THIRD EDITION

STUDY GUIDE TO ACCOMPANY

PRICE THEORY AND APPLICATIONS

STEVEN E. LANDSBURG

PREPARED BY

WILLIAM V. WEBER

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PREFACE

USING THE *STUDY GUIDE*

This *Study Guide* has been prepared to accompany Steven E. Landsburg's *Price Theory and Applications*, third edition. When properly used in conjunction with the textbook, the *Study Guide* can be a valuable supplement in your learning of microeconomic theory. More than 800 exercises, questions, and problems with complete solutions are provided to help you in your efforts.

FEATURES

Each chapter of the *Study Guide* contains seven sections to help you with the material covered in the textbook: a list of key terms, a list of key ideas, a set of completion exercises, a graphical analysis section (when appropriate), a selection of multiple choice questions, supplemental review questions, and a set of problems for analysis. The following are some suggestions on how to successfully use each of these features of the *Study Guide*.

Key Terms. A list of the chapter's key terms, including all terms mentioned in the textbook's marginal glossary, is provided at the beginning of each chapter. Use this list to check your ability to define and explain these terms.

Key Ideas. A list of the main ideas in each section is also provided at the beginning of each chapter. Use this list when you need a quick, condensed review of the basic topics covered in the textbook.

Completion Exercises. A set of fill-in-the-blank exercises is provided to check your ability to recognize and use the chapter's key terms. When you work through these exercises, choose the key term that best completes each sentence. After you have finished the completion exercises, you will have a detailed summary of the material contained in the chapter, which can be used for review.

Graphical Analysis. One of the biggest mistakes students make when they study for an economics exam is that they fail to prepare for graphical analysis. You will certainly be asked on exams to read graphs, label and complete graphs, sketch graphs representing a particular situation, and perform original graphical analysis. You cannot prepare for such questions by simply staring at the graphs in the text and your notes. You must practice using graphs to be adequately prepared for an examination.

Each chapter contains a graphical analysis section which builds the most important graphs from the chapter step by step. By completing the graphs yourself, you will see how the graph breaks down into its individual components and what each part of the graph represents. This analysis will give you valuable practice in reading, drawing, and labeling graphs.

Multiple Choice Questions. A selection of 15 multiple choice questions has been included with each chapter. Even if your instructor does not choose to use multiple choice questions on exams, these questions can be worthwhile. The multiple choice questions give you a quick and easy quiz over the key definitions, results, and graphs of the chapter. By spending a relatively small amount of time on these questions, you can identify any problem areas in advance. Furthermore, the solutions include a short explanation in addition to the letter of the correct answer, which can help you see how to approach the question when you are unsure of the answer.

Questions for Review. A set of 7 review questions with complete solutions are provided with each chapter. These questions are designed to help you prepare for essay questions on an exam. Do not simply read through a review question and answer it in your head; that approach will not help you learn to write using the economist's language. Instead, you should attempt to write out in the space provided a complete paragraph responding to the review question. Check your answer against the solution to see if you've given enough detail or missed any major points.

You'll find that putting your ideas into words is easier said than done. Too often, students believe that they know the material well, only to discover on the exam that they can't put what they know down on paper. The writing skills that you need for an essay exam, like any other skills, are only developed with practice. Write out the answers to the review questions to get the practice you need.

Problems for Analysis. Each chapter concludes with 3 problems that require a more advanced level of economic analysis than do the completion exercises, multiple choice questions, and review questions. Sometimes these problems will ask you to combine the material you've learned to discover new facts, other times you will be asked to do numerical exercises which use the mathematics underlying the material you've learned, and yet other times you will have to apply the material you've learned to new situations. You will not be able to simply look up the answers in the textbook; these problems will require you to think on your own as an economist.

Other Features. Two classic economic articles are reprinted in Appendices A and B of the *Study Guide*. The first is "The Use of Knowledge in Society" by F. A. Hayek, which was written in 1945. Many of Hayek's ideas are discussed in Chapter 9 of the textbook, and this article will help you understand the role of prices in communicating and synthesizing society's knowledge. The second article is "The Problem of Social Cost" by Ronald Coase, which was published in 1960. In this article, Coase shows why the Pigovian analysis of externalities is flawed and presents the theorem which now bears his name. It is highly recommended that you read this article when you study external costs and benefits in Chapter 13.

In Appendix C at the end of the *Study Guide* is FastGraph, in which all the graphs from the textbook are reprinted. FastGraph is designed to help you take notes during your instructor's lectures. When your instructor refers to a specific graph in the text, you may remove the appropriate page from FastGraph and use it to follow your instructor's comments and make notes about the graph. The pages from FastGraph also contain grid lines to help you draw other graphs from your instructor's lecture.

DRAWING EFFECTIVE GRAPHS

As you already know, graphical analysis is a major part of economics. Whether you're taking lecture notes involving graphs, working through one of the graphs in the *Study Guide*, or drawing a graph on an exam, there are four basic rules you can follow that will make your graphs more effective.

Draw large graphs. The U.S. Postal Service has never introduced a set of stamps honoring economic graphs, and you should not be trying to design one. If you draw your graphs too small, they will be difficult

to label, difficult to correct when you make an error, and impossible to read later when you're studying for an exam (or even worse, impossible for your instructor to read when you're being graded). Save yourself these headaches by starting with a sufficiently large set of axes—a big graph never hurts.

Use pencil when drawing graphs. You can't always draw a graph right the first time. It can be difficult to draw a curve precisely through the point you desire or to get a tangent point precisely where you want it. After you've completed a graph, you may find that it doesn't really show what you wanted it to. Be prepared to erase.

Use several colors and use them consistently. We use graphs in economics to show cause and effect, and action and reaction. These relationships are not easy to see when you are staring at a fully-completed graph. Colors can be an effective way of clarifying the causal relationships we are trying to illustrate.

In addition to a regular pencil, have two or three colored pencils ready when you take lecture notes, take an exam, or work problems. By using your colors consistently, you can keep track of the order in which things happen in the graph.

For example, suppose you have a blue pencil and a red pencil in addition to your regular pencil. Always use your regular pencil to draw the axes and the initial situation shown in the graph. Then always use your blue pencil to show the first thing that changes on your graph (e.g., for the first shift in a curve or the first area identified). Your red pencil will be reserved to show the second change in your graph. By using your colors in a consistent manner, you can easily see how the graph was designed to show economic cause and effect.

Use adequate labels on your graphs. Everything on your graph should be labeled. The last thing you want to see when you're studying the night before an exam is a mysterious curve wandering through your graphs. The curves in your graphs represent specific relationships between economic variables, and you need to know precisely what relationships are being shown. Effective use of labels will help you to keep track of what is happening in your graphs. When you use abbreviations in your labels, be sure you know what the abbreviations stand for. Also, don't hesitate to put additional explanatory notes in the margin beside and beneath your graphs.

ACKNOWLEDGMENTS

Thanks should properly go to a multitude of family, friends, teachers, and colleagues, both past and present, but space limitations permit me to mention only a selected few. Steven Landsburg has written an excellent textbook, and his preparations for the third edition certainly made it easier to make the appropriate revisions in the *Study Guide*. The fine people at West Publishing have done a superb job of seeing this project through to completion; I am particularly indebted to Sharon Adams who, in her role as editor, tirelessly supplied ideas and assistance. My Macintosh computer system performed flawlessly and survived this project without a single hard drive crash or power supply failure, and for this minor miracle I am most grateful. Finally, I could not have completed this project without the support of the faculty, staff, and students in the Economics Department at Eastern Illinois University, my friends and students at Haskell Indian Nations University and the University of Kansas, the many charter members of the Harriet Martineau Fan Club and the Fun Couple Society, and—with special thanks—Dennis Glasco, Jannett Highfill, and Robert Funk.

William V. Weber
Charleston, Illinois

August 1994

CONTENTS

CHAPTER 1

SUPPLY, DEMAND, AND EQUILIBRIUM

No matter how complicated economic models get, they still rest on the fundamental ideas of supply and demand. This chapter reviews the basic facts concerning supply and demand and shows how these ideas can be applied to analyze the effects of taxation.

KEY TERMS

- ❒ Law of demand
- ❒ Quantity demanded
- ❒ Demand
- ❒ Demand curve
- ❒ Fall in demand
- ❒ Rise in demand
- ❒ Sales tax
- ❒ Econometrics
- ❒ Law of supply
- ❒ Quantity supplied
- ❒ Supply
- ❒ Rise in supply
- ❒ Fall in supply
- ❒ Excise tax
- ❒ Equilibrium point
- ❒ Satisfied
- ❒ Economic incidence
- ❒ Legal incidence

KEY IDEAS

❒ **Section 1.1.** Demand is not a number but a relationship. Demand shows the relationship between price and quantity demanded, assuming other important factors (like consumer tastes, consumer income, and prices of other commodities) are held constant.

❒ **Section 1.2.** Supply, like demand, is also a relationship between two variables. Supply shows the relationship between price and quantity supplied, assuming other important factors (like technology, the costs of resources, and the size of the industry) are held constant.

❒ **Section 1.3.** When supply and demand interact, competitive forces cause the price and quantity exchanged to head towards a state of rest, known as the equilibrium point. By comparing how a sales tax and an excise tax change the equilibrium point, we discover that the two taxes have the same economic effects. Economists summarize this idea by saying that the economic incidence of a tax is independent of the legal incidence.

COMPLETION EXERCISES

The relationship called (1)_____ shows the quantity of a good that buyers are willing and able to purchase at each and every possible price, assuming all other relevant factors remain unchanged. We typically graph this relationship placing price on the vertical axis and quantity on the horizontal axis; this graph is known as a (2)_____. Notice that the term (3)_____ is reserved for referring to the entire price–quantity relationship that describes the buyers' desires to purchase a good. If we wish to refer to the specific amount that buyers have chosen to purchase at a particular price, we instead use the term (4)_____.

The (5)_____ states that price and quantity demanded are inversely related, assuming that all other relevant factors are unchanged. In other words, a rise in price will cause a fall in the quantity demanded (assuming no other factors are also working to alter the situation), and *vice versa*. This inverse relationship is shown by drawing a downward-sloping demand curve. The demand curve may be either flat or steep, depending on the degree to which quantity demanded changes in response to a price change; statistical techniques known as (6)_____ can be used to estimate whether demand is flat or steep.

Several factors (such as tastes, incomes, and the prices of other goods) affect demand and can cause the demand curve to shift. A (7)_____ results when buyers decide to purchase less of a good at each possible price; this is illustrated by a shift down and to the left in the demand curve. A (8)_____ occurs when buyers wish to purchase more of a good at each and every price; the demand curve shifts up and to the right in this case. However, a change in the price itself only changes (9)_____ and does not cause a fall or rise in demand.

The development of the supply side of the market parallels that of the demand side. The term (10)_____ refers to a set of price–quantity pairs that shows the quantity that sellers are willing and able to provide at each and every price, assuming other related factors are held constant. The (11)_____ states that a rise in price will cause an increase in quantity supplied (assuming other related factors are unchanged) and is illustrated by an upward-sloping supply curve. Notice that the term (12)_____ is reserved for referring to the entire supply curve, while the term (13)_____ refers to the specific amount provided at some specific price.

Factors such as technology, the costs of resources, and the number of suppliers affect supply and can cause a shift in the supply curve. A shift in the supply curve up and to the left is called a (14)_____, showing that suppliers wish to sell less at each and every price. A shift in the supply curve down and to the right is called a (15)_____, which occurs when suppliers want to sell more at each and every price. A change in price, however, will only change (16)_____ and will not shift the supply curve.

The intersection of supply and demand shows the only price where the quantity demanded and quantity supplied are equal and is called the (17)_____. Competitive behavior of

demanders and suppliers causes the price and quantity traded in the market to head towards the equilibrium point. For example, suppose the price is so high that the quantity supplied is larger than the quantity demanded. In this case, the suppliers are not (18)_____—they cannot sell as much of the good as they would like at the current price. Competition between these suppliers would cause them to lower the price towards the equilibrium price in order to attract more buyers. Conversely, if the price is so low that the quantity supplied is smaller than the quantity demanded, demanders are not (19)_____ and will bid up the price to the equilibrium level.

The analysis of taxation provides one interesting application of the supply–demand model. The (20)_____ of a tax indicates the legal requirement on demanders and suppliers to pay a tax, while the (21)_____ of a tax indicates the amounts of the tax actually paid by suppliers and demanders. A per-unit tax which demanders are required to pay when purchasing a good is called a (22)_____; the legal incidence of this tax falls entirely on the demanders. On the other hand, a per-unit tax which suppliers are required to pay when selling a good is called an (23)_____; the legal incidence of this tax falls entirely on the suppliers. Surprisingly, these two types of taxes have the same economic effects, even though their legal incidences are different. We summarize this idea by saying that the (24)_____ of a tax is independent of (i.e., is not affected by) the (25)_____.

GRAPHICAL ANALYSIS—THE ECONOMIC INCIDENCE OF A TAX

Complete Worksheet 1–1 by following the instructions below. This worksheet is designed to show you how to use supply and demand to prove that the economic incidence of a tax is independent of its legal incidence. (Worksheet 1–1 is located on page 15 and may be removed for convenience.)

Step 1. Two identical graphs of the supply and demand for a market are shown in Worksheet 1–1. Some specific points on these supply and demand curves are summarized in the tables on the right. Verify that the supply and demand curves are correctly graphed. Also verify that the equilibrium for this market occurs at a price of 6 dollars per unit, where quantity supplied and quantity demanded are both equal to 6 units.

Demand		Supply	
Q	P	Q	P
0	12	0	3
1	11	1	3.5
2	10	2	4
3	9	3	4.5
4	8	4	5
5	7	5	5.5
6	6	6	6
7	5	7	6.5

Step 2. We will use the top graph in Worksheet 1–1 to show the effects of a $3-per-unit sales tax. Since the legal incidence falls on demanders, the sales tax will affect the demand in the market. Also notice that the net amount demanders are willing to pay for any given quantity of the good has not changed. This implies that the price consumers are now willing to pay for the good itself must be adjusted downward to account for the sales tax. For example, before the tax, consumers were willing to pay $8 per unit for 4 units of the good; to make up for the $3-per-unit sales tax, consumers are now only willing to pay $5 per unit for this same quantity.

To show the effects of the sales tax in the top graph, first complete the table to show the post-tax demand curve. Second, use these points to graph this new demand curve. Finally, find the new equilibrium quantity, equilibrium price received by suppliers, and post-tax price paid by demanders. If you've done this correctly, you should find that the equilibrium quantity is 4 units, with demanders paying a total of $8 per unit and suppliers receiving $5 per unit.

Step 3. Use the lower graph in Worksheet 1–1 to show the effects of a $3-per-unit excise tax. In this case, the legal incidence falls on suppliers. Since suppliers must now receive a higher price in order to cover the extra cost of the tax, this tax shifts the supply curve upward. As in Step 2, complete the table to find points on the new supply curve, graph the new supply curve, and find the new equilibrium quantity, the price paid by demanders, and the post-tax price received by suppliers.

If you've done this step correctly, you should find that the equilibrium quantity and prices under the excise tax are the same as under the sales tax. This comparison shows a major result in the theory of taxation—the burden that a tax imposes on demanders and suppliers is the same no matter who is legally required to pay the tax. We summarize this result by saying that the economic incidence of the tax is independent of the legal incidence.

Summary. A sales tax shifts the demand curve down by the amount of the tax, while an excise tax shifts the supply curve up by the amount of the tax. A sales tax and an excise tax of the same size will have the same economic effects, even though their legal incidences are different.

MULTIPLE CHOICE QUESTIONS

❒ Questions 1–5 refer to the supply–demand diagrams at the top of the following page.

1. Which of the diagrams shows what happens in the market for oranges when a severe late frost in Florida damages orchards statewide?
   A. Figure II.
   B. Figure III.
   C. Figure IV.
   D. None of the above.

2. Poorer families tend to use pawn shop services more than do wealthier families. Which of the diagrams shows what happens in the market for pawn shop services when a severe recession causes a substantial reduction in households' incomes?
   A. Figure I.
   B. Figure II.
   C. Figure III.
   D. None of the above.

3. Which of the diagrams shows what happens in the market for cotton when the price of cotton falls to eliminate a surplus in the market?
   A. Figure I.
   B. Figure II.
   C. Figure III.
   D. None of the above.

4. Which of the diagrams shows what happens in the market for milk when improvements in cattle feed result in higher milk yields from dairy cows?
   A. Figure I.
   B. Figure III.
   C. Figure IV.
   D. None of the above.

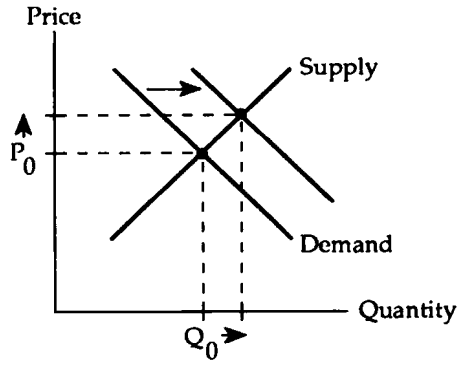


Figure I

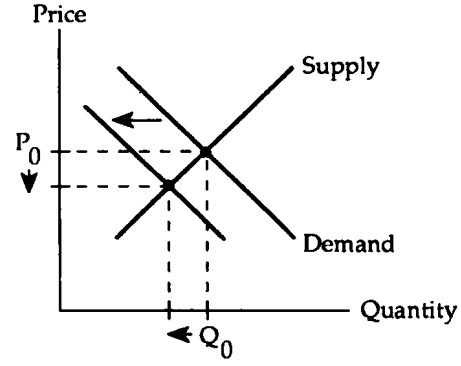


Figure II

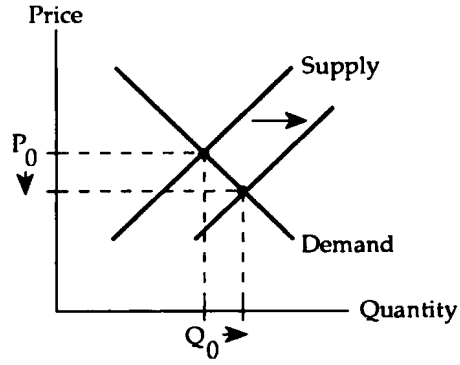


Figure III

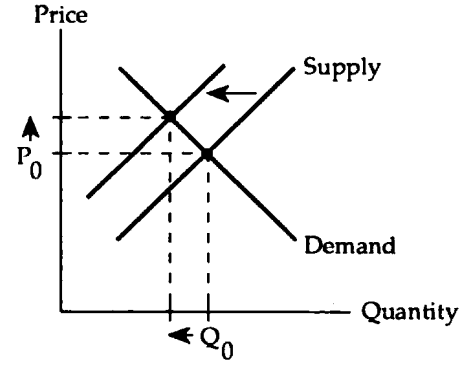


Figure IV

5. Airplane travelers take frequent taxi trips to and from airports. Which of the diagrams shows what happens in the market for trips by taxi when travelers are faced with rising airline prices?
   A. Figure I.
   B. Figure II.
   C. Figure IV.
   D. None of the above.

6. The immediate effect of a fall in the price of CD players is an increase in
   A. the demand for compact discs.
   B. the quantity demanded for compact discs.
   C. the supply of compact discs.
   D. the quantity supplied of compact discs.

7. The immediate effect of a fall in the price of compact discs is an increase in
   A. the demand for compact discs.
   B. the quantity demanded for compact discs.
   C. the supply of compact discs.
   D. the quantity supplied of compact discs.

8. When people travel because they are faced with emergencies, the price of air travel has little effect on their decision to fly instead of using a slower form of transportation. In this situation,
   A. the equilibrium price of air travel must be high.
   B. the demand curve for air travel is upward sloping.
   C. the demand curve for air travel is relatively flat.
   D. the demand curve for air travel is relatively steep.

9. According to the law of supply, a price increase will cause
   A. an increase in the equilibrium quantity.
   B. a decrease in the equilibrium quantity.
   C. an increase in the quantity supplied, provided other factors have remained unchanged.
   D. a decrease in the quantity supplied, provided other factors have remained unchanged.

10. Suppose the price of a commodity is $20 per unit. At that price, consumers wish to purchase 4,000 units weekly and producers wish to sell 7,000 units weekly. In this situation,
   A. unsatisfied consumers will bid up the market price.
   B. the market price will fall because producers are unsatisfied.
   C. a rise in demand will occur to bring the market to equilibrium.
   D. a decrease in supply is necessary for the market to reach equilibrium.

11. If the current market price is below the equilibrium price,
   A. suppliers are satisfied but demanders are not.
   B. demanders are satisfied but suppliers are not.
   C. neither demanders nor suppliers are satisfied.
   D. both demanders and suppliers are satisfied.

12. Suppose we observe that the price of cocaine has been falling, even though the amount of cocaine traded on the black market has also been falling. We can conclude that
   A. the law of demand does not hold for cocaine.
   B. a demand curve for cocaine doesn't exist.
   C. the supply of cocaine must have fallen.
   D. the demand for cocaine must have fallen.

13. A rise in the demand for bread occuring simultaneously with a fall in the supply of bread *must*
   A. decrease the quantity of bread traded in the market.
   B. increase the quantity of bread traded in the market.
   C. increase the equilibrium price of bread.
   D. increase the equilibrium price of bread and decrease the equilibrium quantity of bread.

14. Which of the following statements about sales and excise taxes is *false?*
   A. A sales tax causes a parallel shift downward in the demand curve by precisely the amount of the tax.
   B. An excise tax causes a parallel shift upward in the supply curve by precisely the amount of the tax.
   C. The legal incidence of a sales tax is entirely on demanders, while the legal incidence of an excise tax is entirely on suppliers.
   D. The economic incidence of a tax is evenly split between demanders and suppliers, no matter what the legal incidence is.

15. What do we mean when we say that the economic incidence of a tax is independent of its legal incidence?
    A. The economic incidence and legal incidence of a tax are always the same.
    B. The economic incidence of a tax will be the same no matter who bears the legal incidence of the tax.
    C. Demanders and suppliers equally share the economic burden of the tax, regardless of the legal incidence.
    D. Since suppliers can "pass on" a tax to demanders, the economic incidence of a tax will always be on demanders even when the legal incidence is on suppliers.

QUESTIONS FOR REVIEW

1. Distinguish between demand and quantity demanded. Distinguish between supply and quantity supplied. Why are these distinctions important?

2. List some situations which would cause a fall in demand. List some situations which would cause a fall in supply.

3. Consider a demand curve for sex, where the "price of having sex" is the risk of having an unwanted pregnancy. If you believe that making safe, effective birth control easily available to teenagers is the best way to reduce the number of unwanted pregnancies, do you believe this demand curve for sex is flat or steep?

4. If there is a *rise* in supply, the new supply curve lies *below* the old supply curve. Resolve this apparent contradiction.

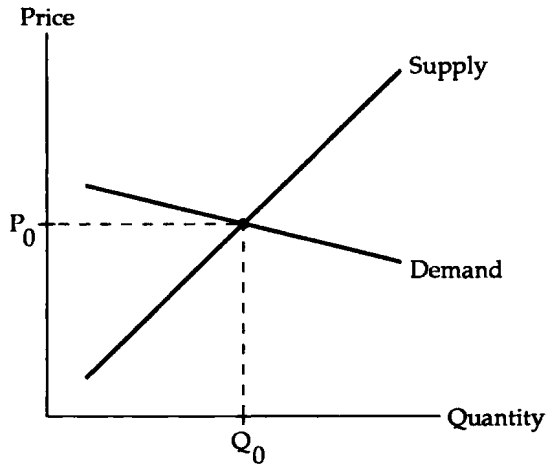
5. What is the equilibrium point and what is its significance?

6. When quantity supplied is smaller than quantity demanded, we say there is a shortage. When would a shortage situation be likely to occur? Why is it unlikely that such a situation would prevail in a market for very long?

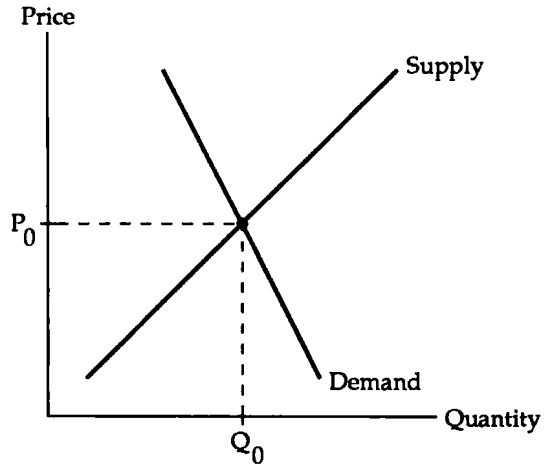
7. Compare and contrast the effects of a sales tax and an excise tax.

PROBLEMS FOR ANALYSIS

1. The markets diagrammed below have identical supply curves but different demand curves.



Flat Demand



Steep Demand

i. Suppose that an excise tax of t dollars per unit is placed on both markets. Complete the above diagrams to show this situation. The following should be labeled:
   a. the new equilibrium quantity and price (Q_1, P_1),
   b. the net price suppliers pay after the tax (P_S), and
   c. the size of the excise tax (t).

ii. In which case (flat demand or steep demand) will the tax cause the equilibrium price to rise very little? In which case will the tax cause the equilibrium price to rise by nearly t dollars per unit?