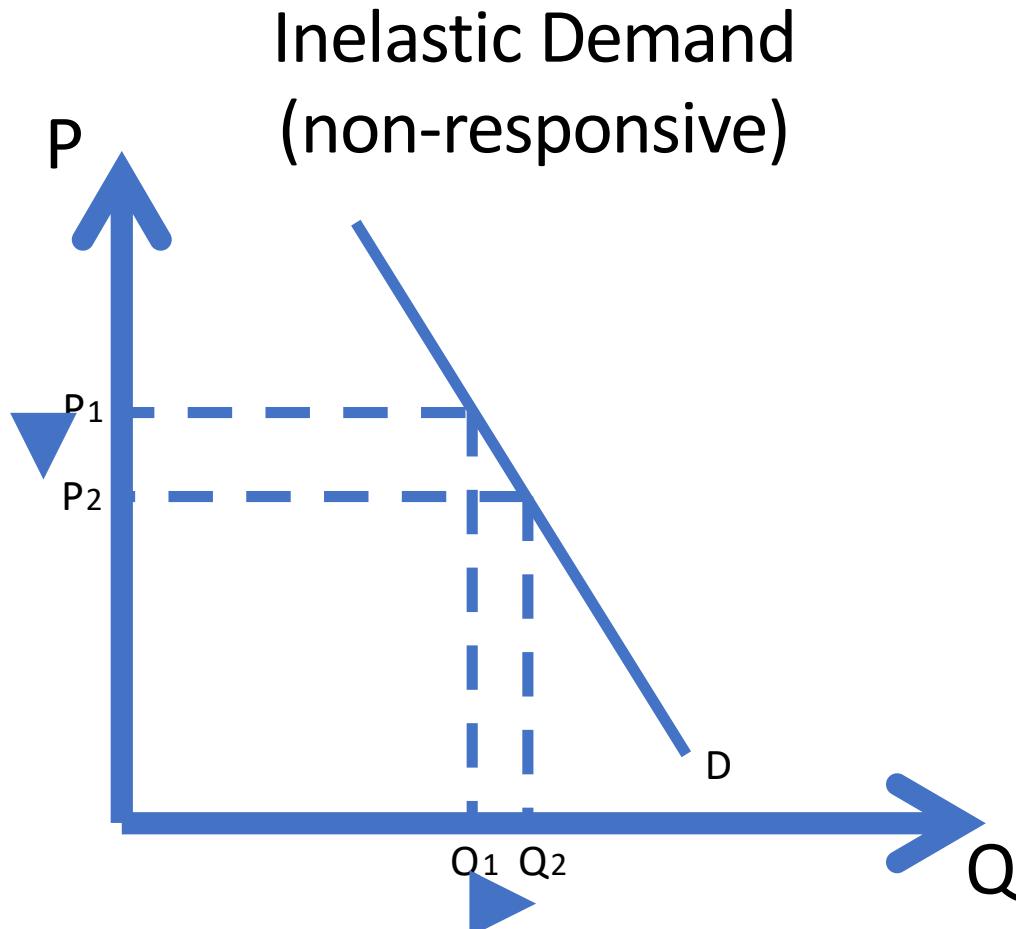
Change in Demand vs Change in Quantity Demanded

- A **movement along** the demand curve is a **change in quantity demanded**
- A **shift** of the demand curve is a **change in demand**



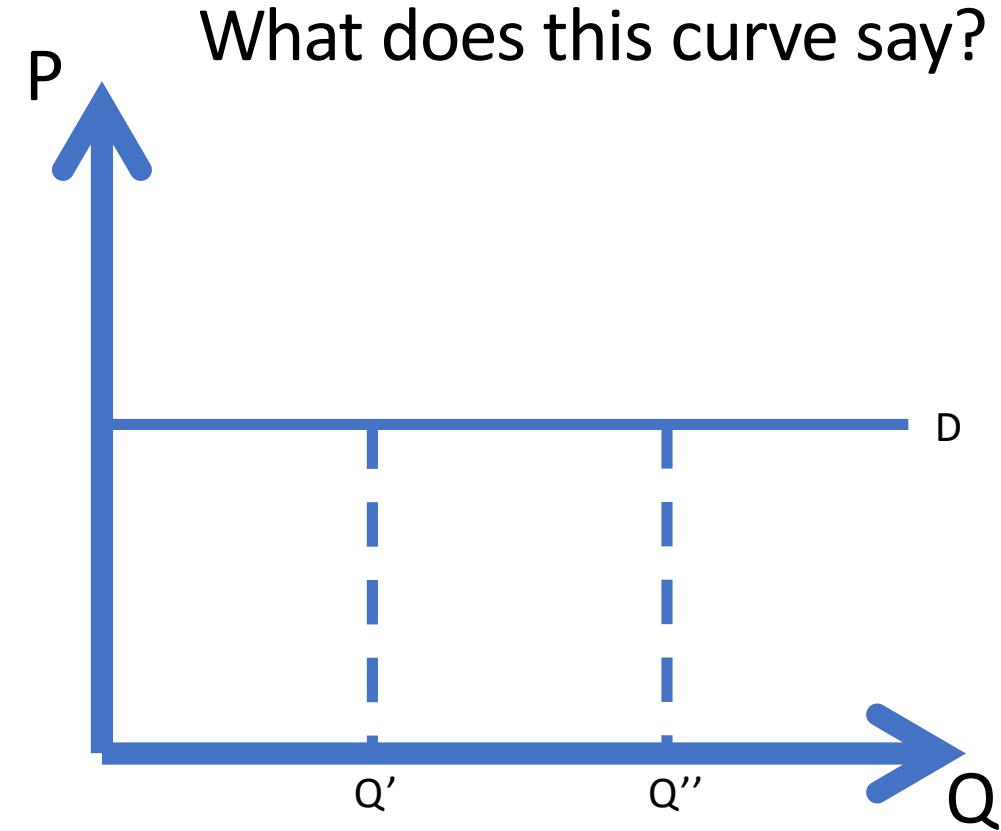
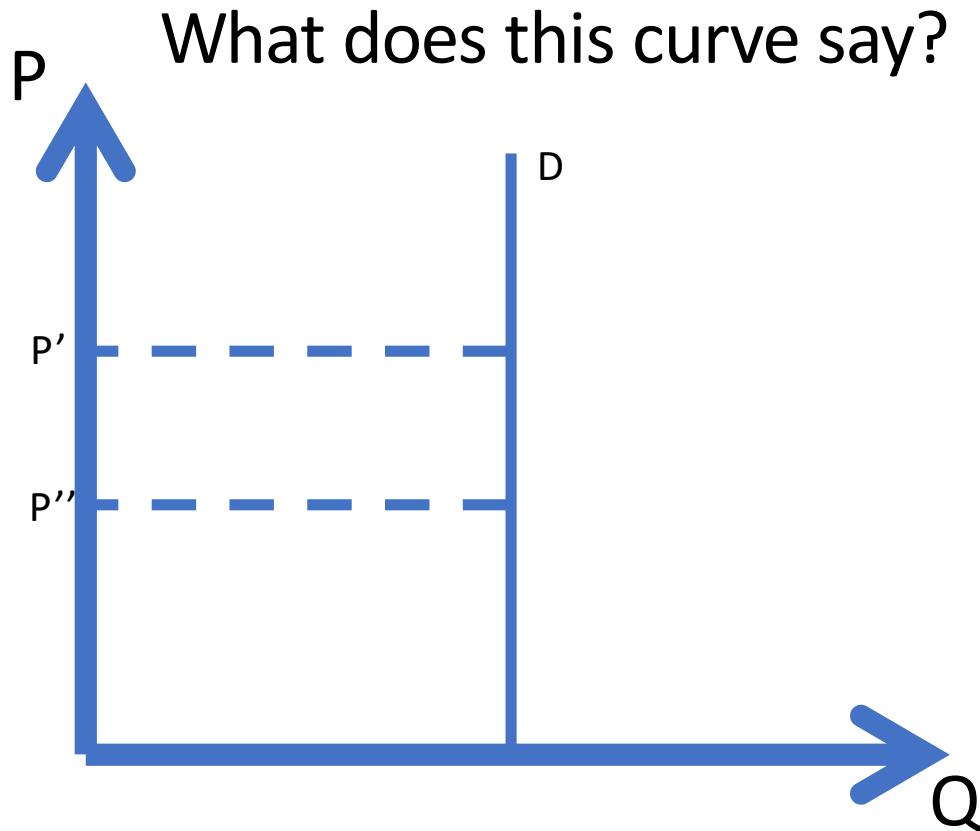
Inelastic vs Elastic Demand Curves

- Sometimes the slope of the curve matters: steeper, flatter?



Perfectly Inelastic and Elastic Demand Curves

- Demand curves can also be vertical and horizontal lines

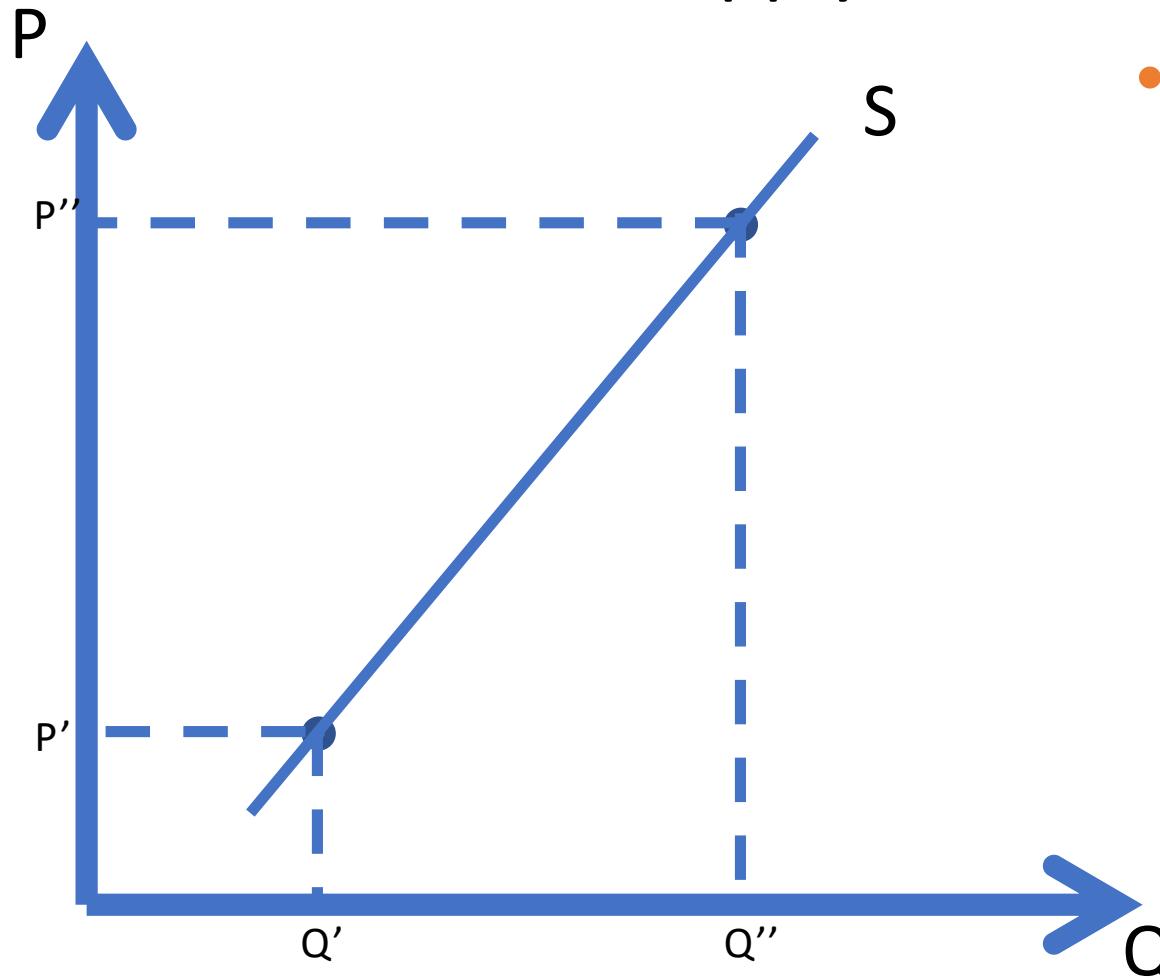


Supply Curves

- Supply curves relate prices to quantity supplied by firms
 - They capture how firms respond to prices
- Generally, higher prices lead to higher supply of goods

The Supply Side of the Market

- The supply curve is upward sloping



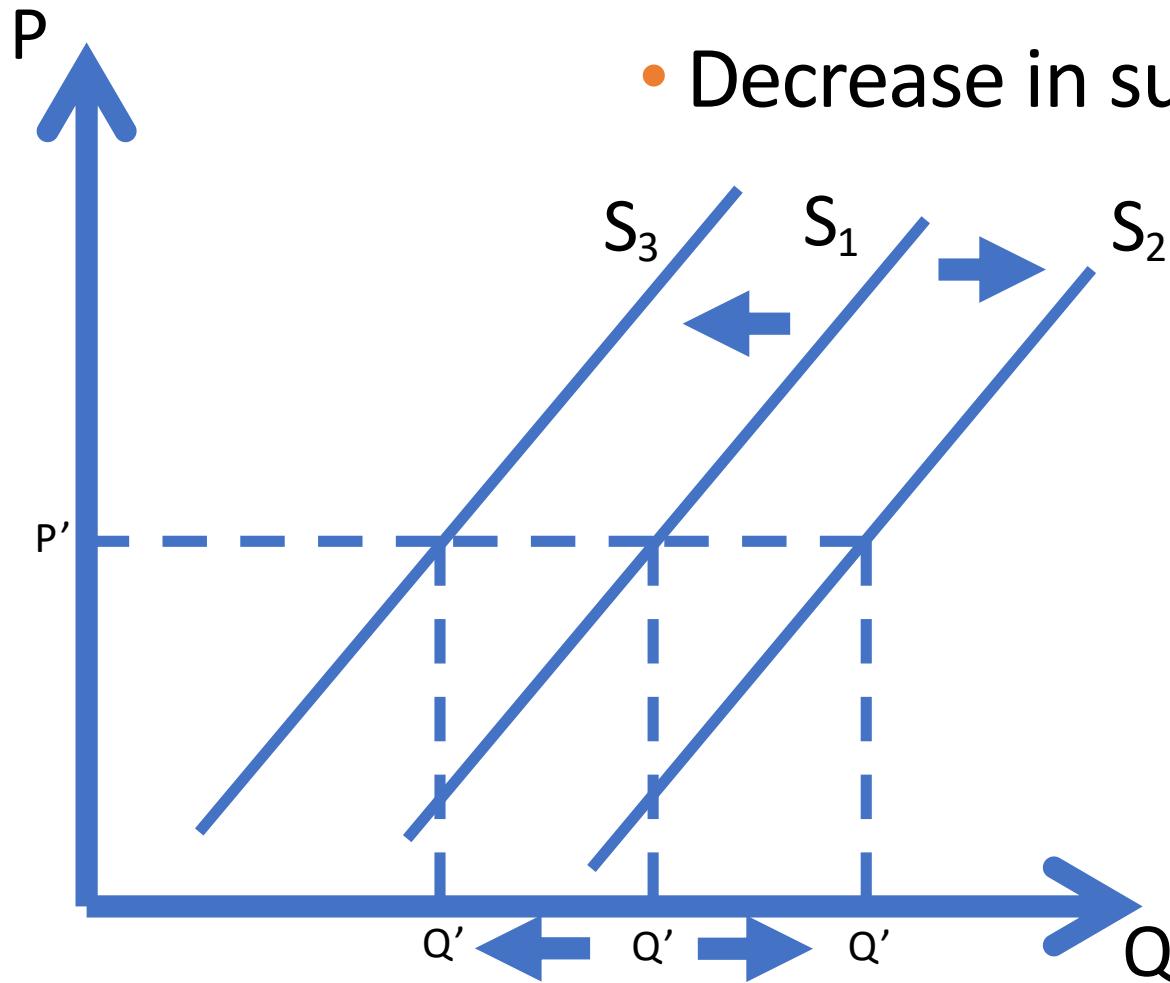
- Ceteris paribus

Variables that Shift Market Supply

- Many variables **other than price** can influence market supply
 - Change in **exogenous** factors cause supply curve to shift
- These five are the most important:
 - Prices of inputs
 - Technological change
 - Prices of related goods in production
 - Number of firms in the market
 - Expected future prices

Supply Shocks

- Increase in supply: Right shift
- Decrease in supply: Left shift

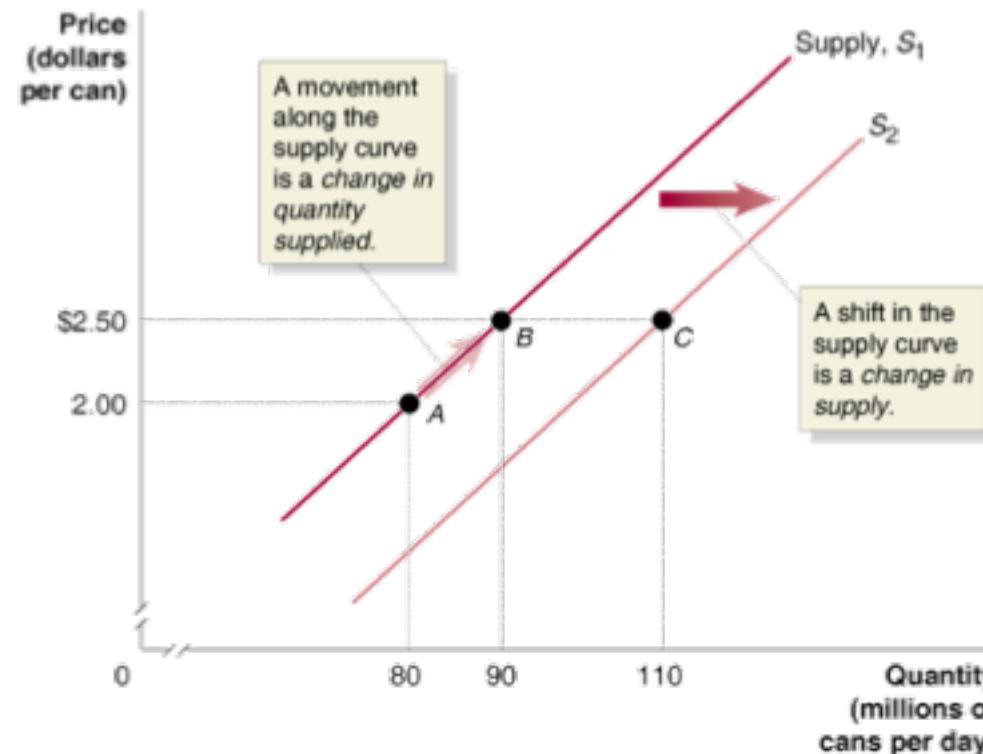


How Variables Shift Market Supply

An increase in ...	shifts the demand curve to the...
Price of an input	
Productivity	
Price of a substitute in production	
Price of a complement in production	
Number of firms in the market	
Expected future prices	

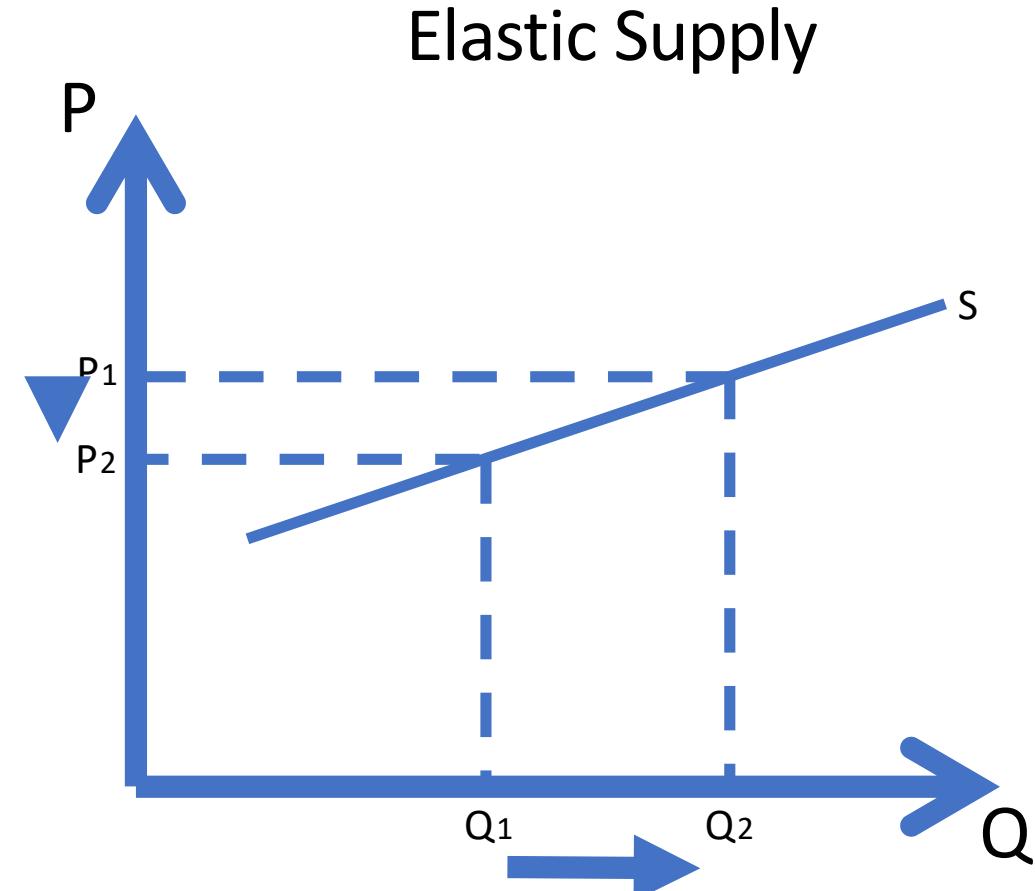
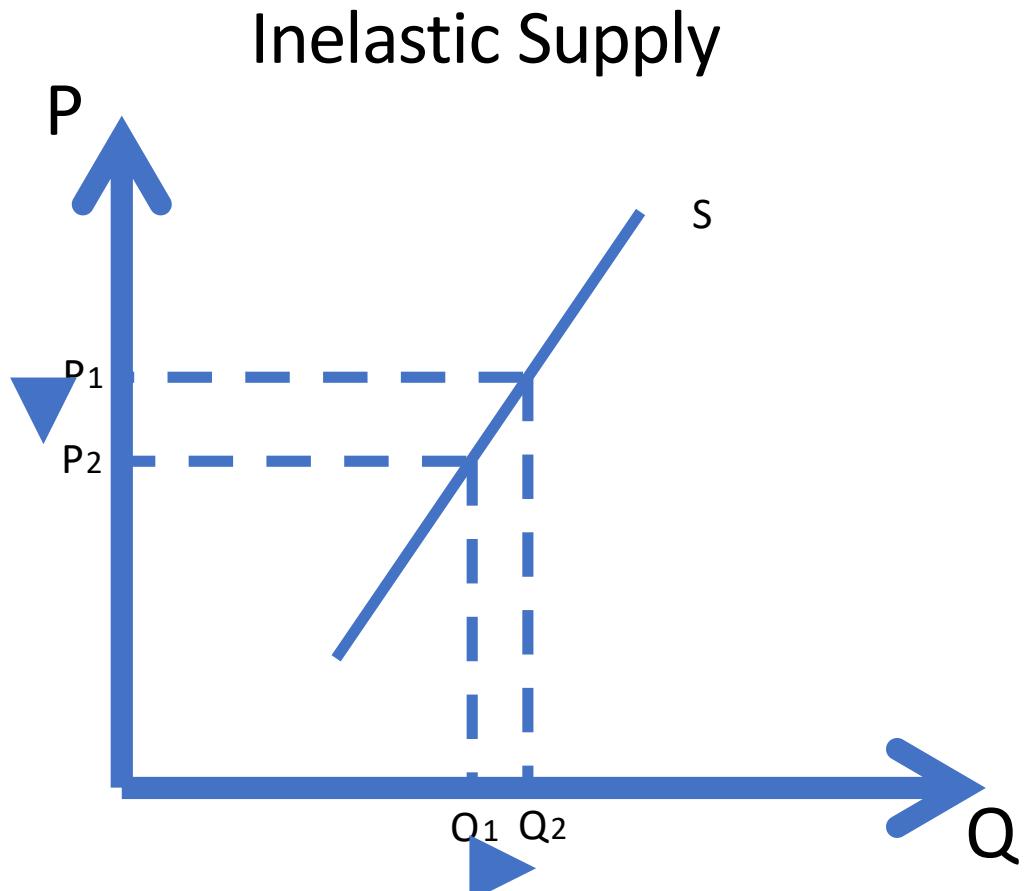
Change in Supply vs Change in Quantity Supplied

- A **movement along** the supply curve is a **change in quantity supplied**
- A **shift** of the supply curve is a **change in supply**



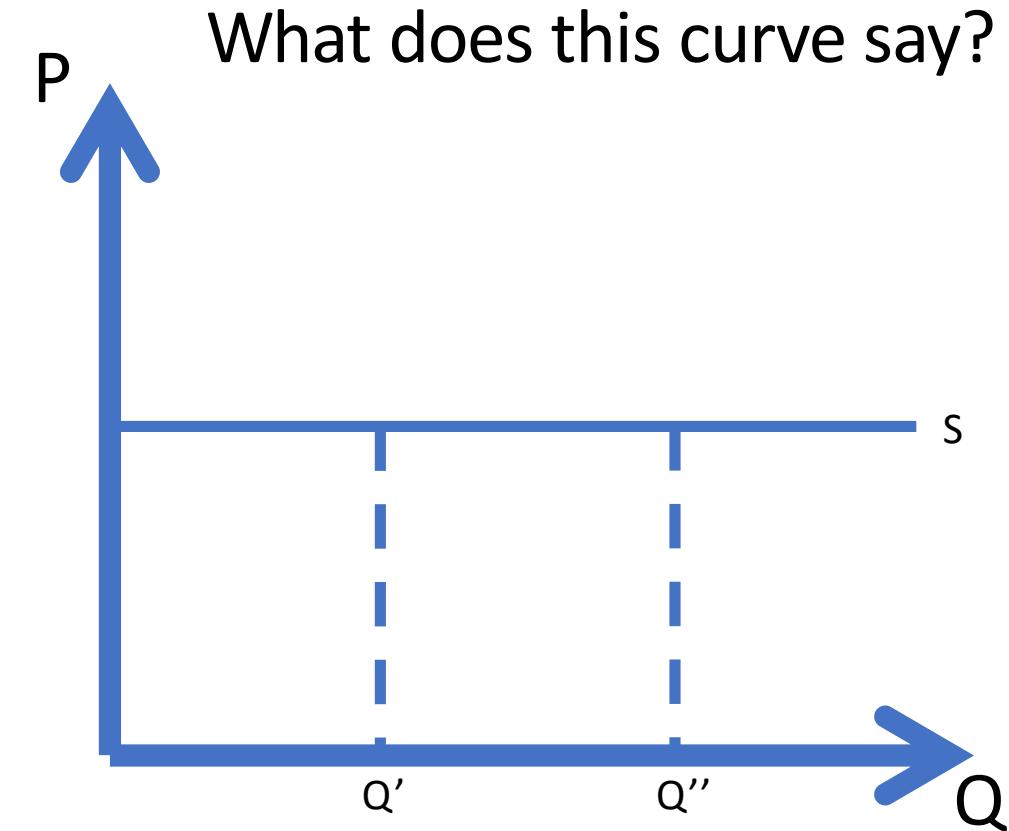
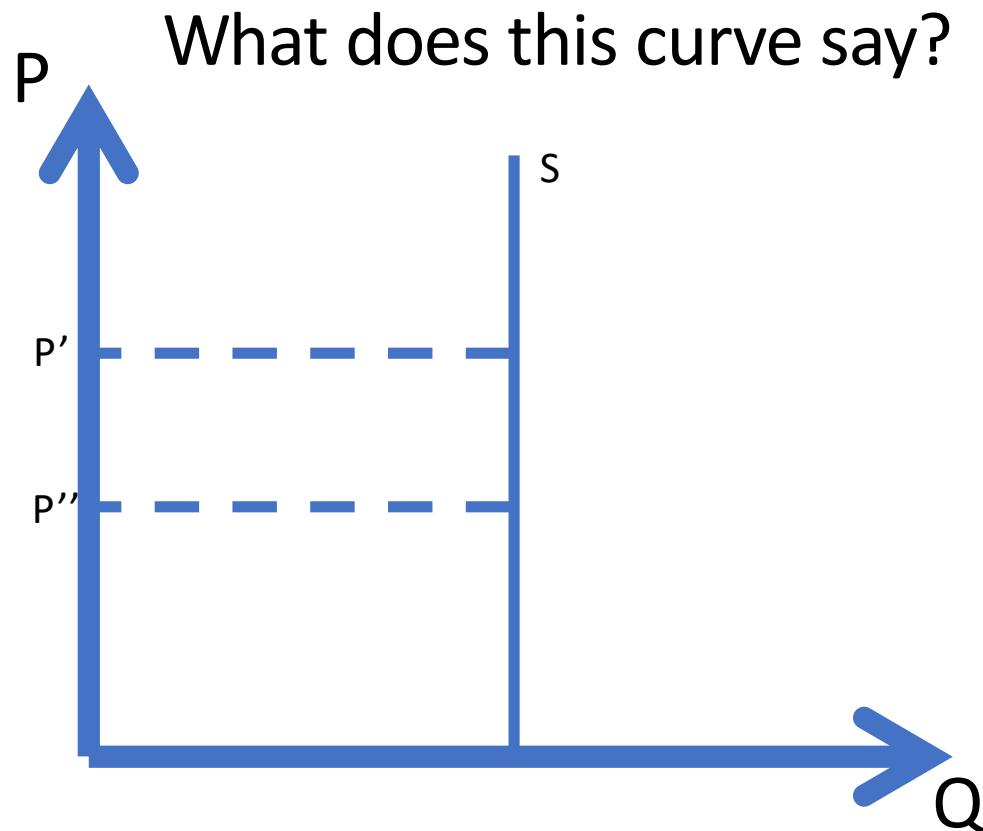
Inelastic vs Elastic Supply Curves

- Sometimes the slope of the curve matters: steeper, flatter?



Perfectly Inelastic and Elastic Supply Curves

- Supply curves can also be vertical and horizontal lines



Elasticity

- **Elasticity**: Measure of the sensibility of the quantity demanded (or supplied) to one of its determinants
 - **Price** elasticity

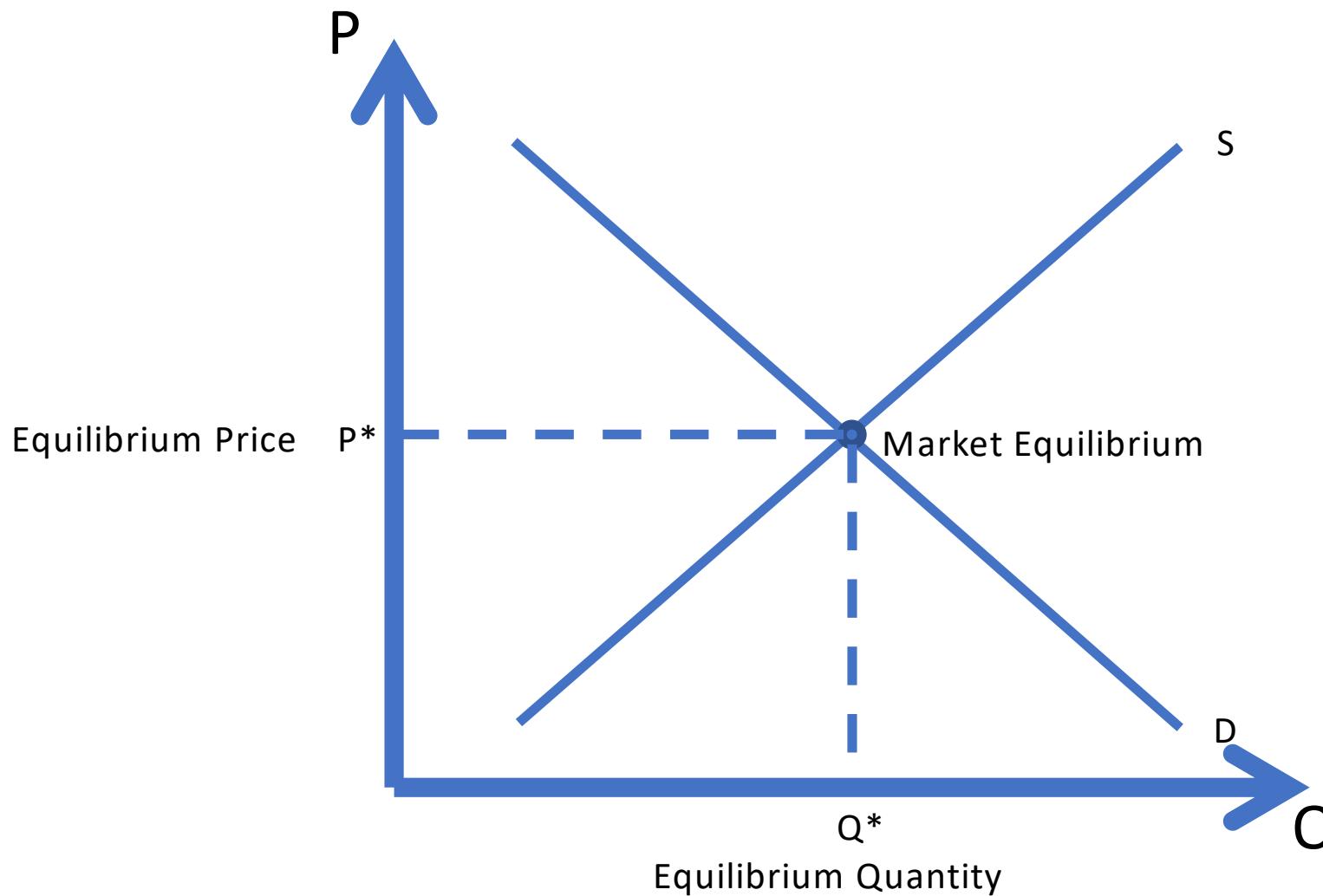
$$\frac{\% \text{ Change in Quantity}}{\% \text{ Change in Price}} = \frac{\Delta Q / Q}{\Delta P / P}$$

- Which industry is likely to have a more elastic **demand**, jets or food?
- Is the **demand** for gasoline more elastic in the short run or the long run?
- Example: Linear **supply** curve defined by points A=(2,3) and B=(6,15). What is the price elasticity at A?

Market Equilibrium

- The purpose of markets is to **bring** buyers and sellers **together**
 - From interaction, firms produce the G & S that consumers want most
- **Equilibrium** is where demand equals supply
 - We say that **markets clear**
- **Interaction** of demand and supply **determines** the **quantity** of the good that is produced and the **price** at which it is sold

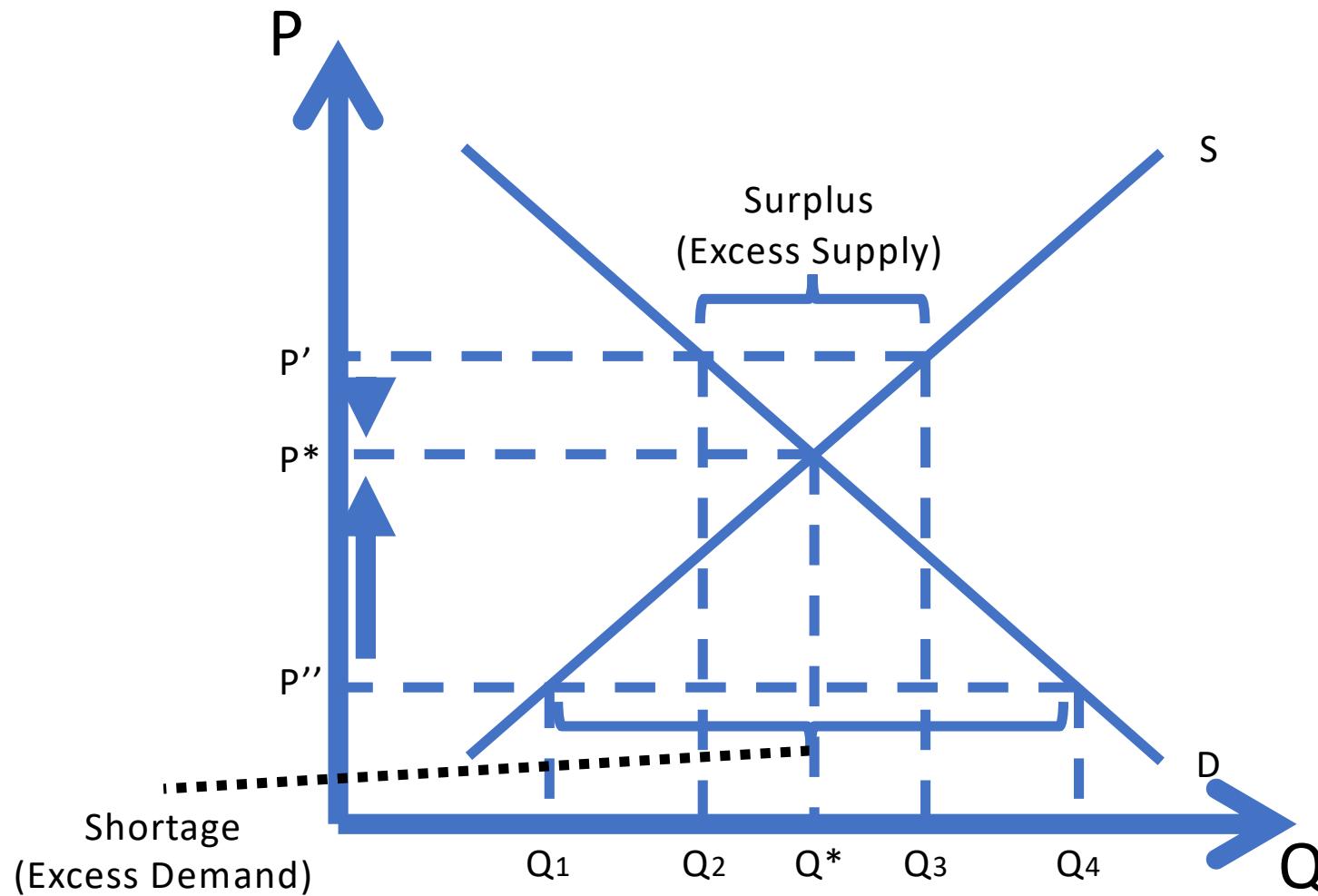
Putting Demand and Supply Together



What Happens When Markets Don't Clear?

- At some prices, supply \neq demand
- A market that is not in equilibrium **moves towards** equilibrium
 - When the price is **above** equilibrium, there will be a **surplus**
 - When the price is **below** equilibrium, there will be a **shortage**
- Once a market is in equilibrium it **remains** in equilibrium

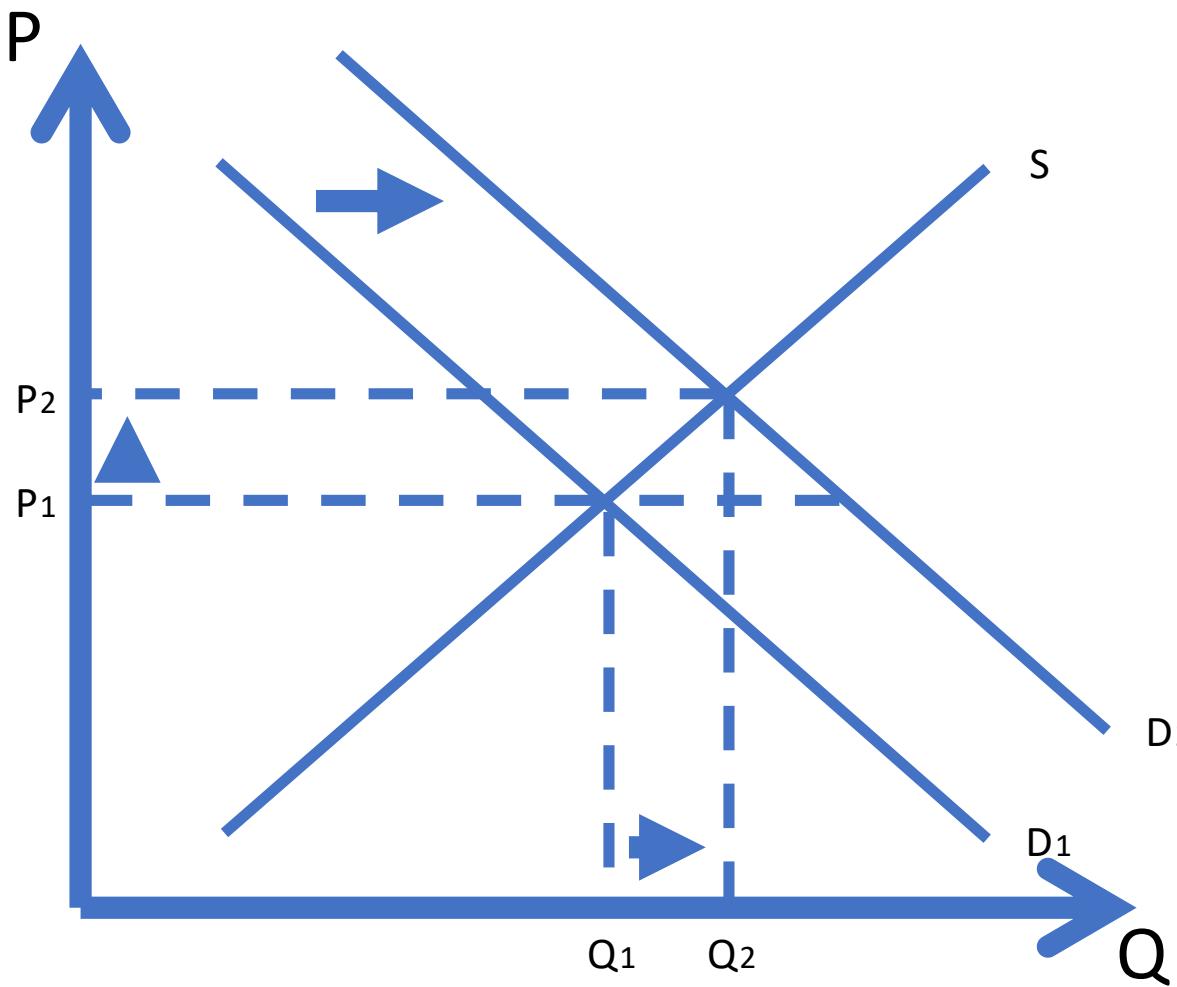
How Markets Eliminate Surpluses and Shortages



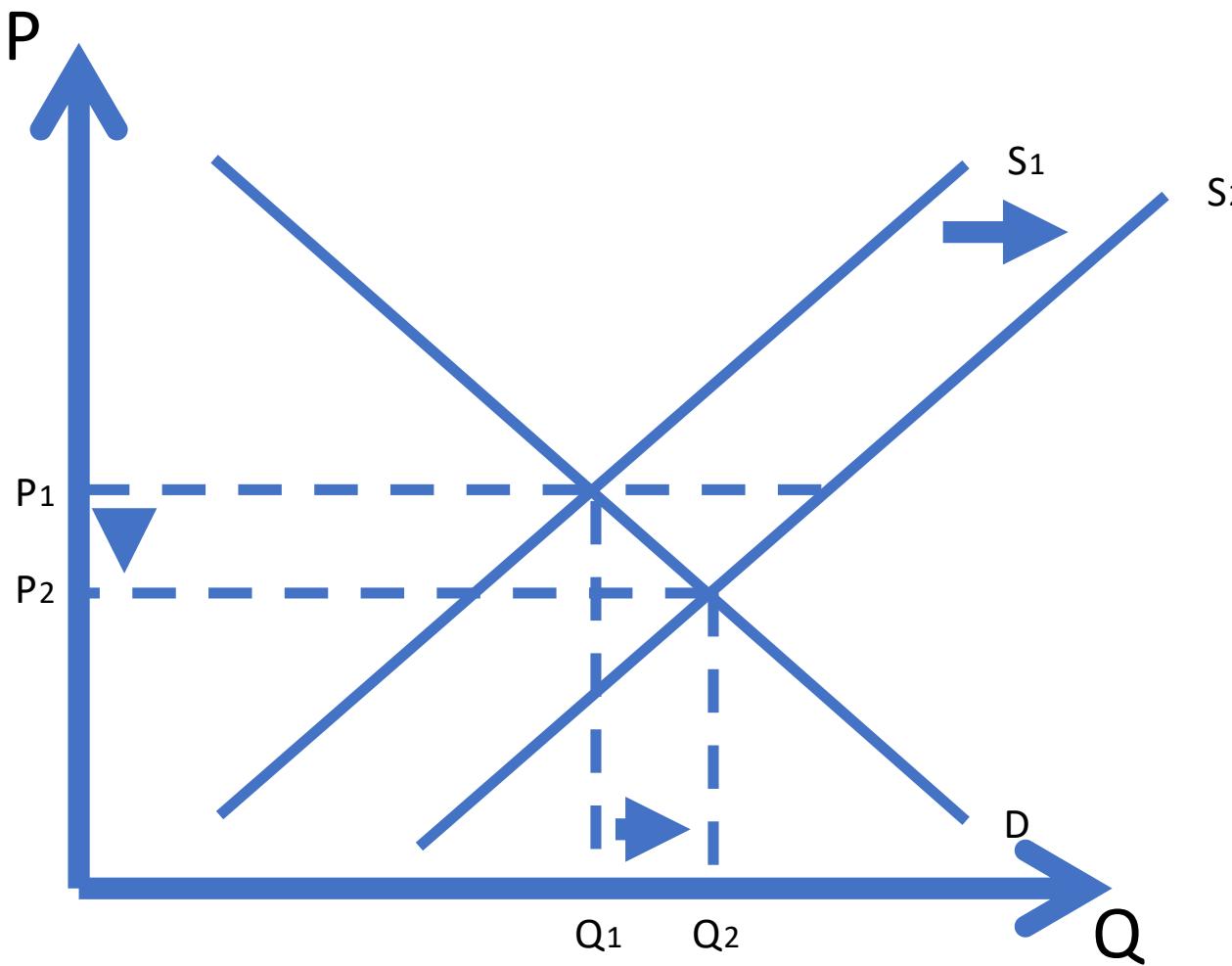
Changes in Equilibrium

- Demand and supply curves are **constantly shifting**
 - Prices and quantities that represent equilibrium are constantly changing
- **How** shifts in demand and supply curves affect the equilibrium?
- **Comparative statics**
 - Compare the old equilibrium with the new equilibrium

Effect of Shifts in Demand on Equilibrium



Effect of Shifts in Supply on Equilibrium

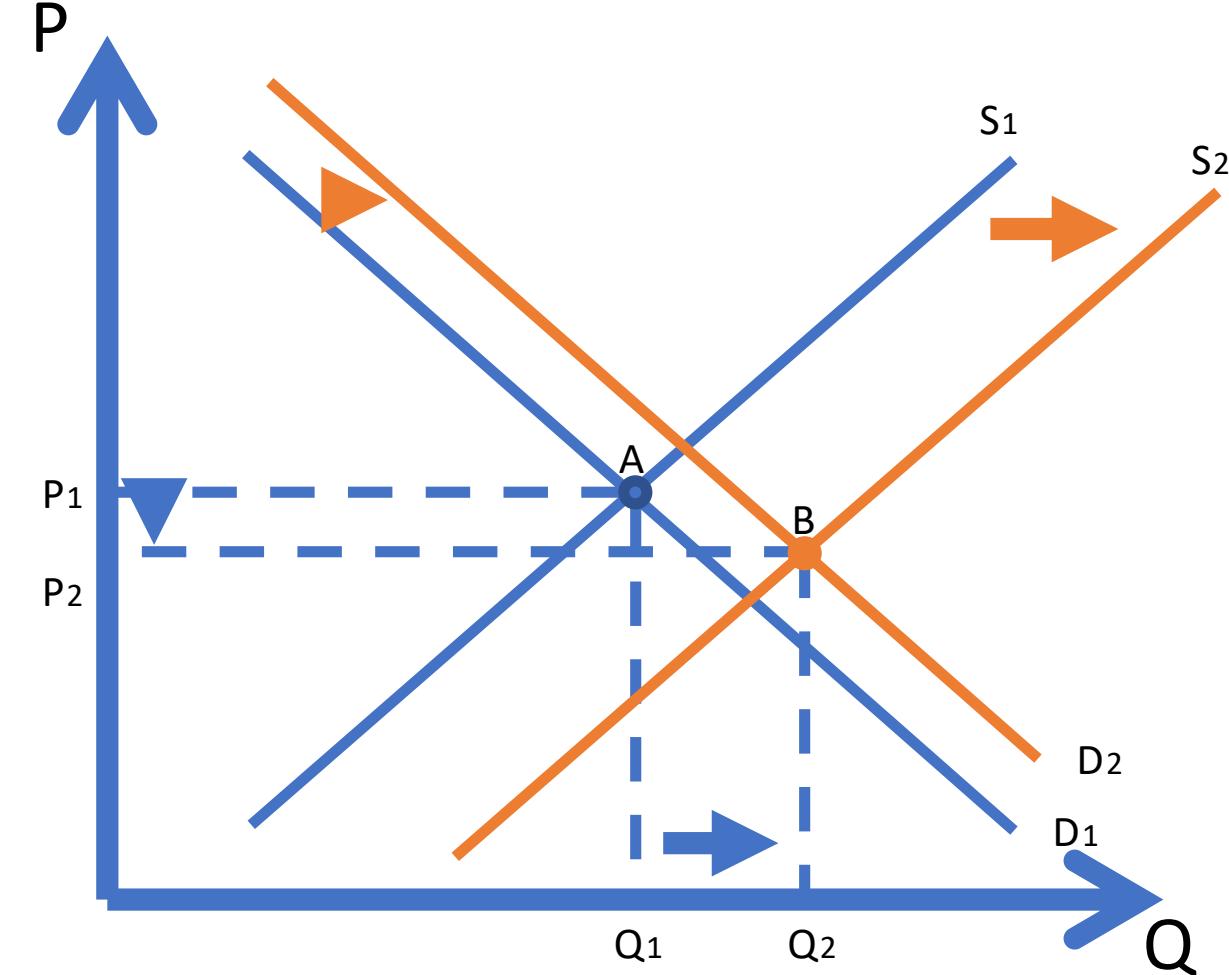
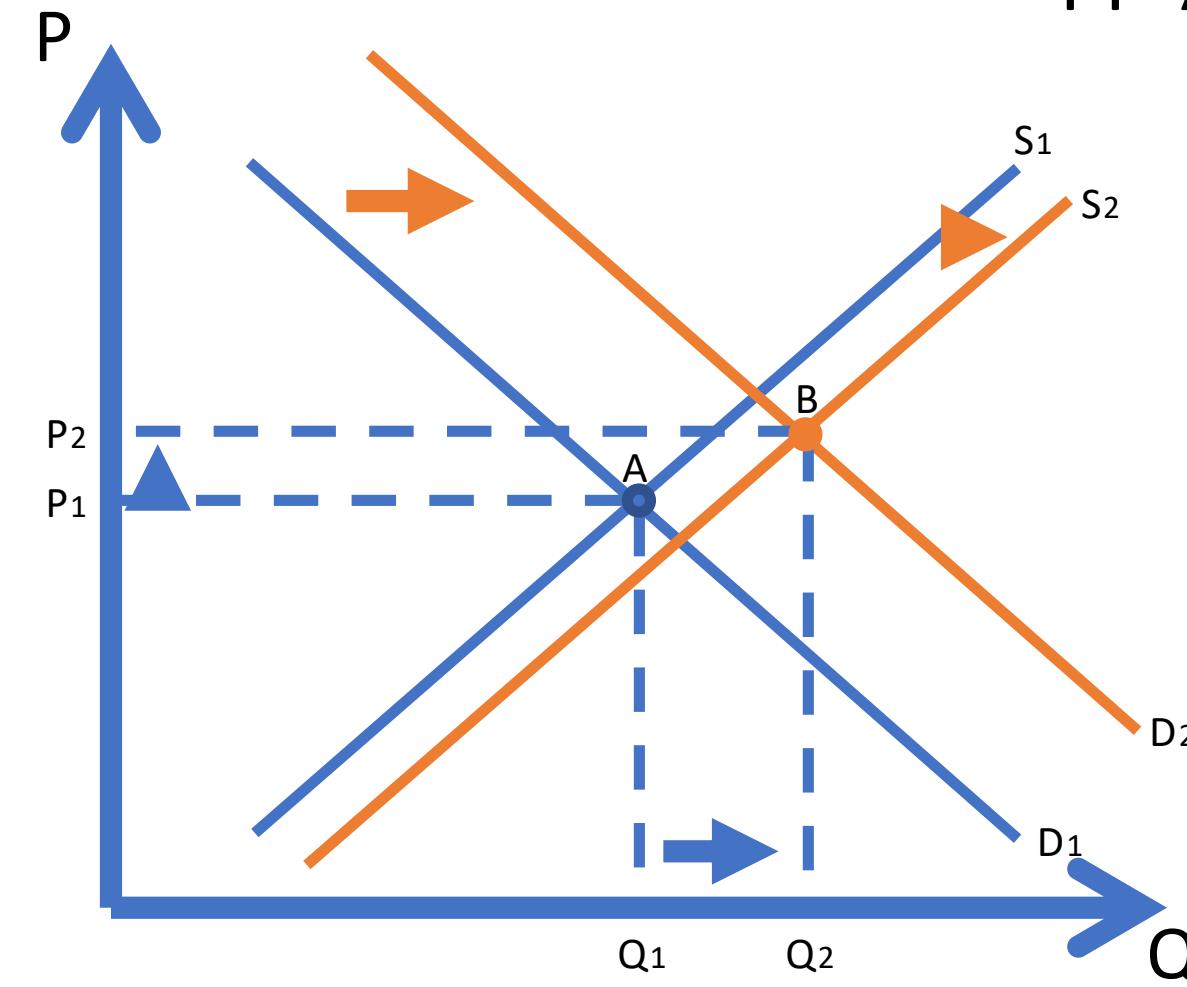


Effect of Shifts in Demand and Supply

- When only **one** curve shifts, easy to predict effect on equilibrium
- What happens if **both** curves shift?
- Whether the equilibrium price or quantity rise or fall depend on whether demand shifts **more than** supply
 - 4 cases

Shifts in Demand and Supply with Different Magnitude

- Positive supply and demand shocks



What Markets Can We Analyze?

- Oil market
- Foreign exchange market
- Loanable funds market
- Labor market
- Bond market
- Apple stock market
- ...

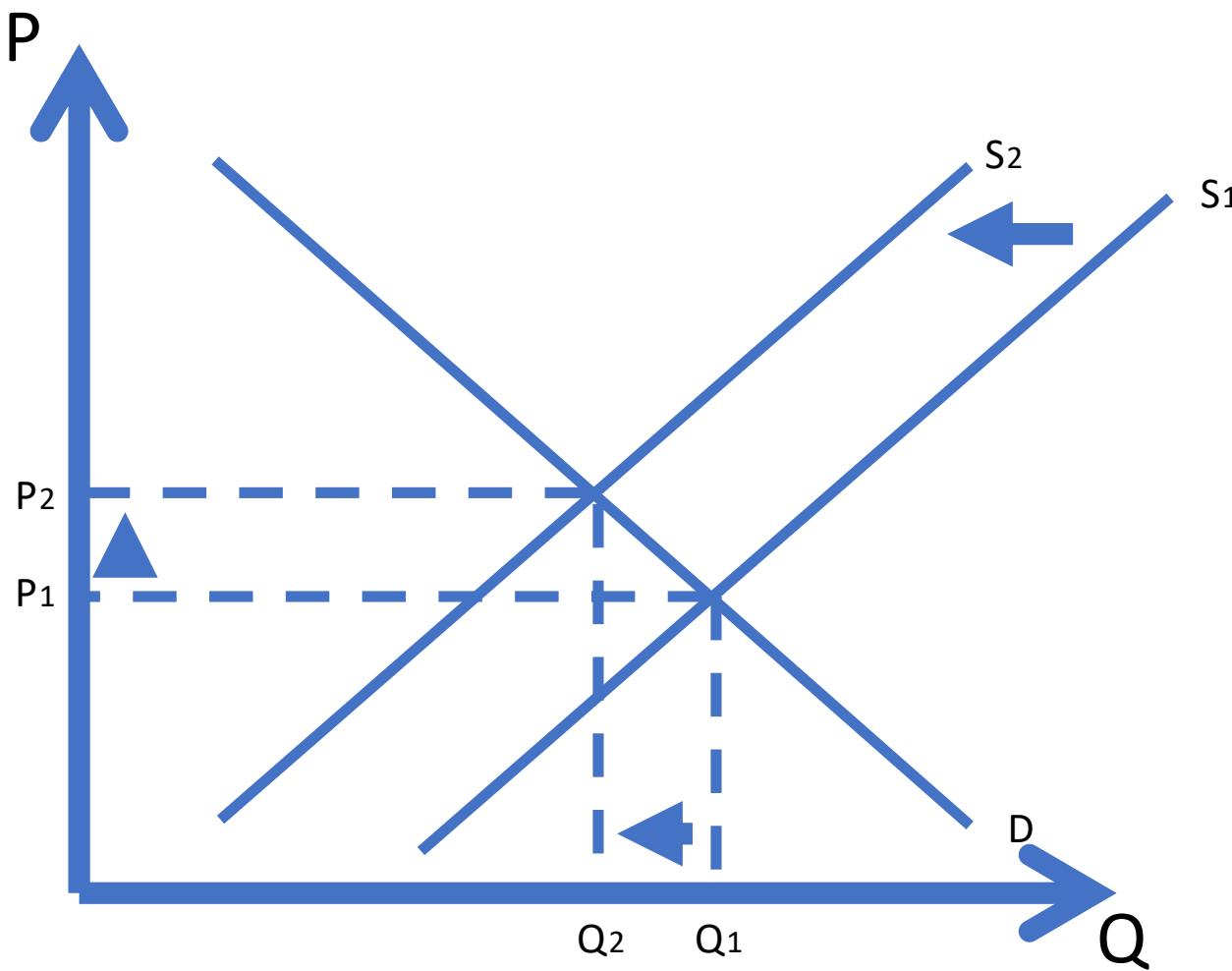
Application: Oil Market

- In late 1970s the price of oil **increased** considerable
 - Why?
- How we can approach it?
 - What sort of shocks could lead to higher prices?
 - Was it a demand shock or a supply shock?

Identifying the Shock

- An upward shift in demand?
 - Higher P
 - Higher Q
- A downward shift in supply?
 - Higher P
 - Lower Q
- Which one is it?
- What additional information is needed?
 - Oil production did not increase in those years
- Now, do we know why prices increased?

Negative Supply Shock



Finding the Effects of Shocks

1. Does the shock shift the demand curve, the supply curve or both?
2. Which side is the shift to?
3. How does the equilibrium change?

More Questions Answered by Microeconomics

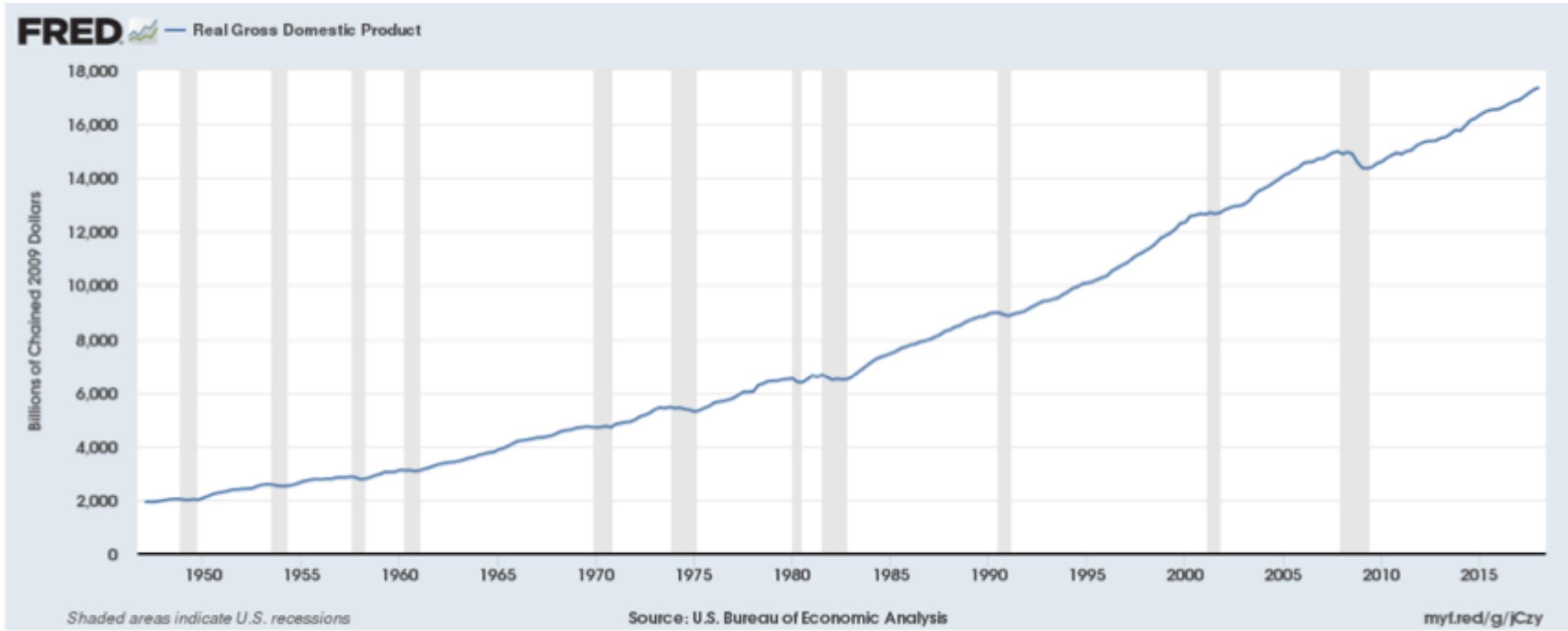
- What are the benefits of the market equilibrium?
- What are the effects of taxes on the equilibrium?
- Do markets always work as expected?
- What if one side of the market has more information?
- What if the market is not perfectly competitive?

Key Macro Variables and Concepts

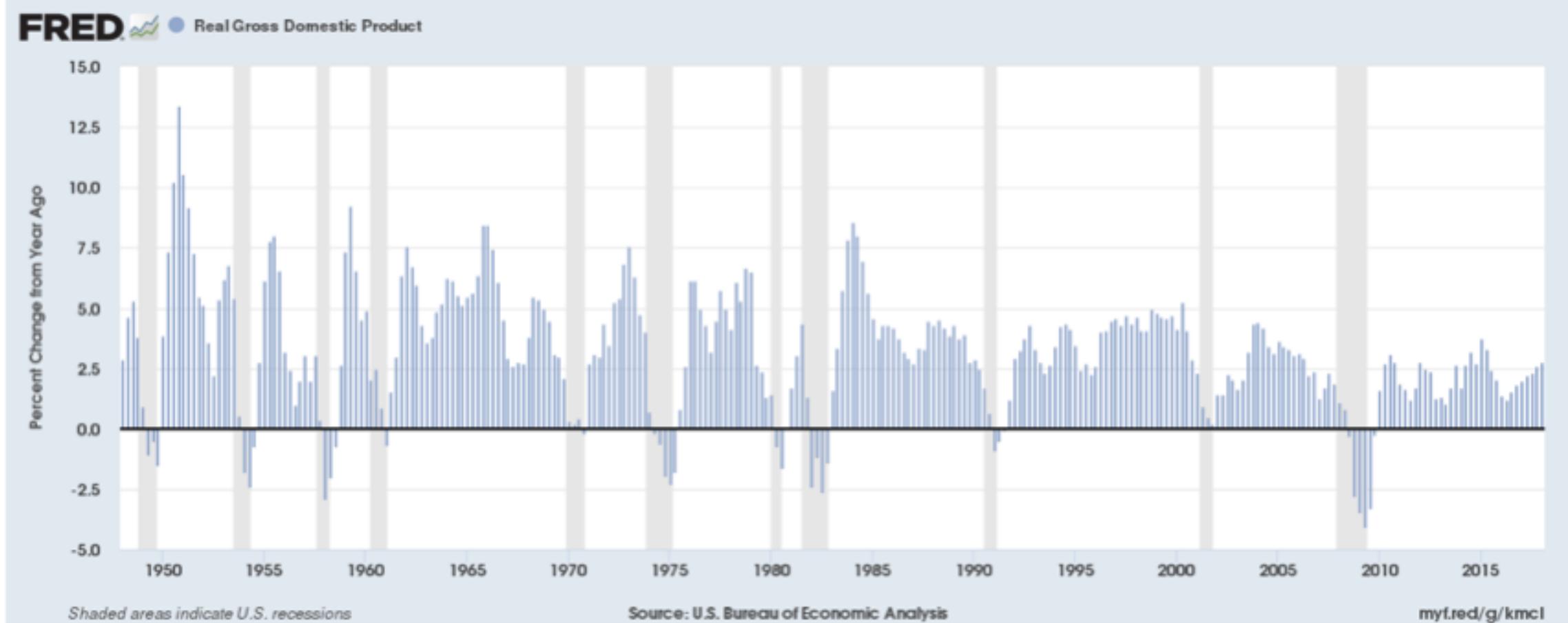
Outline

1. Key Macroeconomic Variables
 2. Business Cycles
 3. Economic Growth
- Textbook Readings: Ch. 8, p. 252; Ch. 9, p. 278; Ch. 10, pp. 337-345

Macroeconomists care about long run growth...



...and short-term fluctuations



Basic Concepts

- Long-Term Trends
 - **Long-run** movements in key macro variables
 - Measurement: Changes in a **decade**, 50 years, etc.
- Business Cycle (Boom and Bust Cycle)
 - **Short-run** movements in key macro variables
 - Measurement: **Quarterly**, annual movements

Key Macroeconomic Variables

- Measuring the **value of economic activity**: **Gross Domestic Product**
- From national income to **individual income**:
 - **Personal Income** and income per capita
 - **Corporate Profits** and earnings per share
- Measuring the **cost of living**: **Inflation Rate**
- Measuring **joblessness**: **Unemployment Rate**
- Measuring the **cost of borrowing**: **Interest Rates** and **Stock Markets**

Why Do We Care About These Variables?

- Macro statistics provide a summary of the success of an economy
- Political/economic debates on how to improve the economy's performance
- Macro variables are like an economic report card
- Governments are judged to be successes or failures to a large extent based on this report card

Stock and Flows

- Many economic variables measure a **quantity** (money, goods, etc.)
- Two types of quantity variables
 - Stock: Quantity measured **at a given point** in time
 - Flow: Quantity measured **per unit of time**
- Stocks and flows are measured in **different units**
- Stocks and flows are **often related**



Stock	Flow
Wealth	Income and Expenditure
Number of unemployed people	Number of people losing their jobs
Amount of capital in the economy	Amount of investment
Government debt	Government budget deficit

Gross Domestic Product (GDP)

- GDP is the most important **flow variable** in macroeconomics
- **GDP**: *market value of all final goods and services produced within an economy in a given period of time* (quarter, year)
 - Sum of money value (**Price x Quantity**) of output (goods and services)
 - Otherwise: 10 apples + 5 diamonds = 14 apples + 1 diamond
- **Nominal GDP**: Uses **current** prices
 - Misleading to gauge economy's ability to satisfy demands
- **Real GDP**: Uses **constant** prices
 - Better measure of economic well-being, not influenced by changes in prices

Business Cycle: Conventional Definitions

- **Business Cycle:**
 - Alternating periods of expansions and recessions
- **Expansions:**
 - Two or more consecutive quarters of **positive** growth of real GDP
- **Recessions:**
 - Two or more consecutive quarters of **negative** growth of real GDP

Growth of Income or Output

Define:

$$\begin{aligned} Y_t &= \text{Real Income} \\ &= \text{Real Output} \\ &= \text{Real GDP} \\ &= \text{Real Gross Domestic Product} \end{aligned}$$

$$\begin{aligned} \Delta Y_t = Y_t - Y_{t-1} &= \text{Change in Real Income} \\ &= \text{Change in Real Output} \\ &= \text{Change in Real GDP} \end{aligned}$$

$$\begin{aligned} \frac{\Delta Y_t}{Y_{t-1}} &= \text{Growth Rate of Real Income} \\ &= \text{Growth Rate of Real Output} \\ &= \text{Growth Rate of Real GDP} \end{aligned}$$

Expansions & Recessions

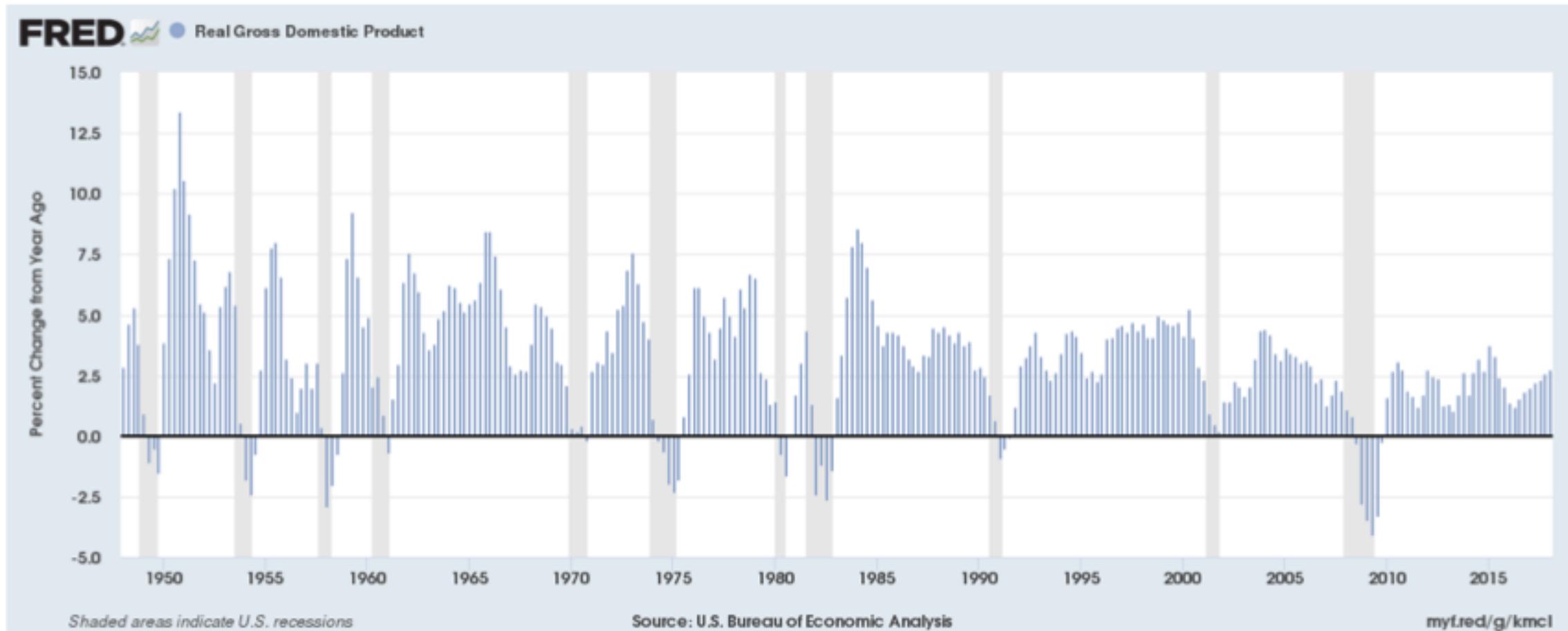
$$\frac{\Delta Y_t}{Y_{t-1}} > 0 \quad \text{Real Income is rising}$$

\Rightarrow Economy is in an Expansion

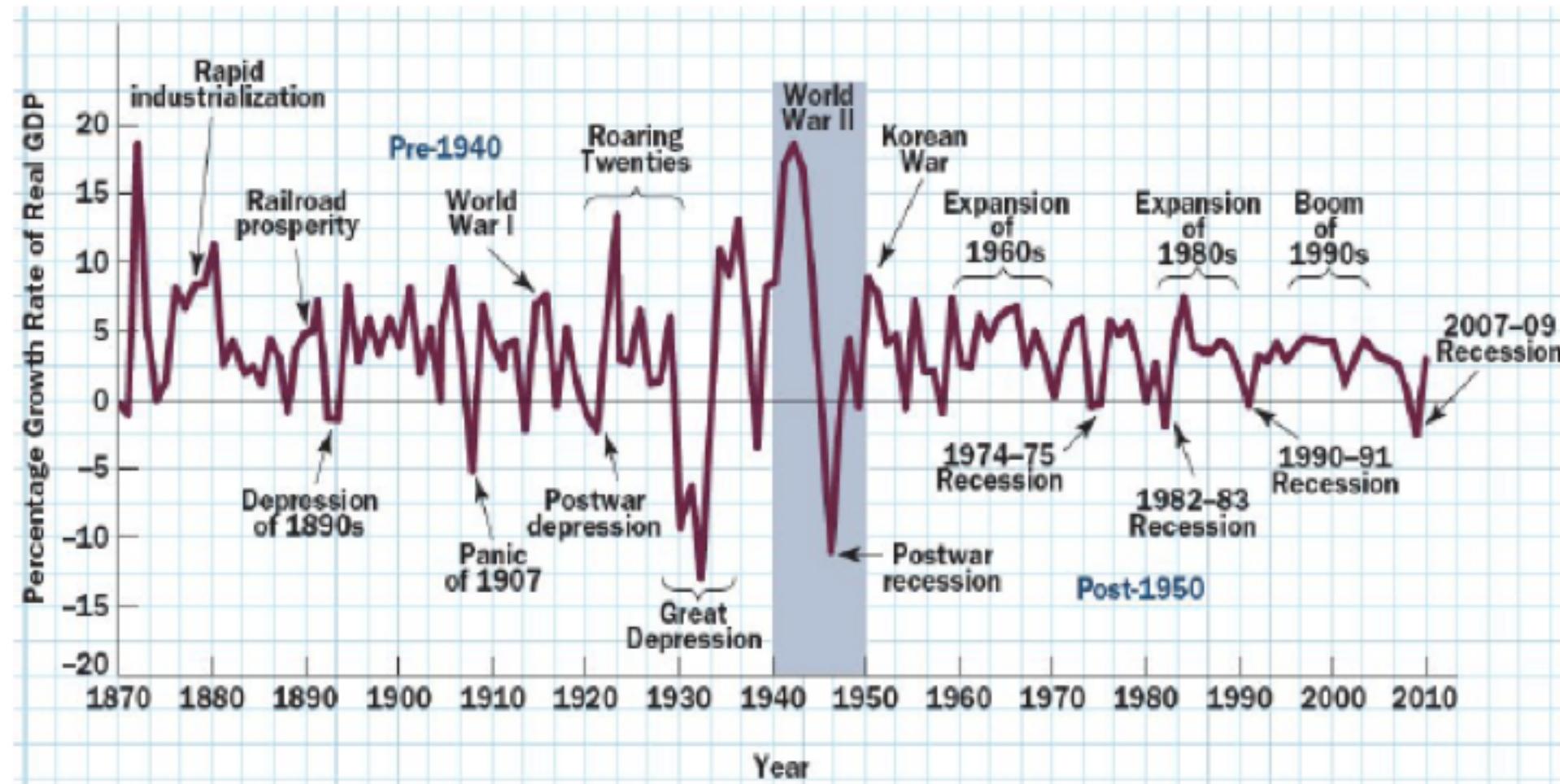
$$\frac{\Delta Y_t}{Y_{t-1}} < 0 \quad \text{Real Income is falling}$$

\Rightarrow Economy is in a Recessions

Negative Real GDP Occurs Regularly



Recessions Are the Feature of Our History



Key Observations: GDP

- Substantial Expansions: “**Booms**”
 - 20s, 60s, 80s & 90s
- Serious Recessions: “**Deep Slumps**”
 - 30s, 46-47, 75,76, 82-83 & 07-09
- Great Moderation: 1985-2007
 - Growth rate **less volatile** after WWII than before
- Great Recession: 2007-2009
- Secular Stagnation: 2010-?

Unemployment Rate

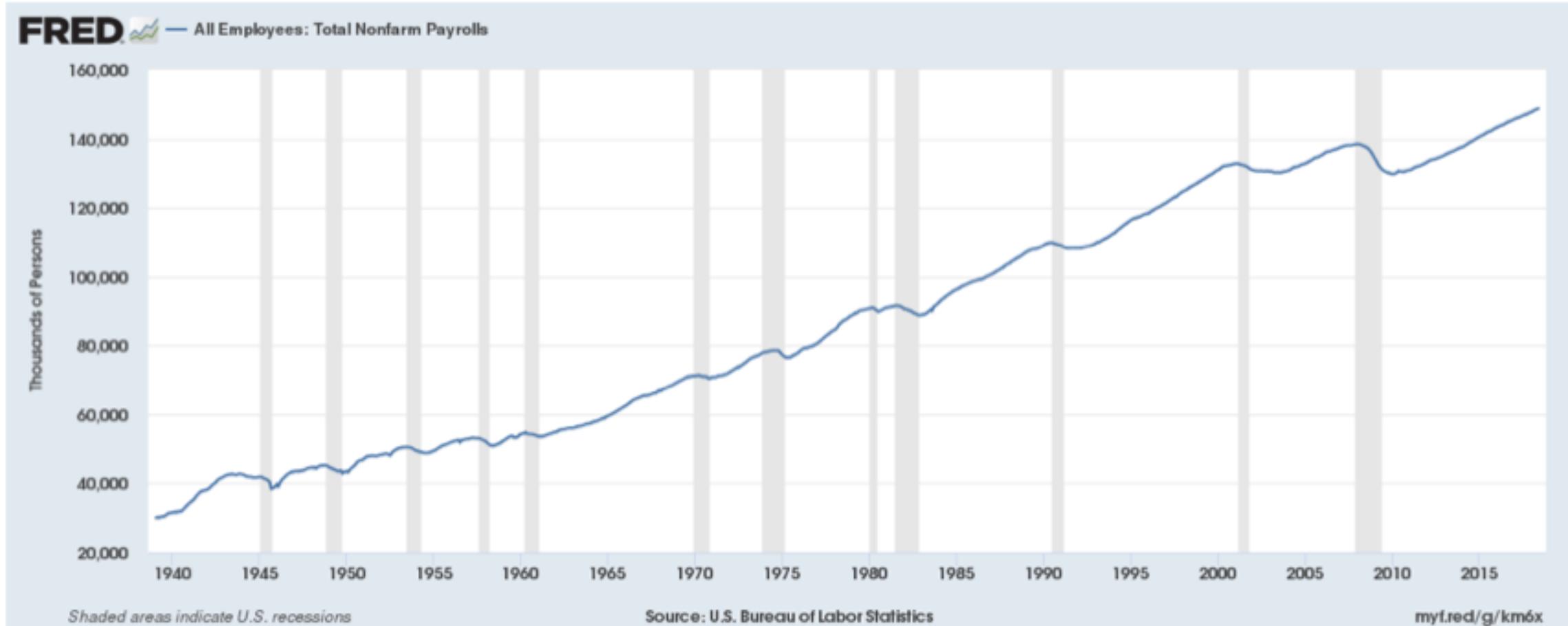
U_t = Unemployment Rate

$$= \frac{\text{Number of Workers Unemployed}}{\text{Labor Force}}$$

Job Market is Affected by Business Cycles



Effect of Recessions on Employment



Key Observations: Unemployment

- **Booms:** Low & Falling Unemployment
- **Recessions:** High & Rising Unemployment
 - Great Depression: Unemployment rate hit **25%**
 - High unemployment rates: 73-75; 80-83; 07-09
 - Unemployment rate tends to decline **slowly** after recessions

Soaring Unemployment = Broken Invisible Hand

- Markets, when they work, match supply and demand
- Prices, in theory, **fall** if there is **too much supply**
- When 10 million people suddenly cannot find work, **why don't wages fall** until everyone who wants a job can get a job?
- We will work hard to answer this question!

Inflation Rate

P_t = Average Level of Prices
= Implicit Price Deflator for GDP

$\Delta P_t = P_t - P_{t-1}$ = Change in the Price Level

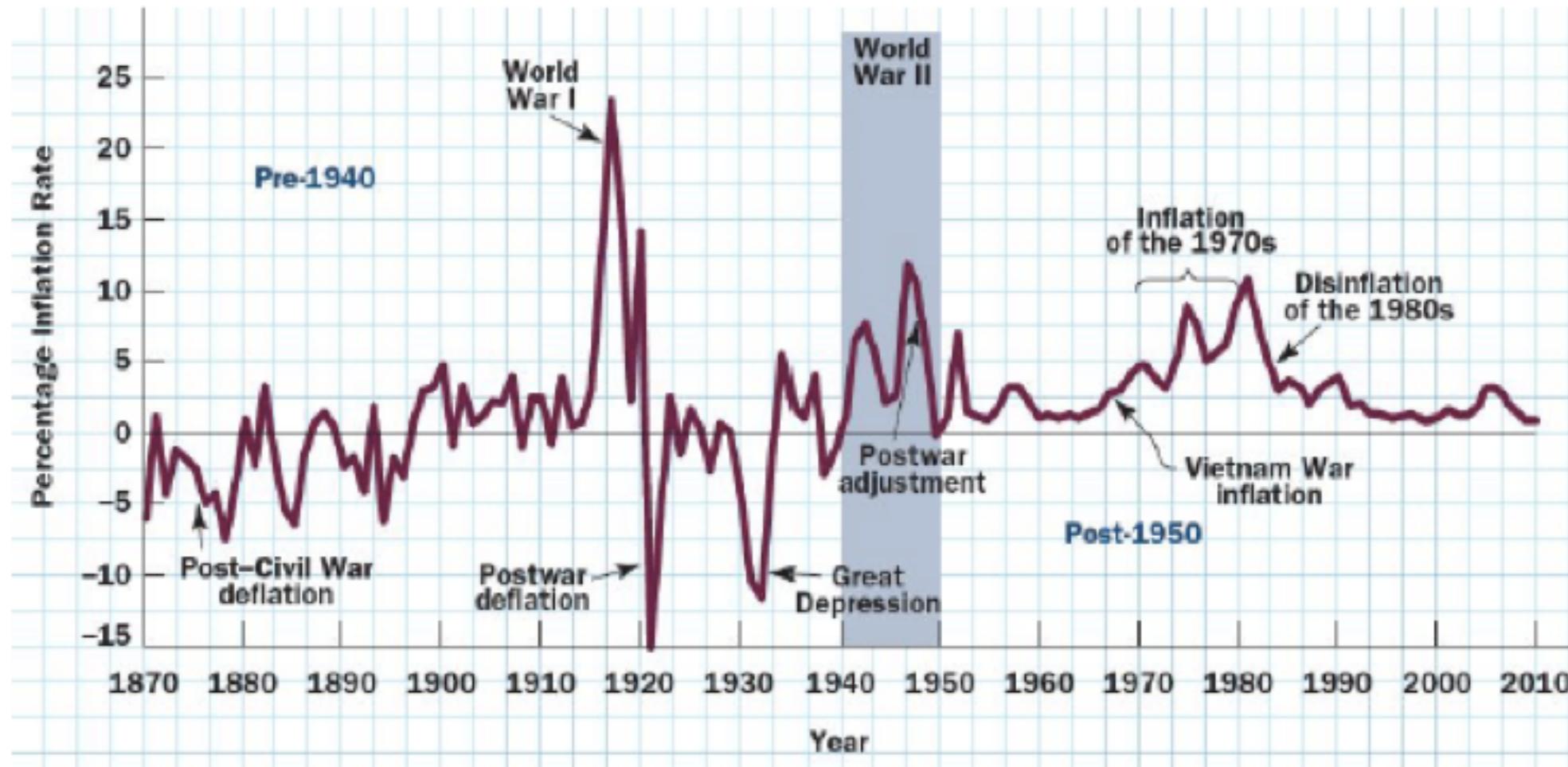
$\frac{\Delta P_t}{P_{t-1}} = \pi_t$ = Rate of Inflation

Inflation and Deflation

$\pi_t > 0$ Inflation: Price level is rising
or the Cost of Living is rising

$\pi_t < 0$ Deflation: Price level is falling
or the Cost of Living is falling

The Inflation Rate in the US (1870-2010)



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Key Observations: Inflation

- Substantial **Inflations**
 - WWI, WWII, 70s
- Substantial **Deflations**
 - Late 1800s, Post WWI, 30s
- No deflation **after** WWII
- Inflation much **less volatile** after WWII than before

Economic Cycles

- **Pro-cyclical** variables
 - Consumption, Investment, Industrial Production, Employment
- **Counter-cyclical** variables
 - Unemployment
- **Acyclic** variables
 - Wages

Business Cycle Questions

- What causes expansions and recessions?
- Why was GDP growth less volatile after WWII than before?
- What caused the most recent recession, i.e. the Great Recession?
- What macroeconomic policies can be followed to prevent circuit recessions or to sustain expansions?

Long-Run Trends

- Long run performance is a **critical issue**
 - Why do some countries, over half-century periods, do much better than others?
- Economists look at **income/capita**, to give nation/states long run performance assessments
- **Income/capita**: A useful, but far from perfect measure

TABLE

The Variety of Growth Experiences

Source: Robert J. Barro and Xavier Sala-i-Martin, *Economic Growth* (New York: McGraw-Hill, 1995), tables 10.2 and 10.3; *World Development Report 2005*, Table 1; and author's calculations.

Country	Period	Real GDP per Person at Beginning of Period ^a	Real GDP per Person at End of Period ^a	Growth Rate (per year)
Japan	1890–2003	\$1,280	\$28,620	2.79%
Brazil	1900–2003	663	7,480	2.38
Mexico	1900–2003	987	8,950	2.16
China	1900–2003	610	4,990	2.06
Germany	1870–2003	1,859	27,460	2.05
Canada	1870–2003	2,022	29,740	2.04
United States	1870–2003	3,412	37,500	1.82
Argentina	1900–2003	1,952	10,920	1.69
India	1900–2003	575	2,880	1.58
United Kingdom	1870–2003	4,094	27,650	1.45
Indonesia	1900–2003	759	3,210	1.41
Pakistan	1900–2003	628	2,060	1.16
Bangladesh	1900–2003	531	1,870	1.16

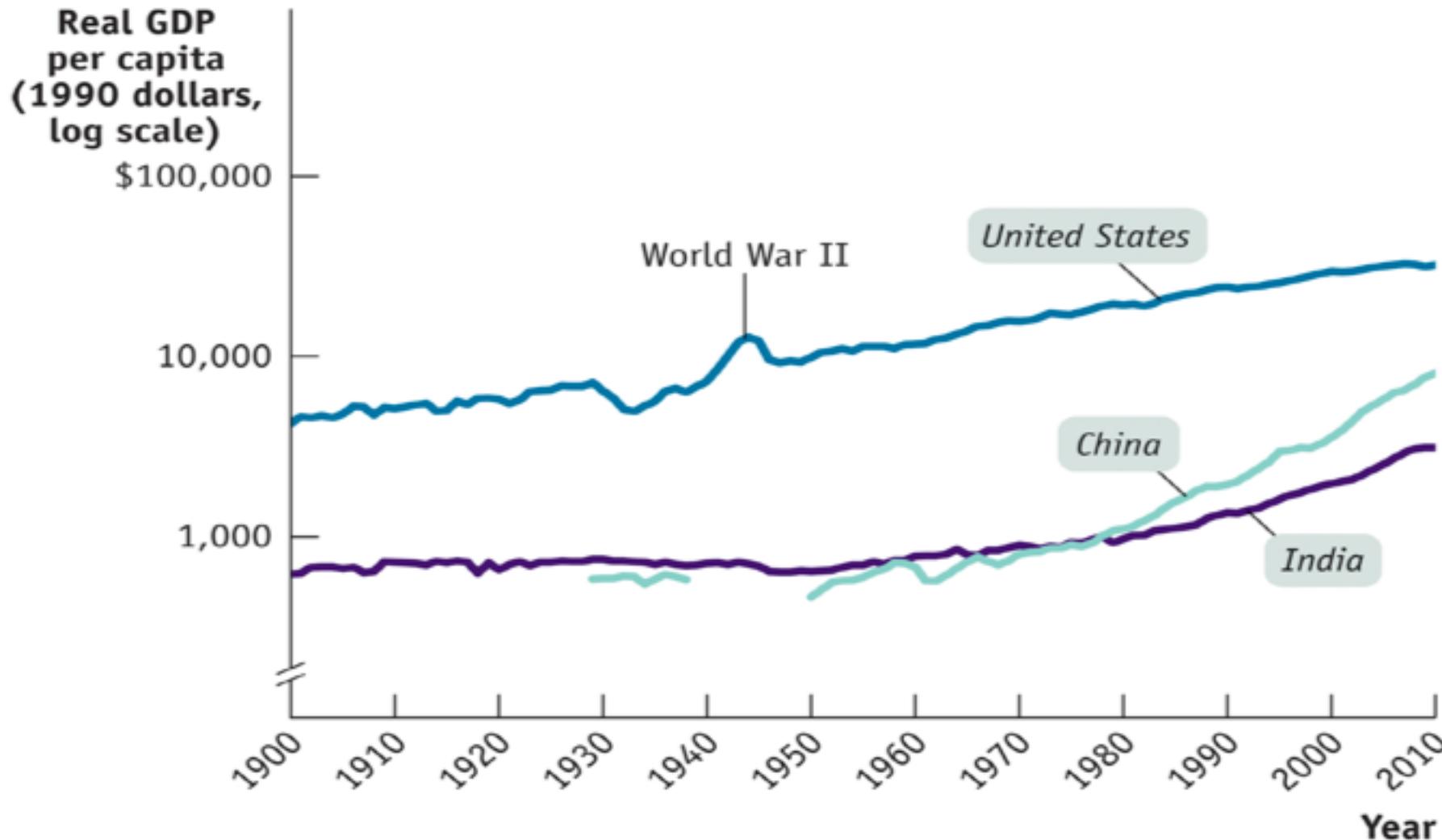
^aReal GDP is measured in 2003 dollars.

Small Differences in Growth Rates Matter

- How much will your generation have to share, when you are retiring?
- 3.4% growth for 50 years:
 - Economy is 5.4 times larger, when you retire
- 2.0% growth for 50 years:
 - Economy is 2.7 times larger, when you retire

Appreciate the power of compounding!

Comparing Economies



Long-Term Growth Questions

- What causes sustainable growth?
- What are the main drivers of long-term growth?
- Is there convergence among different countries?
- Should there be long-term growth?