Instructor's Manual

for

Price Theory and Applications

by

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Ninth Edition

Chapter One:
Supply, Demand, and Equilibrium

General Discussion

Even after a course in principles, many students are confused about the fundamentals of supply and demand. The most frequent sources of difficulty are:

1) The distinction between demand and quantity demanded. The text places considerable emphasis on this. I always tell my students that a failure to grasp this distinction results in the ability to make arguments that sound very logical but are in fact incorrect; problem 5 at the end of the chapter provides a good example. I have occasionally made it a semester-long assignment to collect examples of such fallacies from the popular press; students with subscriptions to the *New York Times* or the *Wall Street Journal* have ample raw material to work from.

2) A failure to understand that the equilibrating process does not affect the supply and demand curves. The story that we tell about price adjustment following a temporary disequilibrium does not involve any changes in the quantities that people desire to exchange.

3) A failure to understand the role of price adjustment from a point of disequilibrium in the supply and demand model. It is important for students to understand that in this simple model we *always* assume that all markets are in equilibrium. We do tell stories about what we think would happen out of equilibrium (demanders bidding up prices that are too low or suppliers bidding down prices that are too high), but the purpose of these stories is only to motivate the assumption that disequilibrium does not occur. Students sometimes come away with the false impression that the details of price adjustment are an integral part of the model and that the model attempts to describe the path to equilibrium. It is important to be on guard against this.

4) An incorrect approach to comparative statics. Ask students what will happen to the price of bread following a rise in the price of butter. Some will respond that bread is now less desirable, so that people want less of it, which causes the price to be bid down. Others may respond that in that case, less bread will be produced, and this fall in quantity will lead to a higher price. This in turn calls more bread into the market, which causes the price to be bid down, which causes... It is distressingly common for students to begin reasoning in such a circle, stop at an arbitrary point, and think that they have reached a correct conclusion. I stress to my students that when you are asked how the price of bread will react in a given circumstance, it is *never* correct to begin by thinking about the price of bread. One must begin by thinking about the effects on supply and demand (in this case, demand is down and supply is unchanged) and only then infer the effect on price (in this case, price is down).

Many students are bothered by two aspects of this analysis. First, it will seem to them (correctly) that each step in the earlier, convoluted analysis is an important one and that all of these counteracting effects need to be taken into account. They believe (incorrectly) that the supply and demand analysis fails to do this. Second, they simply will not see any reason why the supply and demand analysis should be preferred to the more naive approach.

To address these questions, I sometimes ask students to volunteer the various direct and indirect ways in which the price of bread is affected by an increase in the price of butter. (In fact, this works even better if you use a slightly more complicated example in which both supply and demand change simultaneously.) I list them on the blackboard

(1: lower demand leads to lower price; 2: less bread produced causes price to be bid up, etc.) When the list is long enough, I point out that no one could possibly sort out all of these countervailing effects and come to a conclusion without some additional device. I then point out that supply and demand analysis *is* such a device. The key (and for many students, this must really be stressed) is that in the single shift of the demand curve, we really do take account of all of these effects simultaneously. The fact that *all* of the effects are important is exactly what makes it both *correct* and *necessary* to resort to curve-shifting.

Teaching Suggestions

1) Regarding the seat belt example on pp. 8-9: Someone (I think Armen Alchian) has suggested that the best way to prevent highway deaths might be to require that every car have a spear mounted on the steering wheel aimed directly at the driver's heart. Surely this would reduce the number of accidents. This observation always gets a laugh and makes the point.

2) For another example of how people react to prices in non-market situations: There is apparently a psychology experiment in which subjects are given cups of coffee and told that they can keep the cups. They are not warned that the cups are extremely hot. When the cup is clearly inexpensive, subjects usually drop it; when it is made of fine china, they manage to hang on. I wanted to include this example in the book but was not able to track down a reference on time.

3) Along the same lines, you can cite a paper of Viscusi in the *American Economic Review*: Apparently when child safety caps on medicines are made more difficult to remove, sufficiently many people stop using the caps at all that there is an increase in the number of accidental poisonings.

4) For some students it might be necessary to stress that equilibrium can occur at any price and quantity, and that unusually high or low prices do not imply disequilibrium. For example, if wages are very low and few people are working, some students want to jump to the conclusion that there is disequilibrium in the labor market.

Point out to them that a low demand curve for labor explains the same phenomenon.

5) To drive home the inverse relationship between price and quantity demanded, you might mention that in August, 1990, East German taxicab drivers went on strike to demand *lower* fares.

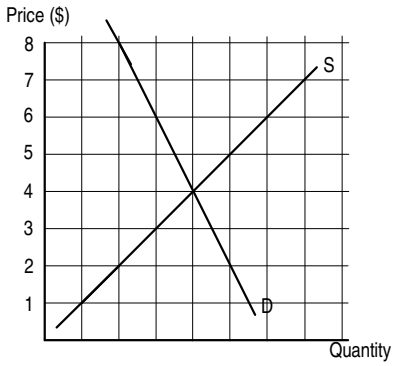
6) Here is a slightly different way to present the material in Exhibit 1–10 (the economic incidence of a tax is independent of its legal incidence). Begin by drawing a graph showing just the original supply and demand curves. Note that ultimately the suppliers must be on their supply curve and the demanders must be on their demand curve; otherwise prices will adjust.

Now note that a 5 cent tax, regardless of its legal nature, drives a 5 cent "wedge" between the suppliers' price and the demanders' price. Take a piece of chalk, hold it vertically, and say that its length is "5 cents." Then hold the chalk vertically between the supply and demand curves near the price axis, and slowly move it rightward until its top and bottom just touch the demand and supply curves. Conclude that you have found the post-tax equilibrium. Now note that in order to find this equilibrium, you never had to ask what sort of tax was being imposed; thus such information must be irrelevant.

Additional Problems

1. Suppose a new fat substitute comes on the market, making it easy to produce low-calorie hamburgers, french fries, milkshakes, and so forth. *True or False*: The average American will weigh less after this product appears on the market.
2. *True or False*: If 1000 potatoes per day are sold in Des Moines, Iowa, and if a new supplier decides to sell 200 potatoes per day, then 1200 potatoes per day will be sold.
3. *True or False*: If a frost wipes out half the Florida orange crop, then some people who want to buy oranges will not be able to.
4. *True or False:* If we observe a reduction in the number of cars being purchased, then we should expect this change in demand to lead to a fall in price.
5. *True or False:* If the demand for lettuce falls, the price will fall, causing the demand to go back up.
6. *True or False*: According to the laws of supply and demand, when the price of a good rises, less of that good will be sold.
7. *True or False*: In the cities, there are more medical services provided than there are in rural areas. Nevertheless, the price of medical services is higher in the cities. This indicates that our simple "supply and demand" story does not apply to markets for things like medical care.
8. *True or False* : If both the quantity consumed and the price of medical services have risen in the last fifteen years, then the demand curve for medical services must have shifted.
9. A major daily newspaper reports that "although home sales are down, home prices continue to rise, in apparent violation of the law of supply and demand."
   Does this observation in fact violate the laws of supply and demand?
10. Ice cream is more expensive in New York than in Iowa, but nevertheless New Yorkers eat more ice cream than Iowans do.
    True or False: This is contrary to what a simple "supply and demand" analysis would predict.
11. If the price of ice cream is higher in New York than in Iowa, it must be because the demand for ice cream is higher in New York.
12. In 2003, mad cow disease was first detected in American cattle.
    a) What do you expect happened to the demand for American beef?
    b) What do you expect happened to the price of American beef?
    c) In fact, in the aftermath of the mad cow scare, the price of American beef fell by about 15% and Americans' beef consumption increased. Can you reconcile this observation with the laws of supply and demand? (Hint: the price of beef is determined in a world market, whereas the demand curve is the sum of American demand and foreign demand.)
13. If the demand curve for avocados is horizontal, then an excise tax on avocados will be passed on entirely to demanders.
14. If the supply curve for corn is perfectly horizontal, how will an excise tax affect the market price of corn? What about a sales tax?
15. If the supply curve for corn is perfectly vertical, how will an excise tax affect the market price of corn? What about a sales tax?

16. The following diagram shows the supply and demand for cupcakes (with quantity measured in dozens).



a) Suppose the government imposes a new sales tax of $6 per dozen cupcakes. What will the new price of cupcakes be?

b) Suppose the government imposes a new excise tax of $6 per dozen cupcakes. What will the new price of cupcakes be?

17. The demand and supply curves for oranges in Lower Slobbovia are identical to the demand and supply curves for oranges in Upper Slobbovia. One day, the Lower Slobbovian *demand* curve shifts *right* by 150 oranges, while the Upper Slobbovian *supply* curve shifts *left* by 150 oranges.

a) Use a diagram to illustrate the effect on the price of eggs in Lower Slobbovia. Use a *separate* diagram to illustrate the effect on the price of eggs in Upper Slobbovia.

b) In which country does the price change by more? Justify your answer by referring to the locations of specific points in your diagrams.

18. The demand and supply curves for widgets in Upper Slobbovia are identical to the demand and supply curves for widgets in Lower Slobbovia. In Upper Slobbovia, every buyer of widgets receives a 5-cent-per-widget subsidy from the government. In Upper Slobbovia, every seller of widgets receives a 5-cent-per-widget subsidy from the government. *True or False:* The price of a widget in Upper Slobbovia is exactly five cents more than the price of a widget in Lower Slobbovia. Use a graph to justify your answer.

19. *True or False*: Some cities raise revenue by levying a tax on employers equal to a certain number of dollars per employee per year. This is a good thing for workers, because workers are not taxed.

20. Coconino County raises revenue through a tax on workers: everybody who has a job in Coconino County must pay a tax of $25 per year. It has been proposed that this tax be abolished and replaced by a tax on businesses equal to $25 per employee per year. *True or False*: Although this change sounds like a good thing for workers, it might actually turn out to be bad for them, since the number of jobs would go down.

21. Coconino County raises revenue through a tax on workers: everybody who has a job in Coconino County must pay a tax of $25 per year. It has been proposed that this tax be abolished and replaced by a tax on businesses equal to $25 per employee per year. *True or False*: Although this change sounds like a good thing for workers, it might actually turn out to be bad for them, since it could cause wages to fall.

22. The government of Fredonia wants to increase employment and is deciding between two plans. Plan I is to encourage hiring by giving employers $1 for each hour of labor that they hire. Plan II is to encourage entry into the labor market by giving workers $1 (in addition to their salary) for every hour that they work.
    a) Show separately how each plan affects the demand for labor, the supply of labor, and the equilibrium wage rate.
    b) Which plan is better for workers? Which plan is better for employers?
    c) Referring to your graphs from part a), carefully explain how you were able to draw the conclusion in part b).

23. The government of Coconino County wants to encourage firms to hire more workers. To accomplish this, each firm receives a government subsidy of $100 per year for each worker on the payroll. To raise the funds for this program, everybody who has a job in Coconino County must pay a $100 per year "employment tax". Recently, a city councilman has proposed abolishing the entire program (eliminating both the subsidies to firms and the tax on workers). *True or False*: If the councilman has his way, there will be fewer jobs in Coconino County.

    Justify your answer carefully, by looking at the effects on both the supply and demand for labor.

24. Suppose that for some reason, Canadian companies want to sell exactly 100 widgets per year in the U.S., regardless of the price. American widget producers like to produce more widgets when the price goes up.
    a) In the U.S. widget market, draw the Canadian companies' supply curve and the overall supply curve.

    Now suppose that the U.S. government wants to improve the fortunes of U.S. widget-makers, and is considering two plans to accomplish this. Under Plan A, all Canadian imports will be banned. Under Plan B, the U.S. government will purchase 100 widgets per year from American manufacturers at whatever is the going price.
    b) Use supply and demand diagrams to illustrate the effects of these two plans. Which is better for the widget-makers? How do you know?

25. Suppose that the only way to reach a certain restaurant is by train, and the train fare is $3. One day a law is passed requiring the restaurant owner to provide free transportation to his restaurant, which he does by making an arrangement with the railroad whereby his customers ride free and he pays the $3 fare per customer directly to the railroad.
    a) What does this do to the supply curve for restaurant meals?
    b) What does this do the demand curve for restaurant meals (*Hint:* It does *not* stay fixed.)
    c) What does this do to the price and quantity served of restaurant meals?
    d) Of the following, who benefits and who loses as a result of this law: The restaurant owner, the restaurant customers, the railroad?

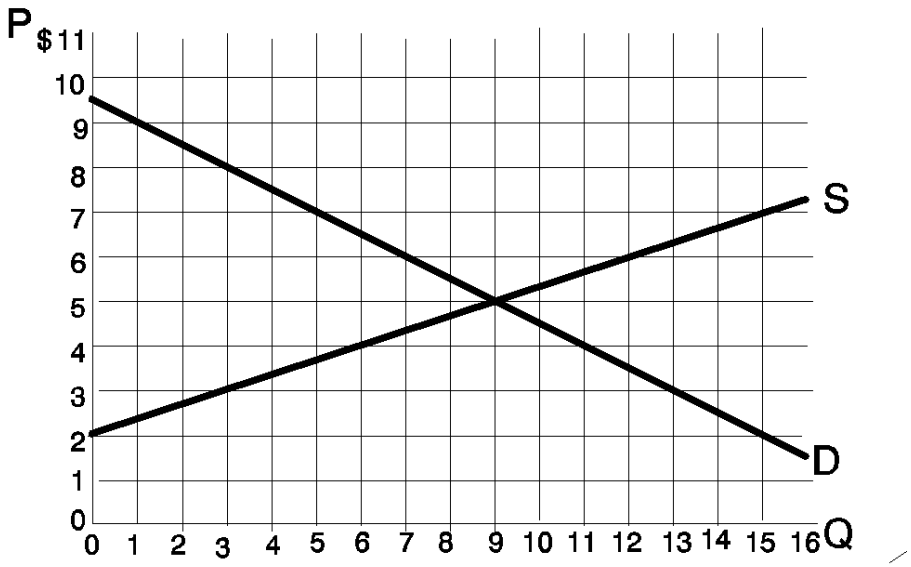
26. Apples are currently subject to a sales tax of 10 cents per apple. They sell for 25 cents apiece (that is, to buy an apple, the consumer must pay 25 cents plus 10 cents sales tax).

a) Suppose the sales tax is eliminated. How much can you say about the new price of apples?

b) Suppose the sales tax is replaced by an excise tax of 10 cents per apple. How much can you say about the new price of apples?

27. At a price of $15,000 apiece, Japanese producers are willing to sell any quantity of compact cars that Americans want to buy. *True or False*: An excise tax on Toyotas sold in the United States would be paid entirely by Americans.

28. The following diagram shows the demand and supply for widgets:



a) Suppose the government imposes a sales tax of $5 per widget. What is the new price of widgets, and how many are sold? Briefly explain how you got your answer.

b) Suppose instead that the government imposes an excise tax of $5 per widget. What is the new price of widgets, and how many are sold?

c) Which tax is better for consumers? Explain your answer in one sentence, based on your answers to parts a) and b).

29. The market for yachts is in equilibrium at a quantity of 500 per year; all 500 are bought by private citizens. Suppose the U.S. government announces that henceforth it will buy 150 yachts per year (regardless of the price).

a) What happens to the demand for yachts?

b) Now how many yachts are bought by private citizens? (Hint: The number bought by private citizens is equal to the total number bought minus the the number bought by the government.) If it is possible to answer this question with an exact number, do so. Otherwise, give a range of numbers (like "between 1,000 and 2,000"). Explain how you got your answer.

30. Suppose that a sales tax would cause the price of an apple to fall by 3 cents. What would be the effect of an excise tax of 10 cents per apple? (Remember that "price" means the pre-tax price.)

31. Suppose that a 40 cent excise tax on apples would lead to a 35 cent increase in the market price of apples. How would a 40 cent sales tax affect the market price of apples?
(The "market price" means the price paid by the buyer to the seller, not including any taxes paid by the buyer.)

32. *True or False:* If the demand curve for rabbit fur is perfectly horizontal, then an excise tax on rabbit fur would be passed on entirely to demanders.

33. Two presidential candidates have offered different economic platforms. Paul Simon, a Democrat, proposes to help the working class by giving each worker an income tax reduction of $1 for each hour that he works. Art Garfunkel, a Republican, proposes to encourage employment by giving every firm a subsidy of $1 for each hour of labor that it hires.
    a) Illustrate the effects of the Simon plan on the demand and supply curves for labor.
    b) Illustrate the effects of the Garfunkel plan on the demand and supply curves for labor.
    c) *True or False:* Workers might actually prefer the Garfunkel plan because it encourages firms to offer more jobs at higher wages. Justify your answer carefully.

34. The government is considering an economic plan under which consumers will pay a new sales tax of 50 cents per gallon of gasoline. The revenue will be used to pay subsidies to gas station owners, who will receive 50 cents from the government for every gallon of gas that they sell.
    a) How does this plan affect the demand curve for gasoline?
    b) How does this plan affect the supply curve for gasoline?
    c) *True or False:* Although this plan looks like a good thing for gas station owners, it might actually hurt them because demanders will buy less gasoline.

35. Suppose that it costs car manufacturers $1,000 to install an air bag in a car, and that each customer values an air bag at $500. A new law requires every car to have an air bag.
    a) Show how the new law affects the demand and supply curves for cars.
    b) What happens to the price of a car after the law is passed? Does it go up or down? Does it change by more or less than $500? Does it change by more or less than $1,000?
    c) Are consumers made better or worse off by this law? Justify your answer.

36. Suppose that wheat is purchased only by poor people, whose demand for wheat is given by the following chart:

Price	Quantity
$1	8 bushels
2	7
3	6
4	5

In the spirit of Christmas, a coalition of rich people has decided to buy wheat at the going market price (whatever that price happens to be) and resell it to poor people at half that price. Moreover, they will buy and resell as much wheat as poor people care to purchase.
    a) List the coordinates of four points on the new demand curve (that is, the rich people's demand curve) for wheat.
    b) Suppose that the supply curve for wheat is vertical at a quantity of 7. Do the poor benefit from the generosity of the rich?

c) Suppose instead that the supply curve for wheat is horizontal at a price of $2. Do the poor benefit from the generosity of the rich?

37. Apples currently sell for 20 cents apiece. Label each of the following statements *certainly true*, *possibly true* or *certainly false* and justify your answers:
    a) A 10 cent sales tax would cause the price to fall to 15 cents, and a 10 cent excise tax would cause the price to rise to 25 cents.
    b) A 10 cent sales tax would cause the price to fall to 14 cents, and a 10 cent excise tax would cause the price to rise to 26 cents.
    c) A 10 cent sales tax would cause the price to fall to 11 cents and a 10 cent excise tax would cause the price to rise to 21 cents.
    d) Neither tax would affect the price.

38. Cars currently sell for $1500 apiece, plus $500 sales tax.
    a) If the sales tax is eliminated, what can you say about the new price of cars?
    b) If the sales tax is eliminated and replaced by a $500 excise tax, what can you say about the new price of cars?
    c) If the sales tax is eliminated and replaced by a $1000 excise tax, what can you say about the new price of cars? co

39. Suppose a new law requires students to give each of their professors a $100 tip at the end of the semester.
    a) What happens to the demand for college courses?
    b) What happens to the supply of college courses?
    c) Are students made better or worse off as a result of this law? What about professors? Justify your answer.

40. Apples currently sell for 50 cents apiece. The government is considering three different plans. Plan A is to subsidize apple purchases; every time you buy an apple, you get a dime back from the government. Plan B is to subsidize apple sales; every time you sell an apple, you get a dime back from the government. Plan C is to tax apple sales: Every time you sell an apple, you pay a dime to the government. When Plan A is instituted, the price of apples rises to 57 cents.
    a) What would have happened to the price of apples if the government had instituted Plan B instead of Plan A?
    b) What would have happened to the price of apples if the government had instituted Plans A and C simultaneously instead of Plan A alone? Justify your answer.

41. Suppose a new law requires every college professor in your city to wear a special uniform while teaching. These uniforms must be rented from the mayor's brother at a cost of $1 per hour. With the law in effect, universities pay professors $5.40 per hour.
    a) If the law were repealed, how much would professors get paid?
    b) If the law were replaced by a new law requiring the *universities* to pay for the uniforms (at the same $1 per hour), how much would professors get paid?

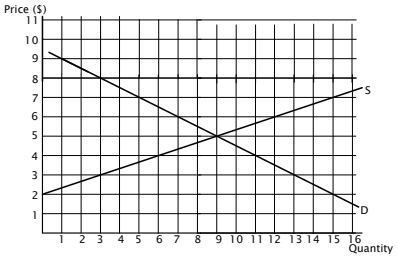
    Each part your answer should be an exact number if possible, or a range of numbers otherwise. (Hint: Remember that the professors are the suppliers of teaching services and universities are the demanders.)

42. The federal government wants to improve the fortunes of domestic car manufacturers and is considering two plans to accomplish this. Under Plan A, every purchaser of a domestic car would receive a $100 rebate from the government. Under Plan B, car manufacturers would receive a $100 rebate from the government for every car they sell.

a) How does Plan A affect the demand for cars?
b) How does Plan B affect the supply of cars?
c) Compare and contrast the effects of the two plans.

43. Gasoline currently sells for $3 a gallon. Suppose the government simultaneously institutes a sales tax of 10 cents per gallon and an excise subsidy of 10 cents per gallon. (The "excise subsidy" means that every time you sell a gallon of gasoline, you get a dime from the government.) What is the new price of gasoline? Are demanders helped or hurt by this pair of policies? What about suppliers?

44. The diagram below shows the demand and supply for hamburgers on your college campus.



a) Suppose your college announces a new plan to improve student life: Any time you buy a hamburger anywhere on campus, you can bring your receipt to the administration building and trade it for a $5 bill. How much does the price of hamburgers change?
b) Suppose instead that the college announces a different plan: It will pay $5 per hamburger to anyone who sells hamburgers on campus. How much does the price of hamburgers change?
c) Which plan is better for the students who like to eat hamburgers? Explain your reasoning.

45. A new law requires each firm to provide its workers with free parking spaces. These spaces are worth $200 a year to the workers and cost firms $500 a year to provide. Is this law good for workers? Is it good for firms? Justify your answers.

46. On Monday, the equilibrium quantity of widgets is 200. On Tuesday, the supply curve shifts right by 50 widgets, and the new equilibrium quantity is 230. On Wednesday, the supply curve returns to its Monday position, and the demand curve shifts left by 30 widgets.
a) Draw separate graphs to illustrate the situations on Tuesday and Wednesday.
b) What is the equilibrium quantity on Wednesday?
c) Carefully justify your answer to part b) by comparing the locations of specific points on your graphs from part a).

Price Theory and Applications

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Solutions to Problem Set for Chapter 1

1. False, in the sense of "not necessarily true." A fuel-efficient car reduces the price of "miles driven," so people choose to drive more miles. More driving with greater fuel efficiency could lead to either an increase or a decrease in the amount of gasoline consumed.

If the demand curve for "miles driven" is particularly steep, do Americans increase or decrease their use of gasoline? What if it is particularly shallow?

2. False (in the sense of: not necessarily true). The existence of the new birth control method lowers the "price" of those activities that are capable of producing unwanted babies, and so leads to greater participation in those activities. Since more sexual encounters take place, but each encounter has a lowered probability of leading to an unwanted birth, the number of unwanted births could go either up or down.

To put it another way: after the discovery, there are two sorts of occasions on which people will use the new method of birth control. First there are those occasions when they would have otherwise used a less effective method. Second, there are those occasions on which they would otherwise have refrained from sex altogether. On the first sort of occasion, the new method leads to fewer unwanted pregnancies than previously, but on the second sort of occasion it leads to more.

The example is analogous to the "reckless driving" example in the text. Sometimes students attempt to carry the analogy too far by asserting that the number of unwanted babies must stay about the same (just as, after safety equipment was introduced, the number of driver deaths stayed about the same). But there is no reason why this needs to be true. We have one reason to believe that unwanted pregnancies will decrease (better birth control) and another to believe that they will increase (more people taking chances). Either effect could be bigger than the other, or they might just happen to cancel each other out, as appears to have been the case with auto safety.

Sometimes students attempt to argue that the new method might have no effect since some people will refuse to use it, for reasons of religion or aesthetics. But this is not a good answer, since the fact that *some* people will not use the method doesn't prove anything. In order to draw any conclusions from this sort of argument, it would be necessary to maintain that *nobody* will use the new method, and this seems implausible.

3. Some other "goods" may be sexual relations, clean air, warm weather or marriage.

4. False. A rise in price leads to a fall in quantity demanded, not a fall in demand.

The initial price rise must be caused by either a shift in demand or a shift in supply. The new equilibrium is reached, and no further shifts are needed.

5. a) Supply falls so price rises and quantity falls.

b) Demand rises so price rises and quantity rises.

c) Demand and supply both fall. Quantity falls and price could go either way.

d) As farm workers move to the city to earn the higher wages, the supply of corn falls. Price rises and quantity falls. Sometimes students argue that wealthier industrial workers will demand more corn and therefore the demand curve shifts out as well. This is a commendable insight, but it overlooks the fact that those higher wages

are paid by employers, who might now *reduce* their demand for corn, offsetting the additional demand by the workers. Therefore, unless we know more about why wages went up, we need not expect the market demand curve to shift.

6. a) Demand falls, price falls and quantity falls.
b) Supply increases, price falls and quantity rises.
c) Demand increases, price increases and quantity increases.
d) Demand increases, price increases and quantity increases.
e) Supply increases, price falls and quantity rises.

7. False. The demand curve for apartments shifts downward; therefore the price falls.

8. False. This could be explained, for example, if the supply curves are identical in both places, but the demand curve is higher in New York than in Iowa.

9. False. We are told only that the quantity has fallen. This might equally well be caused by a decrease in demand (in which case price must fall) or by an decrease in supply (in which case the price must rise.)

10. The demand curve for cigarettes shifts rightward by 10 cigarettes per year. The equilibrium quantity of cigarettes increases by less than 10 per year. The number of cigarettes smoked by others is equal to the new equilibrium quantity minus the ten that are thrown away. Thus Nosmo is correct in believing that he reduces the number of cigarettes that other people smoke, but incorrect in believing that he reduces that number by 10 per year.

11. False, the fall in demand would reduce the equilibrium price which would in turn *reduce* the quantity supplied. As a result, there will not be an additional pound of meat for someone else to eat.

12. False. The supply of housing shifts rightward by 1000, so the equilibrium quantity of housing shifts rightward by *less* than 1000.

13. P= $ 2.00 and Q= 7 lbs.

14. a) $.50 $2.00. 4 pounds.
b) $2.50, $.50. 4 pounds.
c) In either case you would not care.

15. a) After the demand curve drops vertically $5, it crosses the supply curve at a quantity of 3 and price of $3. Therefore the new price is $3.
b) After the supply curve rises vertically $5, it crosses the demand curve at a quantity of 3 and a price of $8. Therefore the new price is $8.
c) With a sales tax, consumers pay $3 plus $5 tax. With an excise tax, they pay $8 plus $0 tax. Either way they pay $8, so both taxes are equally bad for consumers.

16. False. The Upper Slobbovian demand curve is steeper, so quantity falls by less in Upper Slobbovia.

17. A sales tax has no effect on the price; an excise tax is passed on entirely to the consumer. So, for example, an excise tax of $1 per head of lettuce causes the price to rise by $1.

Regarding the excise tax, students commonly reach the correct answer while offering a reason that is quite mistaken. Their (incorrect) argument is this: A vertical demand curve indicates that demanders will pay any price at all for avocados; therefore suppliers are able to pass the tax on completely without losing any sales. The argument is incorrect because it overlooks the fact that suppliers compete with each other. Any given supplier will indeed lose sales if he fails to match the going market price.

Indeed, to see that the argument cannot possibly be correct, ask yourself why suppliers don't raise their prices *prior* to the tax increase. If suppliers charge \$1 originally and \$1.25 after the imposition of a \$.25 tax, why don't they charge \$1.25 (or more) even *before* the tax is imposed? The reason is that price is determined not by individual suppliers, but by the intersection of supply and demand.

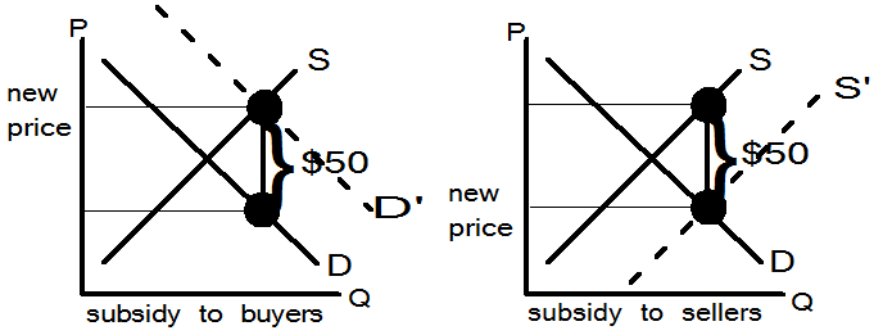
18. a) The demand curve shifts vertically upward a distance \$50. The quick way to see this is to remmember that a \$10 sales tax shifts the demand curve down \$10, and a \$20 sales tax shifts the demand curve down \$20, so a sales tax of *minus* \$50 (as in the problem) should shift the demand curve down a distance -\$50, which is to say, up a distance \$50. If that's too glib for you, you should be able to make an argument from first principles, mimicking the argument in Exhibit 1.3.

b) The new price is higher than the old price, but less than \$50 higher.

19. a) The supply curve shifts downward a vertical distance \$50.

b) The new price is lower than the old price, but less than \$50 lower.

20. The diagram below shows the effects of the subsidy to buyers from problem 18 and the subsidy to sellers from problem 19. The two darkened points in the left-hand panel are identical to the two darkened points in the right-hand panel, because in each case they are located exactly \$50 apart, with one on the old demand curve and one on the old supply curve. In the left-hand panel, consumers care about the price minus the subsidy, i.e. the price at the lower of the two darkened points. In the right-hand panel, consumers care about the price, i.e. the price at the lower of the two darkened points. Because these two prices are the same, consumers are equally well off under either subsidy.



21. The excise tax shifts the supply curve, which now crosses the demand curve at a lower quantity but still at the original price. So the price does not change and demanders (who care only about the price, not the tax) are unaffected.

22. False. This is true if "high" is replaced with steep and "low" is replaced with flat.

23. The price would fall to 13 cents apiece.

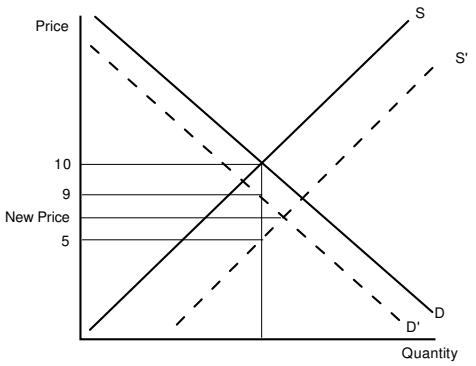
24. a) and e) are possibly true. b) and d) are certainly false because a sales tax cannot cause a price increase. c) is certainly false because an excise tax cannot cause a price decrease.

25. a) The excise tax has caused the price to rise by less than \$15, which means the original price is between \$15 and \$20. When the excise tax is repealed, the price falls back to this original price, i.e. somewhere between \$15 and \$20.

b) The new price will be \$5 lower than it is under the excise tax, i.e. it will be \$15.

c) Starting from a graph that shows the \$5 excise tax, the supply curve now shifts upward another \$3, so the price rises, but by less than \$3. The new price is between \$20 and \$23.

26. The new price will be somewhere between \$5 and \$9. Here is the picture:



27. False. The supply and demand curves both shift downward a distance 50 cents. Therefore the entire picture shifts down 50 cents, so the new equilibrium is 50 cents directly below the old one. In other words, the quantity hasn't changed.

28. False. The excise tax causes the supply curve to shift upward and the sales tax causes the demand curve to shift downward. If you draw some pictures with, for example a very flat demand curve and a very steep supply curve (or vice versa) you'll see that the price can go either up or down.

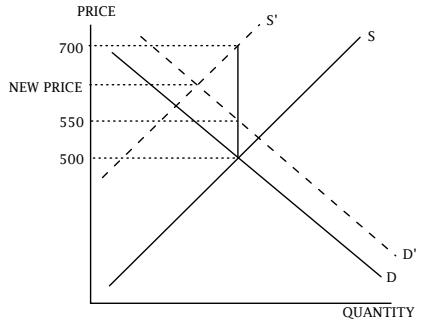
29. a) The price rises. b) The price rises. c) Both price increases are equal. This is because they both occur at that price where the horizontal distance between the original supply and demand curves is exactly 100.

30. a) It means that everyone will have exactly the same take-home pay regardless of which plan is chosen. Also, employers will have exactly the same labor costs regardless of which plan is chosen. For example, if a tax on workers causes wages to rise to \$6 per hour, then a tax on employers will cause wages to fall to \$5 per hour; either way, workers receive a take-home (after-tax) pay of \$5 per hour and employers spend \$6 per hour to hire labor.

b) You should draw the demand and supply curves for labor.

A tax on workers causes the supply curve to rise vertically by \$1 and a tax on employers causes the demand curve to fall vertically by \$1. The resulting prices to suppliers and demanders can be shown to be independent of the choice of tax via reasoning as in Exhibit 1-10.

31. a) Demand shifts up by \$50. Supply shifts vertically up by \$200.
b) The new price of a shower is between \$550 and \$700. (See the picture below.)
c It is bad for consumers, who pay more than \$50 for a digital control they value at \$50. It is also bad for suppliers, who enjoy a price increase of less than \$200 though their costs increase by \$200.



Answers to Numerical Exercises

N1. $P = \$1$, $Q = 800$ oranges/day.

N2. Supply: $Q = 800 \cdot P - 400$;
Demand: $Q = -200 \cdot P + 1,000$.
$P = \$1.40$, $Q = 720$ oranges/day. \$ .90.

N3. Supply: $Q = 800 \cdot P$;
Demand: $Q = -200 \cdot P + 900$. P=\$.90,
$Q = 720$ oranges/day. \$ .90.

N4. Supply: $Q = 800 \cdot P - 160$;
Demand: $Q = -200 \cdot P + 940$.
$P = \$1.10$, $Q = 720$ oranges/day. \$ .90.