CHAPTER 2 SUPPLY AND DEMAND

Answers to Review Questions

1. Under the horizontal interpretation, we begin with a price for the good and then use the demand curve to read the quantity demanded at that price on the horizontal axis. Under the vertical interpretation, we start with a quantity produced and use the demand curve to read the marginal buyer's reservation price for the product on the vertical axis.

   Learning Objective: 02-01
   AACSB: Reflective Thinking
   Bloom's: Understand

2. The equilibrium price of a good is determined by the intersection of its supply and demand curves. We can know everything about a good's cost of production (that is we can know its supply curve exactly) but without the demand curve we will not know the quantity people will want to purchase and therefore we will not know what price must be charged to cover the cost.

   Learning Objective: 02-02
   AACSB: Reflective Thinking
   Bloom's: Understand

3. If price control regulation prevented the price of gasoline from rising to its equilibrium level, we would expect to see symptoms of excess demand for gasoline such as lines of cars waiting at the pumps to buy gas.

   Learning Objective: 02-02
   AACSB: Analytic
   Bloom's: Apply

4. A change in demand means a shift of the entire demand curve, whereas a change in the quantity demanded means a movement along the demand curve in response to a change in price of that specific good.

   Learning Objective: 02-03
   AACSB: Analytic
   Bloom's: Analyze

5. It is smart for each individual at a sporting event to stand up in order to get a better view of the game. However, it is dumb for all to stand up since no one sees any better than if all had remained seated.

   Learning Objective: 02-04
   AACSB: Reflective Thinking
   Bloom's: Understand

Answers to Problems

1. a. The supply curve shifts to the right. The discovery is a technological improvement, so the improved technique would allow a farmer to use the same inputs to produce more corn.

   b. The supply curve shifts to the right. Fertilizer is an input into the production of corn, so this is an example of a decrease in an input price. A decrease in input prices shifts the supply curve to the right.

   c. The supply curve shifts to the right. New tax breaks make farming relatively more profitable than before, so those who were earning an income from a non-farming job that paid just a little bit more than farming would switch to farming if the tax break is big enough.

   d. The supply curve shifts to the left. A tornado would destroy corn fields along with infrastructure used to harvest and store it. Thus, at every given price the quantity of corn supplied would be lower and the supply curve shifts to the left.

   Learning Objective: 02-01
   AACSB: Reflective Thinking
   Bloom's: Understand

2. a. The demand curve shifts to the right. Buyer income has risen and vacations are a normal good, so this increases the quantity demanded at every given price.

   b. The demand curve shifts to the left. Buyer preference will probably change because most people want to avoid foods that cause heart disease, so buyers will purchase fewer pizzas with pepperoni.

   c. The demand curve shifts to the right. Since these goods are substitutes, an increase in the price of MP3s would result in an increased demand for CDs.

   d. The demand curve remains unchanged. An increase in the price of CDs decreases the quantity demanded of CDs, which causes movement *along* the demand curve.

Learning Objective: 02-01
AACSB: Reflective Thinking
Bloom's: Understand

3. The supply of binoculars will not be affected. The demand for binoculars might increase due to more people wanting to spot UFOs. This will lead to an increase in the equilibrium price of binoculars and the quantity of binoculars supplied. However, no change in the supply of binoculars should occur since nothing has changed with regard to input prices, technology, or any of the factors that determine supply.

   Learning Objective: 02-01
   AACSB: Analytic
   Bloom's: Analyze

4. Two goods are complements if an increase in the price of one causes a leftward shift in the demand curve for the other (or if a decrease in the price of one causes a rightward shift in the demand curve for the other). The opposite holds true for a substitute, where an increase in the price of one causes a rightward shift in the demand for the other (or a decrease in the price of one causes a leftward shift in the demand curve for the other).

   a. Since washing machines and dryers are typically used together, we would expect them to be complements.

   b. Since tennis rackets and tennis balls are typically used together, we would expect them to be complements.

   c. Ice cream and chocolate would be substitutes for someone who consumes either one or the other for dessert, and they would be complements for someone who likes to consume ice cream and chocolate together.

   d. Since cloth diapers and disposable diapers are generally consumed in place of one another, we would expect them to be substitutes.

   Learning Objective: 02-03
   AACSB: Reflective Thinking
   Bloom's: Understand

5. An increase in the birth rate will increase the population of potential buyers of land. This will shift the demand curve for land to the right and increase the equilibrium price of land.

   Learning Objective: 02-03

AACSB: Analytic
Bloom's: Analyze

6. An increase in the price of chicken feed shifts the supply curve of chickens to the left, resulting in an increase in the equilibrium price of chickens. Assuming that chicken is a substitute for beef, the increase in the price of chickens will shift the demand curve for beef to the right, increasing both the equilibrium price and the equilibrium quantity of beef.

   Learning Objective: 02-03
   AACSB: Analytic
   Bloom's: Analyze

7. Automobile insurance and automobiles are complements, so an increase in automobile insurance rates will thus shift the demand curve for automobiles to the left. Some people who would have bought new automobiles with the lower insurance rates will choose instead to purchase a used car, use public transportation, or perhaps continue driving their current vehicle.

   Learning Objective: 02-03
   AACSB: Analytic
   Bloom's: Analyze

8. a. The discovery will shift the demand curve for oranges to the right. As a result, both the equilibrium price and the equilibrium quantity of oranges will increase.

   b. Since grapefruit can be assumed to be a substitute for oranges for most consumers, a drastic decrease in the price of grapefruit will make some of the current orange consumers buy grapefruit instead. This will shift the demand curve of oranges to the left. As a result, both the equilibrium price and equilibrium quantity of oranges will decrease.

   c. Since labor is an input to orange production, an increase in the wage is an increase in the cost of an input. This will shift the supply curve of oranges to the left. As a result, the equilibrium price of oranges will increase and the equilibrium quantity will decrease. Note that an increase in wages does not automatically mean an increase in the productivity of the workers, which would have affected supply in the opposite direction.

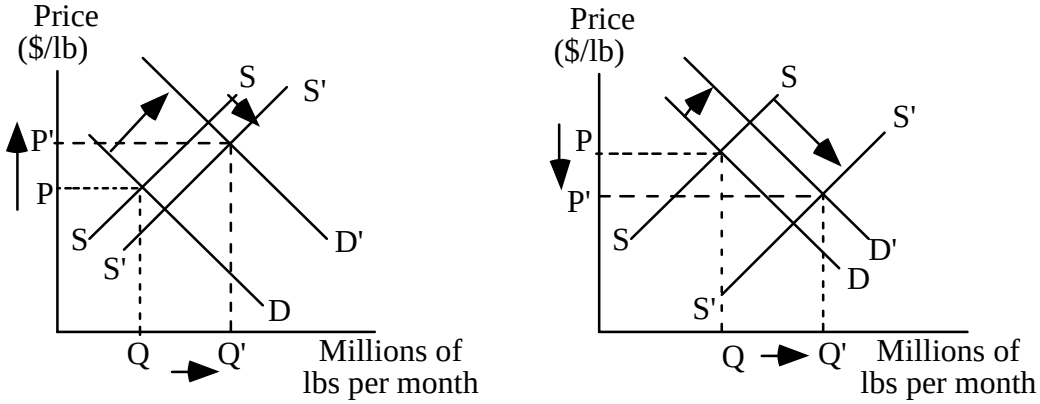
   d. A better than expected harvest means that supply will be greater, shown graphically as a shift of the supply curve to the right. As result, the equilibrium price of oranges will decrease and the equilibrium quantity of oranges will increase.

Learning Objective: 02-03
AACSB: Analytic
Bloom's: Analyze

9. The mad cow disease announcement is likely to cause many consumers to substitute chicken for beef; this will cause the demand curve for chicken to shift to the right. The discovery of the new chicken breed will cause a rightward shift in the supply curve of chicken. The two developments together will increase the equilibrium quantity of chicken sold in the United States, but we cannot determine the net effect on equilibrium price from the information given.

   Learning Objective: 02-03
   AACSB: Analytic
   Bloom's: Analyze

10. Since both the demand and supply curves for tofu have shifted outward, the equilibrium quantity of tofu sold is higher than before. The equilibrium price could be higher (left panel), or lower (right panel), or it could remain the same, depending on the size of the shifts in supply and demand. If the increase in supply is small relative to the price increase in demand, price will rise. If the increase in supply and the increase in demand exactly offset each other, price will not change.



   Learning Objective: 02-03
   AACSB: Analytic
   Bloom's: Analyze

Econ 1110 Lecture 2

The Economic Naturalist

Example 2.1. "Why do the keypad buttons on drive-up automatic teller machines have Braille dots?" **(Bill Tjoa)**

Example 2.2. Why are child safety seats required in cars but not in airplanes?" (Greg Balet)

A mother cannot legally drive her 6-month-old son to a nearby grocery store without first strapping him into a government-approved safety seat. Yet she can fly with him from Miami to Seattle with no restraining device at all. Why this difference?

In case of an accident—whether in a car or an airplane—an infant who is strapped into a safety seat is more likely to escape injury or death than one who is unrestrained. But the probability of being involved in a serious accident is hundreds of times higher when traveling by car than when traveling by air, so the benefit of having safety seats is greater for trips made by car. Using safety seats is also far more costly on plane trips than on car trips. Whereas most cars have plenty of extra room for a safety seat, parents might need to purchase an extra ticket to use one on an airplane. Most parents appear unwilling to pay $600 more per trip for a small increment in safety, either for themselves or their children.

Example 2.3. Why are Australian films so good?

Breaker Morant
Picnic at Hanging Rock
The Last Wave
Strictly Ballroom
Priscilla, Queen of the Desert
My Brilliant Career
Mad Max
Crocodile Dundee
Gallipoli
Moulin Rouge
Walkabout
Lantana
Rabbit Proof Fence
The Year of Living Dangerously
Muriel's Wedding
Shine

Criteria for choosing a film to see:

Is it by a well-known director?
Does it feature a favorite actor or actress?
Has it gotten rave reviews in the media?
Word of mouth?

Only Australian films with a chance to make it in the US market are really good ones—those able to generate strong reviews and word of mouth.

Example 2.4. Why do brides spend so much money on wedding dresses, while grooms often rent cheap tuxedos, even though grooms could potentially wear their tuxedos on many other occasions and brides will never wear their dresses again? (Jennifer Dulski)

This is my all-time favorite economic naturalist question. In attempting to answer it, Ms. Dulski began with the assumption that distinctive attire matters more for women than for men on important social occasions. This might strike many as a heroic assumption, but evolutionary biologists tell us that in largely monogamous species such as humans, distinctive appearance is indeed more important for females than for males. (Precisely the opposite pattern is observed in species in which dominant males take many mates. In those species, bright coloration and other distinctive features are more likely to be found on males than on females.) Ms. Dulski reasoned that if men need not wear distinctive clothing on special occasions, a

rental company could serve their fashion needs at relatively modest prices. Thus, by focusing on only a few variants of the standard men's tuxedo, a company could maintain a sufficiently large inventory to accommodate clients of a wide variety of sizes at rental prices that average roughly one-quarter of the garment's purchase price. If the goal were to appear in distinctive attire, however, it would be necessary to hold an inventory in which numerous different styles were available in all different sizes. Since this would require an inventory possibly dozens of times larger than the corresponding tuxedo inventory to serve a given volume of rentals, a rental price that covered costs would have to be perhaps three or four times a garment's purchase price. And this, she concluded, is why women buy and men rent.

Again, I stress that whether this is the correct explanation for the observed pattern is less important than the fact that Ms. Dulski's question itself is interesting and that her proposed answer is economically plausible.

Example 2.5. Why are round-trip fares from Hawaii to the mainland higher than the corresponding fares from the mainland to Hawaii? (Karen Hittle)

Most people whose trips originate on the mainland are on vacation when they fly to Hawaii, Ms. Hittle reasoned, while those whose trips originate in Hawaii are far more likely to be business or other non-leisure travelers. The distinction is important because while trips taken on business typically entail destinations that are dictated by external circumstances, vacation trips present travelers with an almost inexhaustible choice of destinations. As a result, the price elasticity of demand tends to be higher for leisure than for business travelers. And this, according, to Ms. Hittle, is what accounts for the higher prices on flights that originate in Hawaii.

Another airline example:

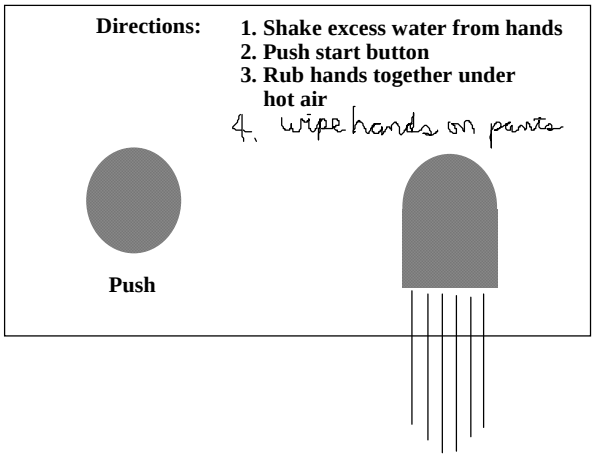
Example 2.6. Why do airlines charge much more for tickets purchased at the last minute, while Broadway theaters follow exactly the opposite practice? (Gerasimos Efthimiatos)

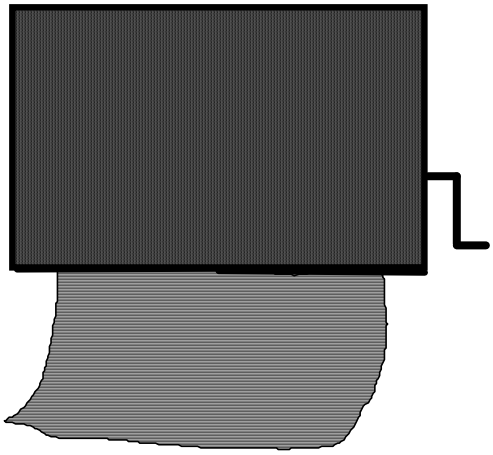
In both cases, firms face downward-sloping demand curves and thus stand to gain if they can segregate buyers with high reservation prices from those with low reservation prices. But why would last-minute purchases be associated with lower reservation prices in the case of theater tickets, but with high reservation prices in the case of airline tickets? The answer, according to Mr. Efthimiatos, stems in part from how a buyer's reservation price case is linked to her opportunity cost of time. By waiting until the last minute to buy a theater ticket, someone whose opportunity cost of time is high would risk wasting a valuable evening if a seat turned out to be unavailable, and hence her willingness to pay a premium for an advance ticket. Although she might also be willing to pay a premium to avoid missing a flight, an offsetting factor seems even more important, which is that those travelers whose opportunity costs of time are highest—business travelers, for the most part—tend also to be those who most often need to rearrange their travel schedules to accommodate last-minute contingencies. By making discounts available only to those who are willing to commit to a specific travel schedule well in advance, airlines are thus able to charge higher fares to those business travelers. Most remaining business travelers are made ineligible for discounts by what for them proves an extremely effective hurdle—namely, the Saturday night stay-over requirement. Since most vacation trips involve at least a weekend, this hurdle is easily cleared by vacation travelers. But having been away from their families during the week, few business travelers are willing to extend their stay for the weekend just to receive a discount.

Example 2.7. Why do many people buy larger houses when they retire and their own children leave home? (Tobin Schilke)

Historically, the pattern was for couples to move to smaller houses in warmer climates when they retired. These days, however, couples are far more likely to sell the family home and then build or purchase a significantly larger one close by. Why this change? Mr. Schilke speculated that it has been driven in part by changes in family structure. It was once the norm for children to have at most four living grandparents. With divorce and remarriage occurring at higher rates than in the past, however, it has become common for any given child to have six, eight, or even more living grandparents and step-grandparents. With a larger number of grandparents and essentially no change in the number of grandchildren, we see excess demand on the part of grandparents for visits with their grand children. By building conveniently located houses with plenty of guest space, game rooms, swimming pools, and other kid-friendly amenities, grandparents are in effect paying higher prices to satisfy their demand for visits with their grandchildren.

Example2.8. Why did paper towels replace hot-air hand dryers in public restrooms in the 1970s?





In the l950s and 1960s, paper towel dispensers were replaced by electric hot-air hand dryers in many public restrooms. More recently, however, it is the hot-air dryers themselves that are being replaced by paper towel dispensers.

The explanation for these movements naturally has to do with the costs and benefits of the different methods of drying hands. The hot-air dryers made their original appearance on the heels of a steady decline in the price of electricity. When power became cheap, as it did in the 50s and 60s, electric dryers became less expensive to operate and maintain than the traditional paper towel dispensers. With the Arab oil embargoes of the 1970s, however, the price of energy rose dramatically, making paper towels once again the hand-drying method of choice.

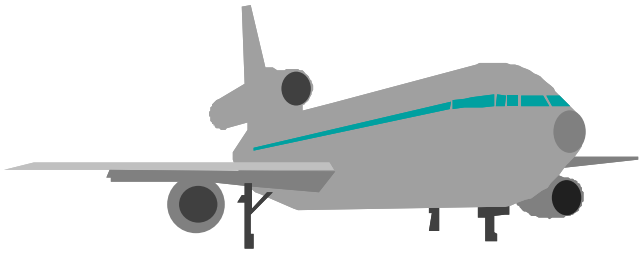
Some economic naturalists may also find it amusing to speculate about why the paper towel dispensers of today are so different from the earlier ones. Most current designs feature a continuous hand crank. The paper is inside on a roll, and the longer you turn the crank the longer sheet of paper towel you get. Older designs also had a roll of paper inside, but you had to pull the paper out by hand. Most of the older models would also release only a limited amount of paper with each pull. To get more, you had to reset the release mechanism by pushing a button on the front of the dispenser.

The advantage of the older design, from the establishment's point of view, was that it induced people to use less paper. Indeed, if your hands were wet enough it was difficult to get any paper at all because, when you pulled, the wet paper would simply tear away in your hands.

But if establishments saved on paper with the old design, why have they switched to the new? The answer is that saving on paper is not their only objective. They also want satisfied customers. Incomes are higher now than they were 30 years ago, and customers are willing to pay more for a more convenient way of drying their hands. The current design may use a little more paper, but it is so much less frustrating that customers seem happy to pay more for their meals or their gasoline in order to cover the extra costs.

Some people may respond that the old design, infuriating though it was, was better because of its paper-saving property. These people feel that it is wrong to waste paper, and that we ought to be willing to tolerate plenty of inconvenience to avoid doing so. The same people also often lament the thousands of trees that must be cut down in order to print each Sunday's *New York Times.* But trees are a renewable resource, which means there is no reason to treat them differently from any other scarce but renewable resource. When the demand for paper is high, we cut down more trees, to be sure. But the market also provides a strong incentive to plant new ones. The irony here is that the more paper we use, the more trees we have. If every metropolitan newspaper were to cease publication tomorrow, we would ultimately have *fewer* acres of forest, not more.

Example 2.9. Why is airline food so bad?



Everyone complains about airline food. Indeed, if any serious restaurant dared to serve such food, it would go bankrupt in an instant. Our complaints seem to take for granted that airline meals should be just as good as the ones we eat in restaurants.

But why should they? The cost-benefit perspective makes clear that airlines should increase the quality of their

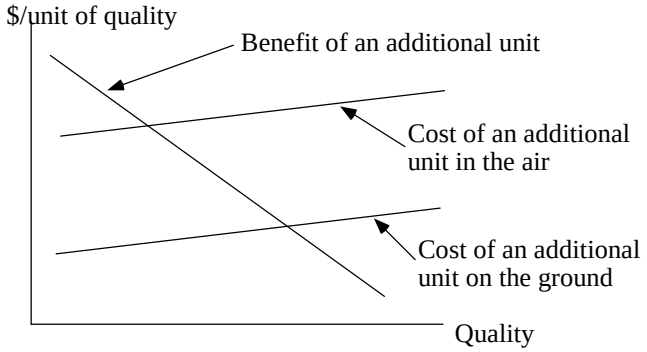
meals if and only if the benefits would outweigh the costs of doing so. The benefits of better food are probably well measured by what passengers would be willing to pay for it, in the form of higher ticket prices. If a restaurant-quality meal could be had for a mere $5 increase in costs, most people would probably be delighted to pay it. The difficulty, however, is that it would be much more costly than that to prepare significantly better meals at 39,000 feet in a tiny galley with virtually no time. It could be done, of course. An airline could remove 20 seats from the plane, install a modern, well-equipped kitchen, hire extra staff, spend more on ingredients, and so on. But these extra costs would be more like $50 per passenger than $5.

For all our complaints about the low quality of airline food, few of us would be willing to bear this extra burden. The sad result is that airline food is destined to remain unpalatable because the costs of making it better outweigh the benefits.

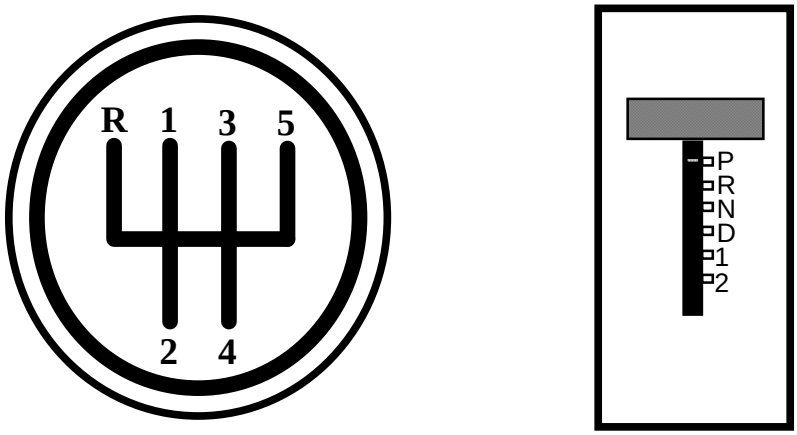
Many of us respond warmly to the maxim, "Anything worth doing is worth doing well." After all, it encourages a certain pride of workmanship that is often sadly lacking. As the airline food example makes clear, however, when the maxim is interpreted literally, it makes no sense. It is completely unmindful of the need to weigh costs against benefits. To do something well means to devote time, effort, and expense to it. But time, effort, and expense are scarce. To devote them to one activity makes them unavailable for another. Increasing the quality of one of the things we do thus necessarily means to reduce the quality of others-- yet another application of the concept of opportunity cost. Every intelligent decision must be mindful of this tradeoff.

Everything we see in life is the result of some such compromise. For Serena Williams to play tennis as well as she does means that she cannot become a concert pianist. And yet this obviously does not mean that she shouldn't spend *any* time playing the piano. It just means that she should hold herself to a lower standard there than in the tennis arena.

Should I increase the quality of the meals?
B(x) = same as in restaurants on the ground
C(x) = much higher than for restaurants on the ground, because of space constraints



Example 2.10. Why do most manual transmissions have five forward speeds, most automatics only four?



The more forward speeds a car's transmission has, the better its fuel economy. The additional gears act like the "overdrive" of cars of the 1940s, conserving fuel by allowing cars to cruise at highway speeds at lower engine speeds. Most cars in current production offer five forward speeds on their manual transmissions, but only three or four speeds on their automatics. Since fuel economy is obviously a good thing, why limit the number of speeds on automatics?

The reason is that fuel economy is not our only objective. We also want to keep the price of the car within limits. Automatic transmissions are much more complex than manual ones, and the cost of adding an extra speed is accordingly much greater in the former. The benefits of adding an extra speed, by contrast, are the same in both cases. If car makers follow the rule, "Add an extra speed if its benefits outweigh its costs," then automatics will have fewer speeds than manuals.

The reasoning in this example also helps make clear why many manual transmissions now have five forward speeds

when 20 years ago most had only three (and many automatic transmissions only two). The benefit of adding an extra speed, again, is that it increases fuel economy. The value of this benefit, in dollar terms, thus depends directly on the price of fuel. The price of gasoline relative to other goods doubled during the 1970s, and this helps explain why transmissions have more speeds than they used to.

Example 2.11. Why does a telecommunications equipment manufacturer offer "free" BMW sedans to employees with more than one year of service?

Arcnet, Inc., a New Jersey company that designs and builds wireless telecommunications systems, provides a "free" BMW sedan to every employee with at least one year of service. The cars are not really free, of course. Each one costs the company about $9,000 a year in leasing and insurance fees, and employees who get one must declare that amount as additional income each year to the Internal Revenue Service. So we're left with a puzzle: If the company had given not the car but an additional $9,000 a year in salary instead, no one should have been worse off and at least some should have been better off. After all, any worker who really wanted a BMW could have spent the extra cash to lease one. Others who happen not to want a BMW would have come out ahead by having $9,000 a year extra to spend on other things. So why give cars instead of cash?

Essentially the same question is raised by ordinary gift exchanges among family and friends. Why give someone a necktie he might never wear when you know you could trust him to spend the same money on something he really wants? Some would answer that giving cash is just too easy, and is hence a less effective way of demonstrating affection than taking the time and trouble to shop for a gift. That explanation might work for small gifts, but is surely a stretch for luxury cars.

A more promising tack was suggested by Richard Thaler (1985), who observed that the best gifts are often things we don't dare buy for ourselves. Why, for example, is a man happy when his wife gives him a $1,000 set of titanium golf clubs paid for out of their joint checking account? Perhaps he really wanted those clubs, but couldn't quite justify spending so much on himself.

The plausibility of this way of thinking about gift giving is affirmed by the advice it suggests for gift givers. For example, consider this thought experiment: Among each of the following pairs of items costing the same amounts, which item would be the more suitable gift for a close friend?

$20 worth of Macadamia nuts (1 pound) or $20 worth of peanuts (10 pounds)?

A $75 gift certificate for one of the nicest restaurants in town (one lunch) or a $75 gift certificate for McDonalds (15 lunches)?

$30 worth of wild rice (3 pounds) vs. $30 worth of Uncle Ben's converted rice (50 pounds)?

For most people, the first item in each pair is almost surely the safer choice.

Arcnet and other employers may be giving away BMWs for essentially similar reasons. An employee might find it awkward to explain to his depression-era parents why he had bought a car costing almost twice as much as a Honda Accord. Or he may worry that buying a new BMW might make his neighbors think he was putting on airs. Or perhaps he really wants to buy the new BMW, but his wife insists on remodeling the kitchen instead. A gift car from his employer erases all these concerns and more.

Further examples:

•Why, despite the proliferation of electrical appliances in the last century, do electrical outlets in newly built houses still have only two receptacles? (Beth Wollberg)
•Why do top female models earn so much more than top male models? (Fran Adams)
•Why aren't NFL kickers paid the same as leading scorers in other sports? (Ed Kline)
•Why didn't anyone sign up for Thanksgiving dinner? (Anita Lee)
•Why won't the Chicago Cubs ever win a World Series?" (Paul Snyder)

Seven Important Ideas

The Scarcity Principle:
Having more of one good thing usually means having less of another.

The Cost-Benefit Principle:
Take no action unless its marginal benefit is at least as great as its marginal cost.

The Incentive Principle:
Cost-benefit comparisons are relevant not only for identifying the decisions that rational people *should* make, but also for predicting the actual decisions they *do* make.

The Principle of Comparative Advantage:
Everyone does best when each concentrates on the activity for which he or she is relatively most productive.

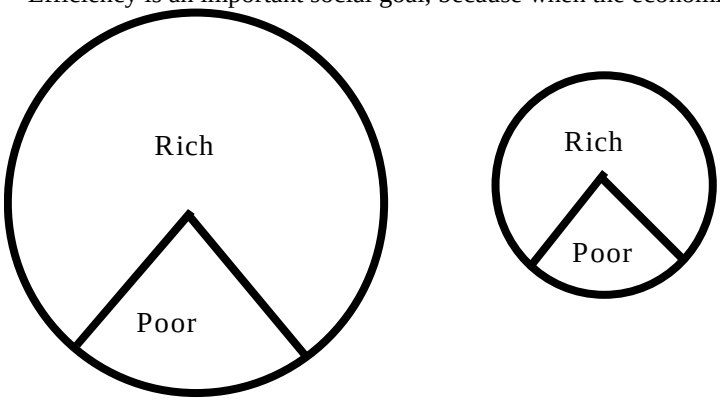
The Principle of Increasing Opportunity Cost:
Use the resources with the lowest opportunity cost before turning to those with higher opportunity costs.

The Equilibrium Principle:

A market in equilibrium leaves no unexploited opportunities for individuals, but may not exploit all gains achievable through collective action.

The Efficiency Principle:

Efficiency is an important social goal, because when the economic pie grows larger, everyone can have a larger slice.



Supply and Demand

Chapter 2

Learning Objectives

1. Describe how the demand and supply curves summarize the behavior of buyers and sellers in the marketplace.
2. Discuss how the supply and demand curves interact to determine equilibrium price and quantity.
3. Illustrate how shifts in supply and demand curves cause prices and quantities to change
4. Explain why markets in equilibrium tend to leave no unexploited opportunities available to individuals.

What, How, and For Whom?

- Every society answers three basic questions

WHAT	▪ Which goods will be produced? ▪ How much of each?
HOW	▪ Which technology? ▪ Which resources are used?

FOR WHOM	▪ How are outputs distributed?
	  ▪ Need?
	  ▪ Income?

Central Planning versus the Market

Central Planning

- **Decisions by individuals or small groups**
  - Agrarian societies
  - Government programs
- Sets prices and goals for the group
  - Individual influence is limited

The Market

- **Buyers and sellers signal wants and costs**
  - Resources and goods are allocated accordingly
- Interaction of supply and demand answer the three basic questions

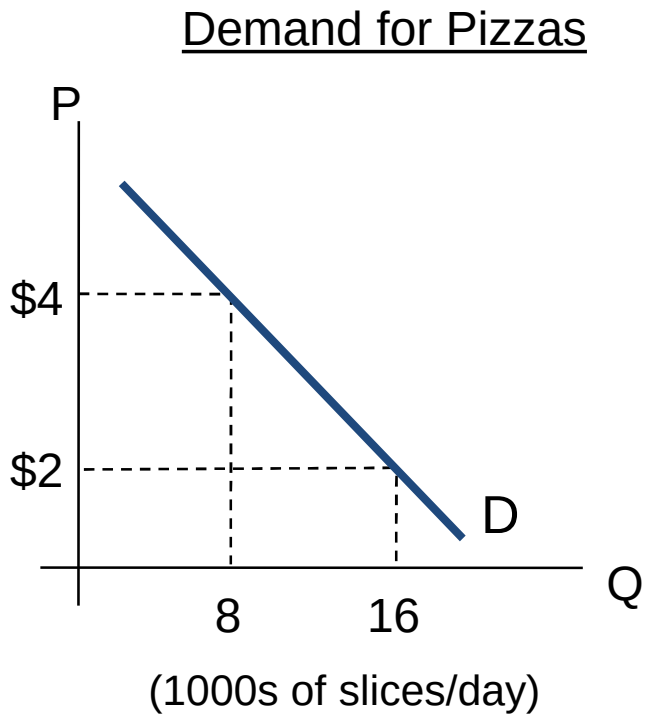
Mixed economies use both the market and central planning

Buyers and Sellers in the Market

- The **market** for any good consists of all the buyers and sellers of the good
- Buyers and sellers have different motivations
  - Buyers want to benefit from the good
  - Sellers want to make a profit
- Market price balances two forces
  - Value buyers derive from the good
  - Cost to produce one more unit of the good

Demand

- A **demand curve** illustrates the quantity buyers would purchase at each possible price
- Demand curves have a negative slope
  - Consumers buy less at higher prices
  - Consumers buy more at lower prices



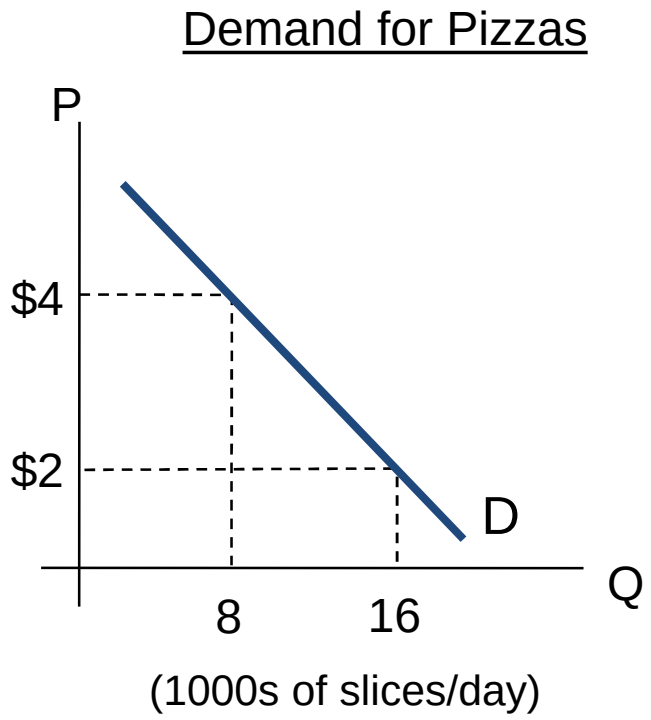
Demand Slopes Downward

- Buyers value goods differently
  - The **buyer's reservation price** is the highest price an individual is willing to pay for a good
- Demand reflects the entire market, not one consumer
  - Lower prices bring more buyers into the market
  - Lower prices cause existing buyers to buy more

Income and Substitution Effects

- Buyers buy more at lower prices and buy less at higher prices
- What happens when price goes up?
  - The **substitution effect:** Buyers switch to substitutes when price goes up
  - The **income effect:** Buyers' overall purchasing power goes down

Interpreting the Demand Curve

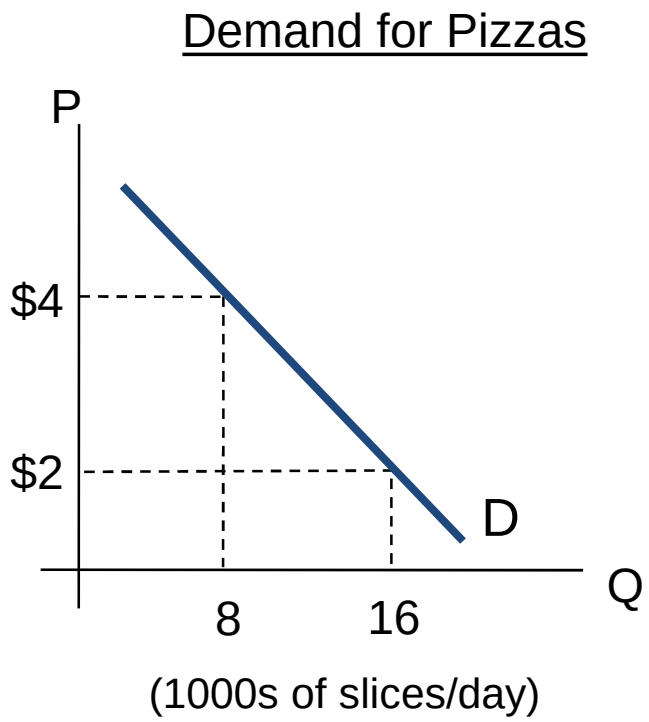


- Horizontal interpretation of demand:

  Given price, how much will buyers buy?

  At a price of $4, the quantity demanded is 8,000 slices/day.

Interpreting the Demand Curve

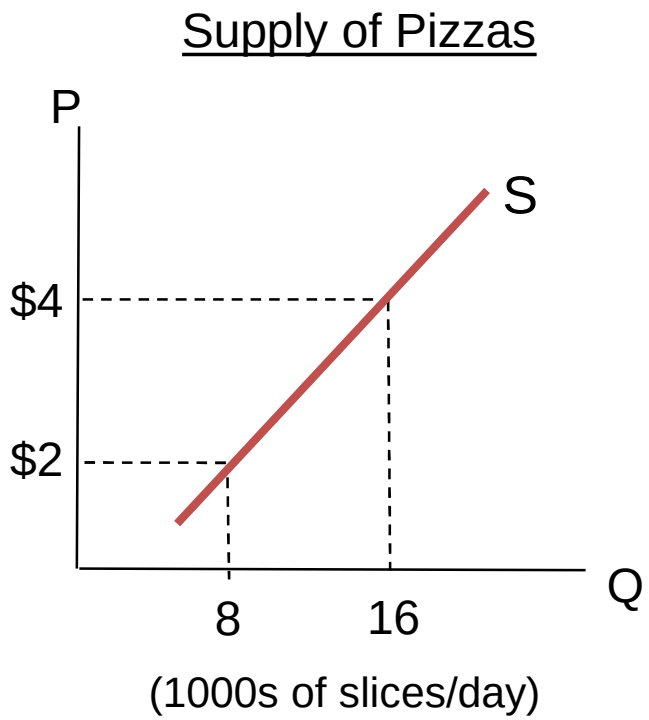


- Vertical interpretation of demand:
  - Given the quantity to be sold, what price is the marginal consumer willing to pay?
  - If 8,000 slices are sold the marginal consumer is willing to pay $4 per slice.

The Supply Curve

- The **supply curve** illustrates the quantity of a good that sellers are willing to offer at each price
  - If the price is less than opportunity cost, offer more
- Opportunity cost differs among sellers due to:
  - Technology
  - Skills
  - Different costs such as rent
  - Expectations
- The **Low-Hanging Fruit Principle** explains the upward sloping supply curve
- The **seller's reservation price** is the lowest price the seller would be willing to sell for
  - Equal to marginal cost

Interpreting the Supply Curve

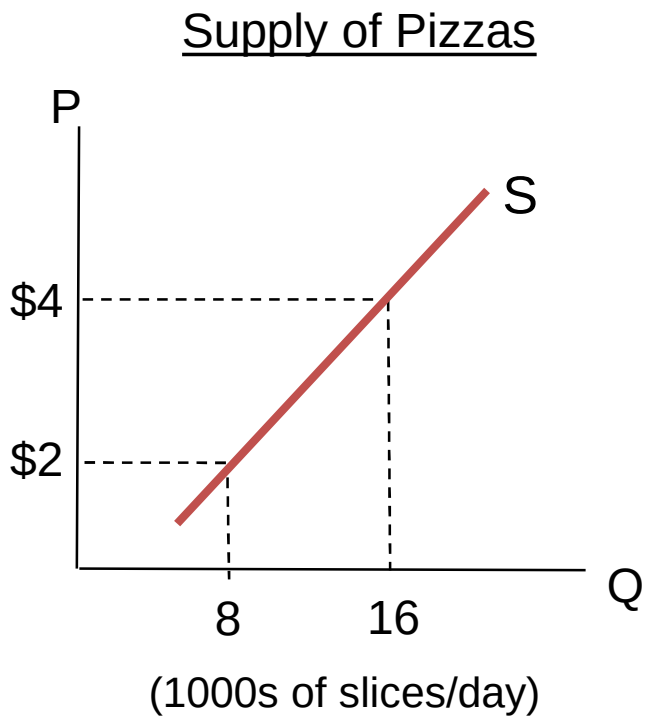


- Horizontal interpretation of supply:

  Given price, how much will suppliers offer?

  At a price of $2, suppliers are willing to sell 8,000 slices/day.

Interpreting the Supply Curve



- Vertical interpretation of supply:
  - Given the quantity to be sold, what is the opportunity cost of the marginal seller?
  - If 8,000 slices are sold, the marginal cost of producing the 8,000th slice is $2.

Market Equilibrium

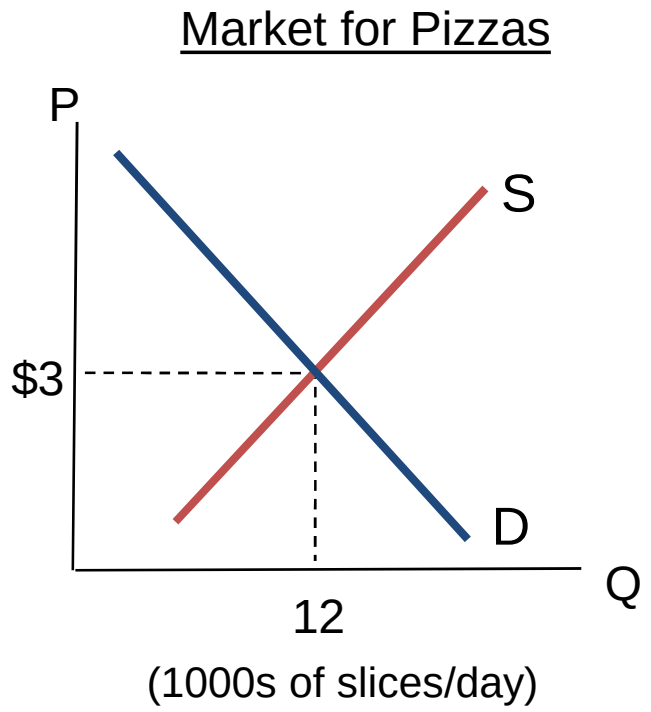
- A system is in **equilibrium** when there is no tendency for it to change
- The **equilibrium price** is the price at which the supply and demand curves intersect
- The **equilibrium quantity** is the quantity at which the supply and demand curves intersect
- The **market equilibrium** occurs when all buyers and sellers are satisfied with their respective quantities at the market price
  - At the equilibrium price, quantity supplied equals quantity demanded

Market Equilibrium

- Quantity supplied equals quantity demanded AND
- Price is on supply and demand curves
- No tendency to change P or Q

  Buyers are on their demand curve

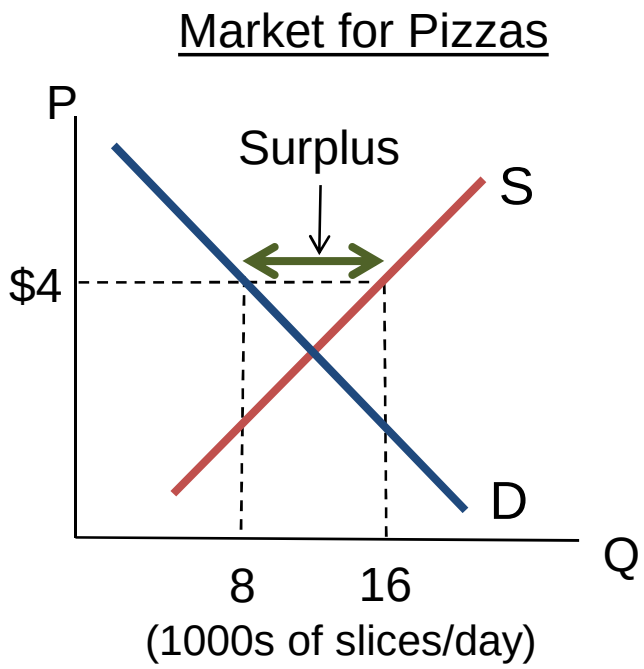
  Sellers are on their supply curve



Excess Supply and Excess Demand

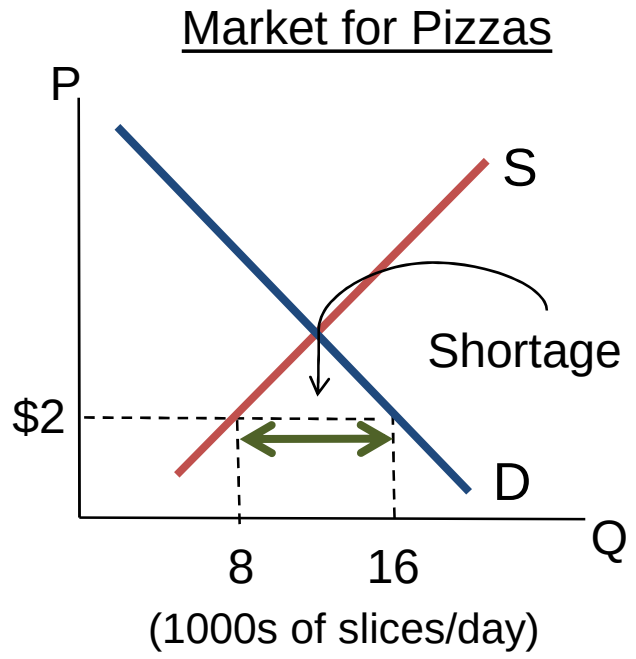
Excess Supply

- At $4, 16,000 slices supplied and 8,000 slices demanded



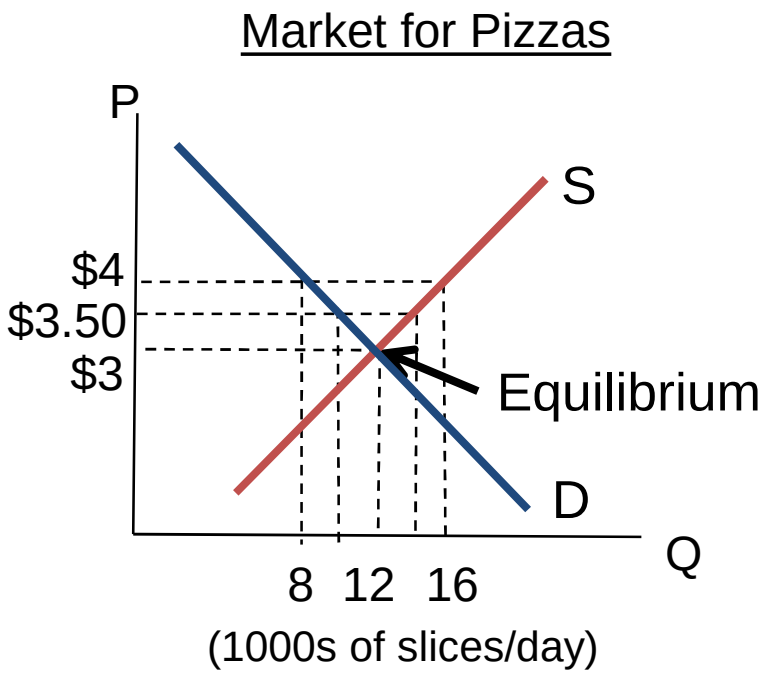
Excess Demand

- At $2, 8,000 slices supplied 16,000 slices demanded

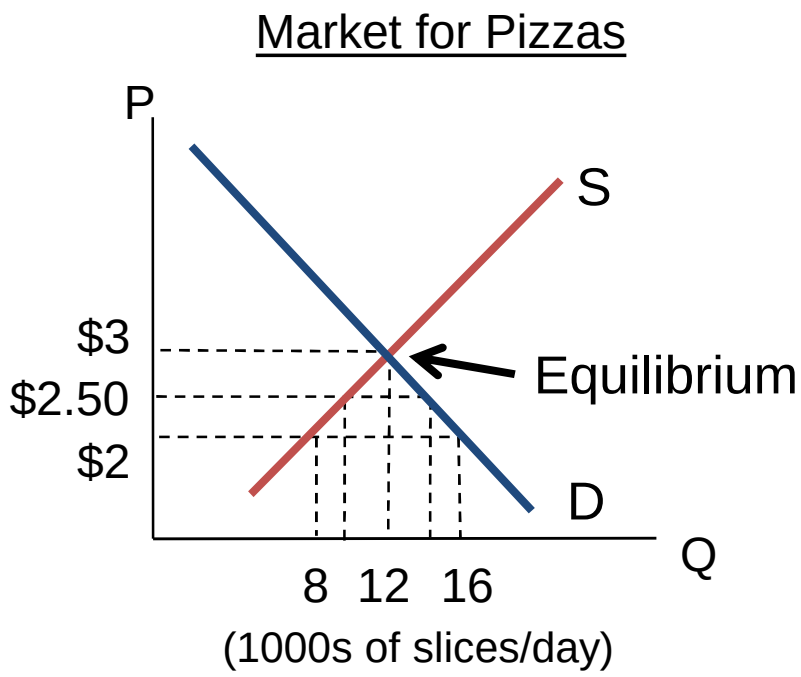


Incentive Principle: Excess Supply at $4

- Each supplier has an incentive to decrease the price in order to sell more
- Lower prices decrease the surplus
- As price decreases:
  - the quantity offered for sale decreases along the supply curve
  - the quantity demanded increases along the demand curve



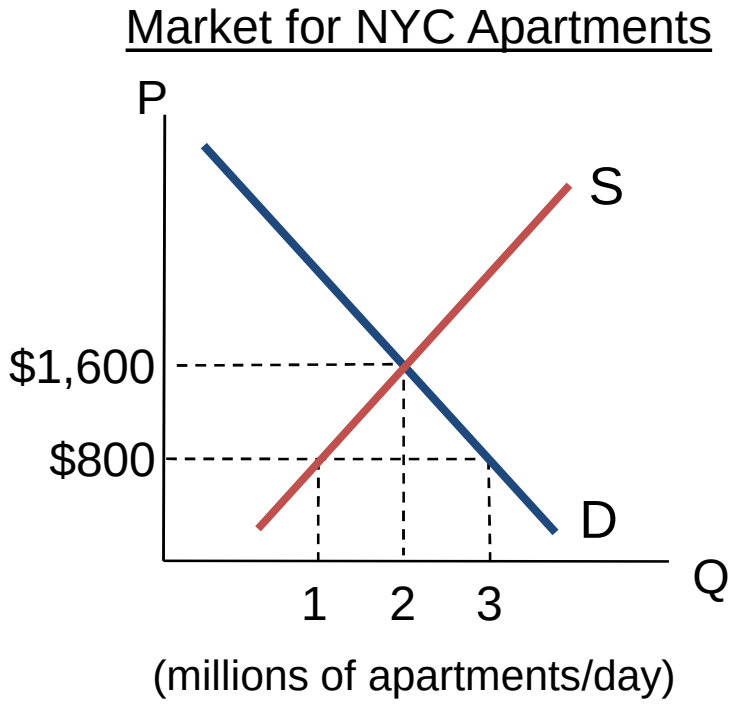
Incentive Principle: Excess Demand at $2



- Each supplier has an incentive to increase the price in order to sell more
- Higher prices decrease the shortage
- As price increases
  - the quantity offered for sale increases along the supply curve
  - As price increases, the quantity demanded decreases along the demand curve.

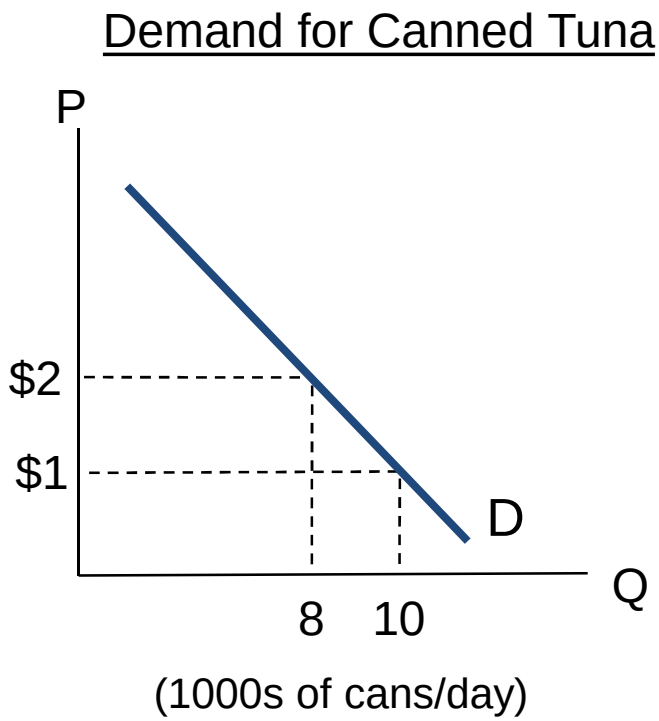
Rent Controls Are Price Ceilings

- A **price ceiling** is a maximum allowable price, set by law
- Rent controls set a maximum price that can be charged for a given apartment
- If the controlled price is below equilibrium, then:
  - Quantity demanded increases
  - Quantity supplied decreases
  - A shortage results



Movement along the Demand Curve

- When price goes up, quantity demanded goes down
- When price goes down, buyers move to a new, higher quantity demanded
- A **change in quantity demanded** results from a change in the price of a good.



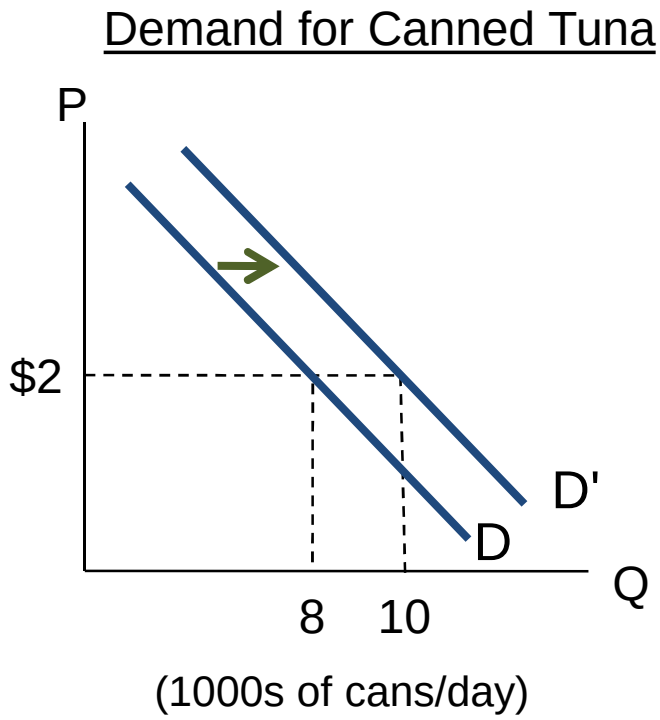
Shift in Demand

- If buyers are willing to buy more at each price, then demand has increased

  Move the entire demand curve to the right

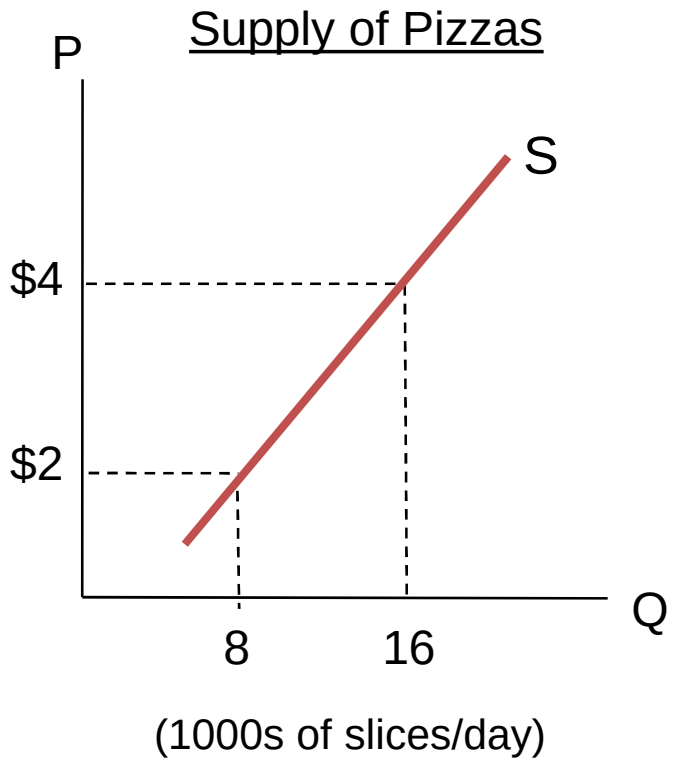
  Change in demand

- If buyers are willing to buy less at each price, then demand has decreased



Movement Along the Supply Curve

- When price goes up, quantity supplied goes up
- When price goes up, sellers move to a new, higher quantity supplied
- A **change in quantity supplied** results from a change in the price of a good.



Shift in Supply

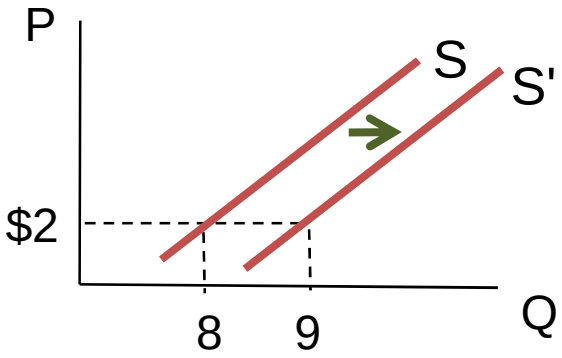
Supply increases when sellers are willing to offer more for sale at each possible price

Moves the entire supply curve to the right

Supply decreases when sellers are willing to offer less for sale at each possible price

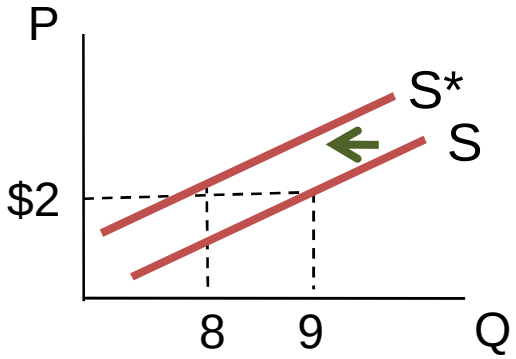
Moves the entire supply curve to the left

Supply of Pizzas



(1000s of slices/day)

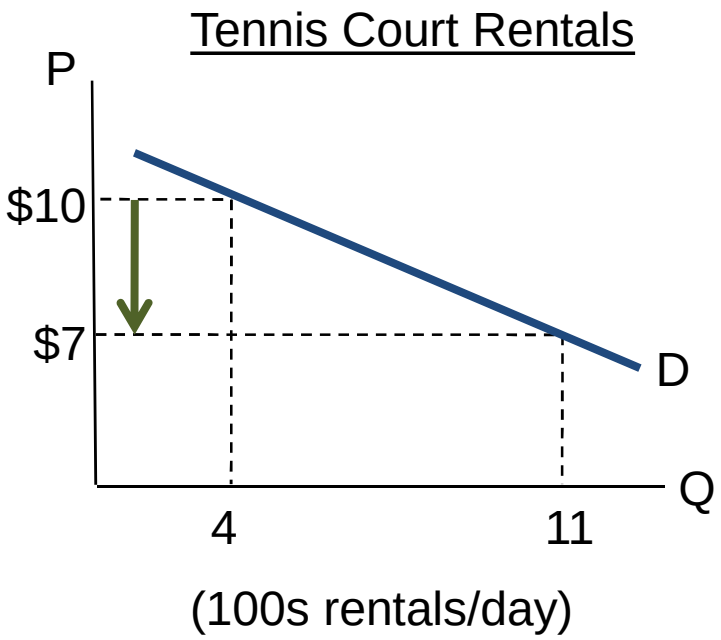
Supply of Tuna

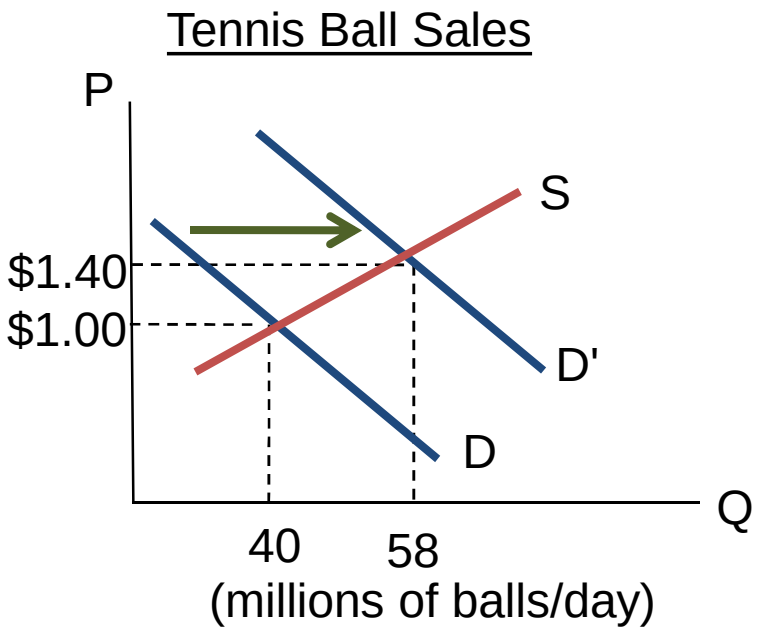


(1000s of cans/day)

Tennis Market

- If rent for tennis court decreases, demand for tennis balls increases
  - Tennis courts and tennis balls are **complements**



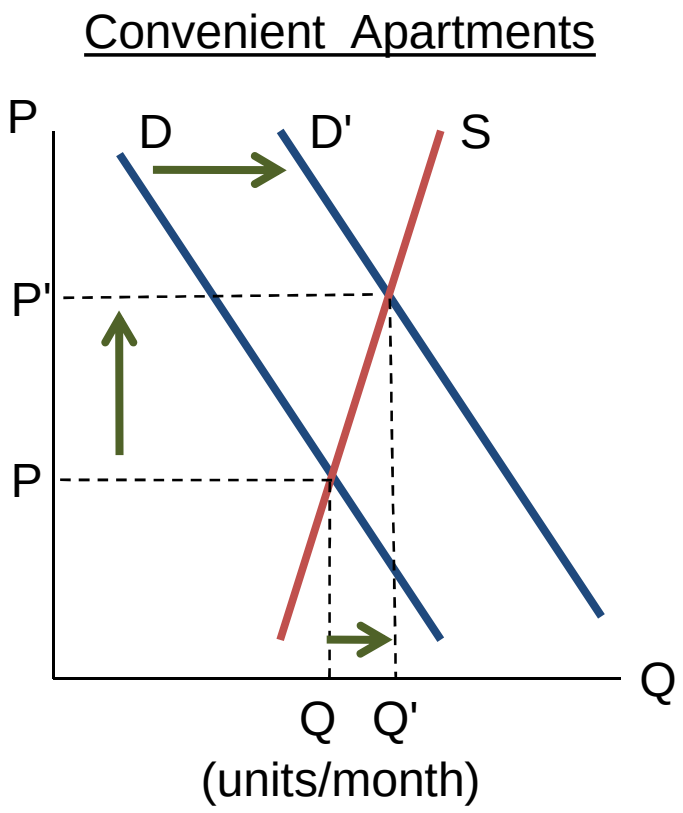


Causes of Shifts in Demand

- Price of complementary goods
  - Tennis courts and tennis balls
- Price of substitute goods
  - Internet and overnight delivery are **substitutes**
- Income: normal or inferior goods?
- Preferences
  - Dinosaur toys after *Jurassic Park* movie
- Number of buyers in the market
- Expectations about the future

Price changes never cause a shift in demand

Apartments Near DC Metro



- If government wages rise, demand for apartments near Metro stations increases
  - Demand increases
    - Price increases
    - Quantity increases
- Demand for a **normal good** increases when income increases
  - Demand for an **inferior good** increases when income decreases

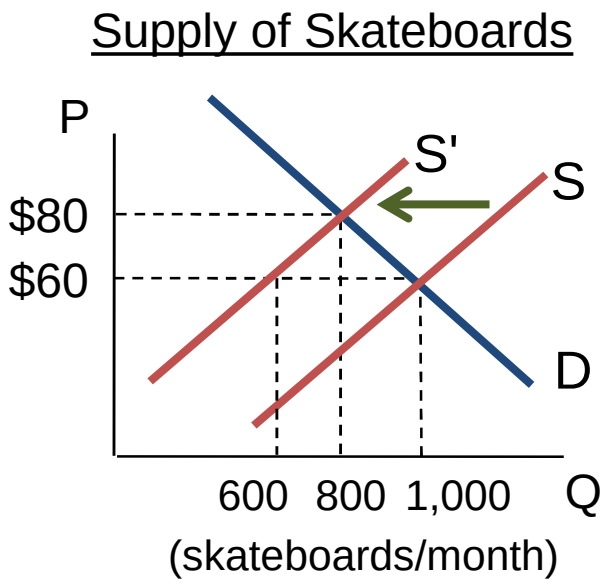
Causes of Shifts in Supply

- A change in the price of an input
  - Fiberglass for skateboards, construction wages
- A change in technology
  - Desktop publishing and term papers
  - Internet distribution of products (e-commerce)
- Weather (agricultural commodities and outdoor entertainment)
- Number of sellers in the market
- Expectation of future price changes

Price changes never cause a shift in supply

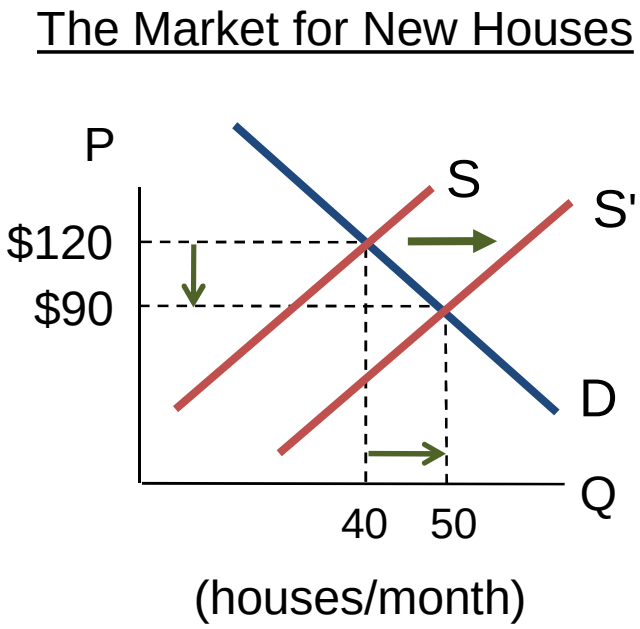
Shifts in Supply: Skateboards

- Costs of production affect the supply of a product
- Cost of fiberglass for skateboards increases
  - Supply decreases
- With no change in demand, the price of skateboards increases to $80 and quantity decreases to 800



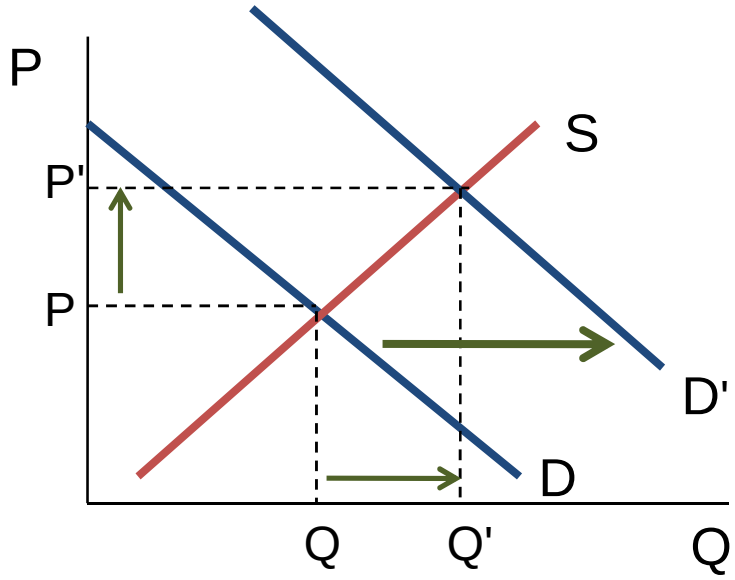
Shift in Supply: Home Construction

- Cost of labor used to produce houses decreases
  - Supply increases
- Demand is constant
- The price of houses decreases to $90,000 per house
- Quantity increases to 50



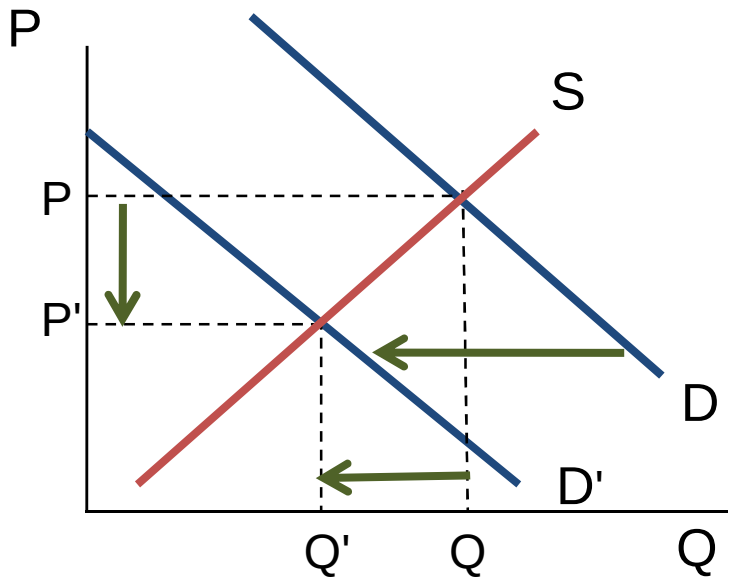
Supply and Demand Shifts: Four Rules

1. An increase in demand will lead to an increase in both equilibrium price and quantity



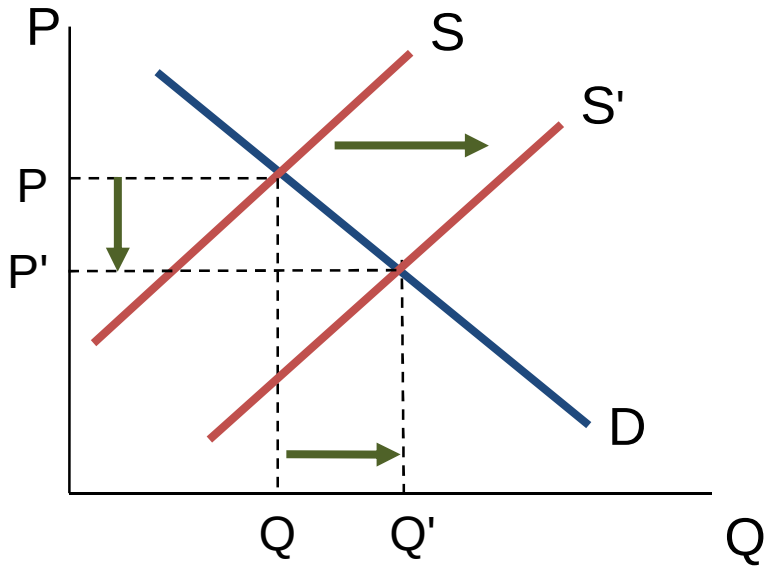
Supply and Demand Shifts: Four Rules

2. An decrease in demand will lead to a decrease in both equilibrium price and quantity



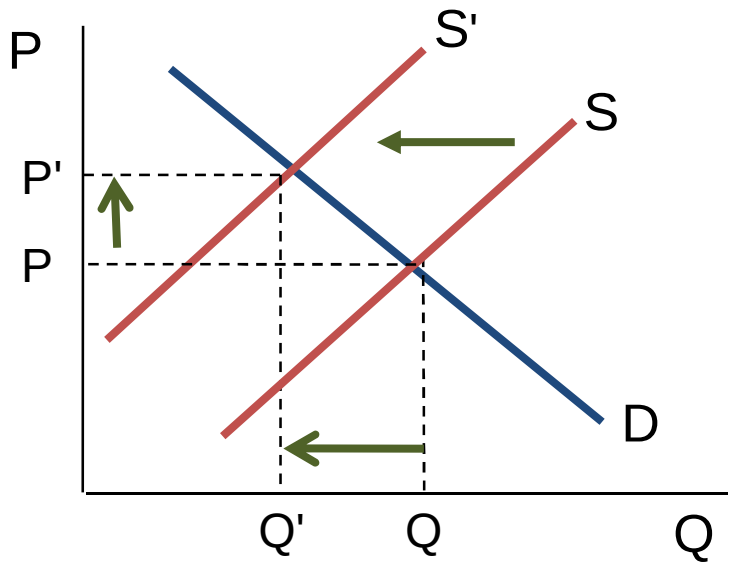
Supply and Demand Shifts: Four Rules

3. An increase in supply will lead to a decrease in the equilibrium price and an increase in the equilibrium quantity.



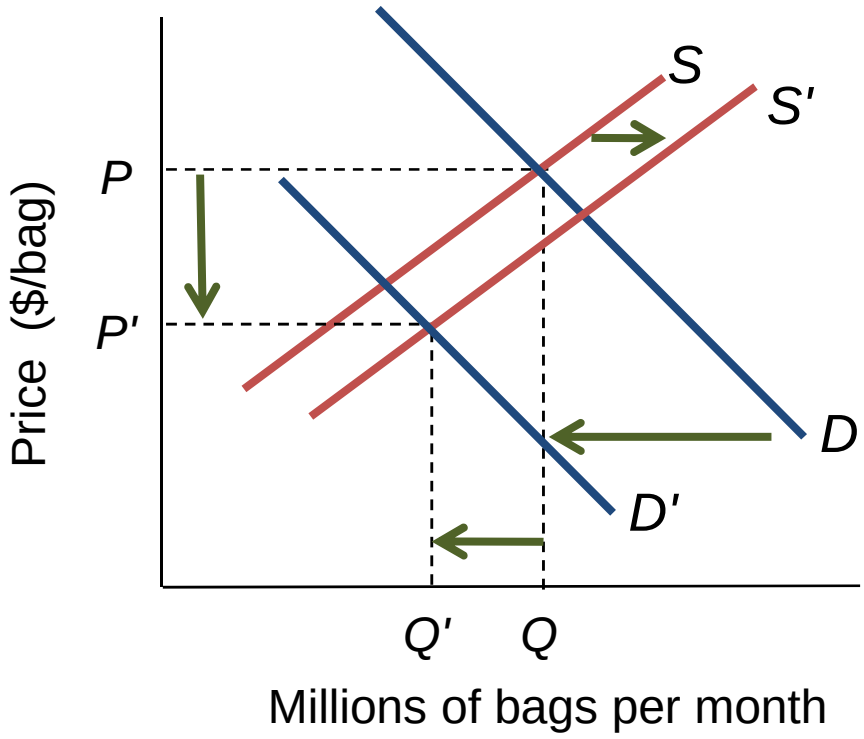
Supply and Demand Shifts: Four Rules

4. An decrease in supply will lead to an increase in the equilibrium price and a decrease in the equilibrium quantity.



Supply and Demand Both Change: Tortilla Chips

Oils used for frying are harmful AND the price of harvesting equipment decreases



Changes in Supply and Demand

	Supply	
Demand	Increases	Decreases
Increases	P Depends Q Increases	P Increases Q Depends
Decreases	P Decreases Q Depends	P Depends Q Decreases

Efficiency and Equilibrium

- Markets communicate information effectively
  - Value buyers place on the product
  - Opportunity cost of producing the product
- Markets maximize the difference between benefits and costs
- Market outcomes are the best provided that
  - The market is in equilibrium AND
  - No costs or benefits are shared with the public

Cash on the Table

Buyer's surplus: buyer's reservation price minus the market price

Seller's surplus: market price minus the seller's reservation price

Total surplus = buyer's surplus + seller's surplus

Total surplus is buyer's reservation price – seller's reservation price

No cash on the table when surplus is maximized

– No opportunity to gain from additional sales or purchases

Efficiency Principle

- The **socially optimal quantity** maximizes total surplus for the economy from producing and selling a good

  Economic efficiency – all goods are produced at their socially optimal level

- **Efficiency Principle:** equilibrium price and quantity are efficient if:
  - Sellers pay all the costs of production
  - Buyers receive all the benefits of their purchase
- Efficiency: marginal cost equals marginal benefit
  - Production is efficient if total surplus is maximized

Smart for One, Dumb for All

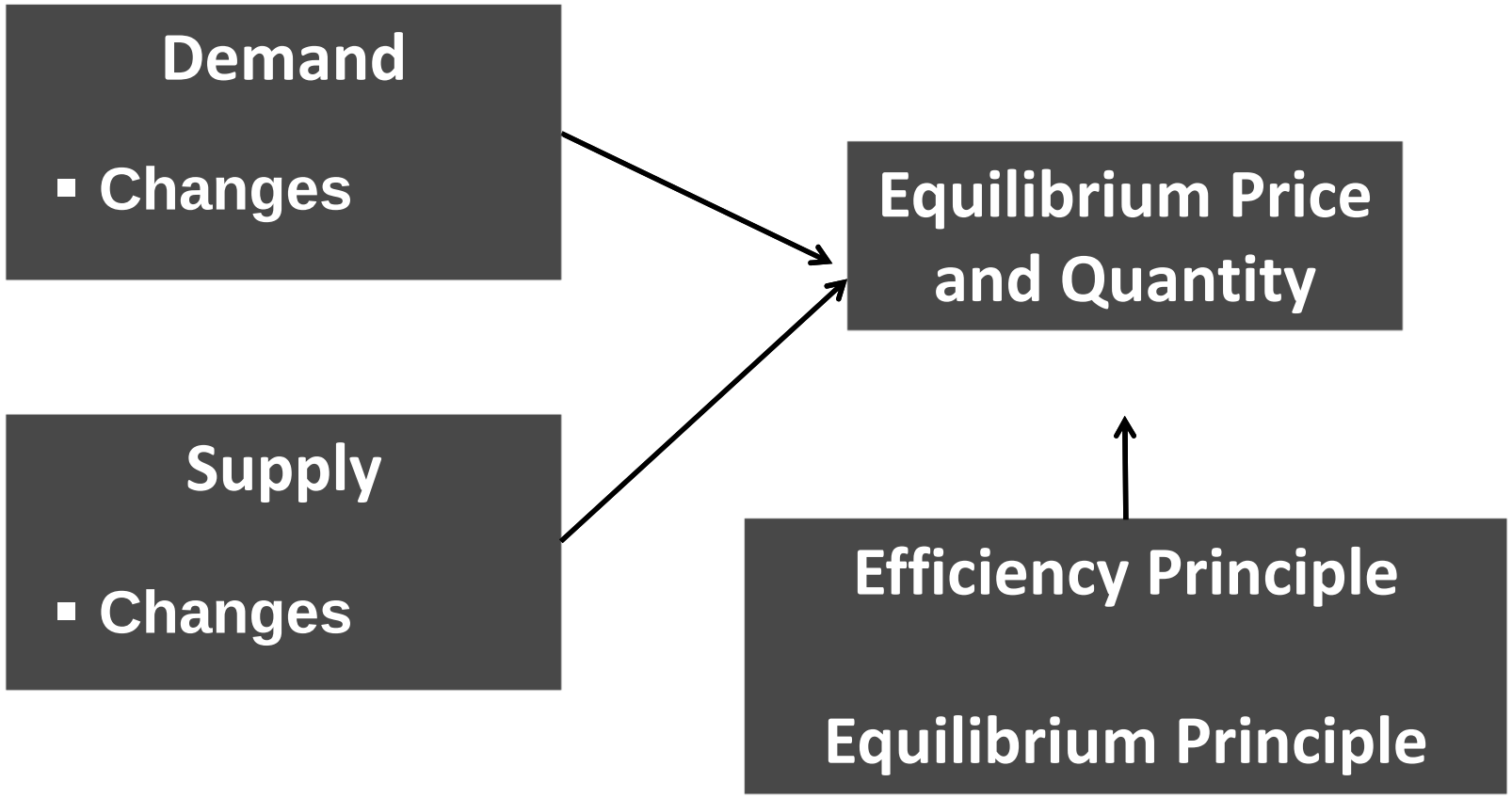
- Producers sometimes shift costs to others
  - Pollution is like getting free waste disposal services
  - Total marginal cost = seller's marginal cost plus marginal cost of pollution
  - When costs are shifted, supply is greater than socially optimal
- Buyers may create benefits for others
  - Marginal benefit is less than the full social benefit
  - Vaccinations, my neighbor's landscaping
  - The demand for these goods is less than socially optimal

Economic Efficiency

Efficiency: occurs when all goods and services are produced and consumed at their respective socially optimal levels.

- Failure to achieve efficiency means that total economic surplus is smaller than it could have been

Supply and Demand



The Algebra of Supply and Demand

Chapter 2 Appendix

From Graphs to Equations …

- Sample equations

$$P = 16 - 2\,Q^d$$

is a straight-line demand curve with intercept 16 on the vertical (P) axis and a slope of – 2

$$P = 4 + 4\,Q^s$$

is a straight-line supply curve with intercept 4 and a slope of 4

… To Equilibrium P and Q

- Equilibrium is where P and Q are the same for demand and supply
  - Set the two equations equal to each other (P = P) and solve for Q ($Q^s = Q^d = Q^*$)

$$16 - 2\,Q^* = 4 + 4\,Q^*$$

$$6\,Q^* = 12$$

$$\mathbf{Q^* = 2}$$

- Use either the supply or demand curve and $Q^* = 2$ to find price

$$P = 16 - 2\,Q^*$$

$$\mathbf{P = \$12}$$