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中级微观经济学：直觉思维与数理方法 下册

Intermediate Microeconomics: An Intuitive and Mathematical Approach

托马斯·内契巴（Thomas J. Nechyba）著

中国人民大学出版社

中级微观经济学：现代方法

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图书在版编目（CIP）数据

中级微观经济学：直觉思维与数理方法：英文 / 托马斯·内契巴著．—北京：中国人民大学出版社，2012.9

高等学校经济类双语教学推荐教材

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ISBN 978-7-300-16312-3

Ⅰ.①中… Ⅱ.①托… Ⅲ.①微观经济学-高等学校-双语教学-教材-英文 Ⅳ.①F016

中国版本图书馆 CIP 数据核字（2012）第 198843 号

高等学校经济类双语教学推荐教材

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出版发行	中国人民大学出版社		
社　　址	北京中关村大街31号	**邮政编码**	100080
电　　话	010—62511242（总编室）	010—62511398（质管部）	
	010—82501766（邮购部）	010—62514148（门市部）	
	010—62515195（发行公司）	010—62515275（盗版举报）	
网　　址	http://www.crup.com.cn		
	http://www.ttrnet.com（人大教研网）		
经　　销	新华书店		
印　　刷	涿州市星河印刷有限公司		
规　　格	215 mm × 275 mm 16 开本	**版　　次**	2012 年 9 月第 1 版
印　　张	54.25 插页2	**印　　次**	2012 年 9 月第 1 次印刷
字　　数	1 185 000	**定　　价**	82.00 元

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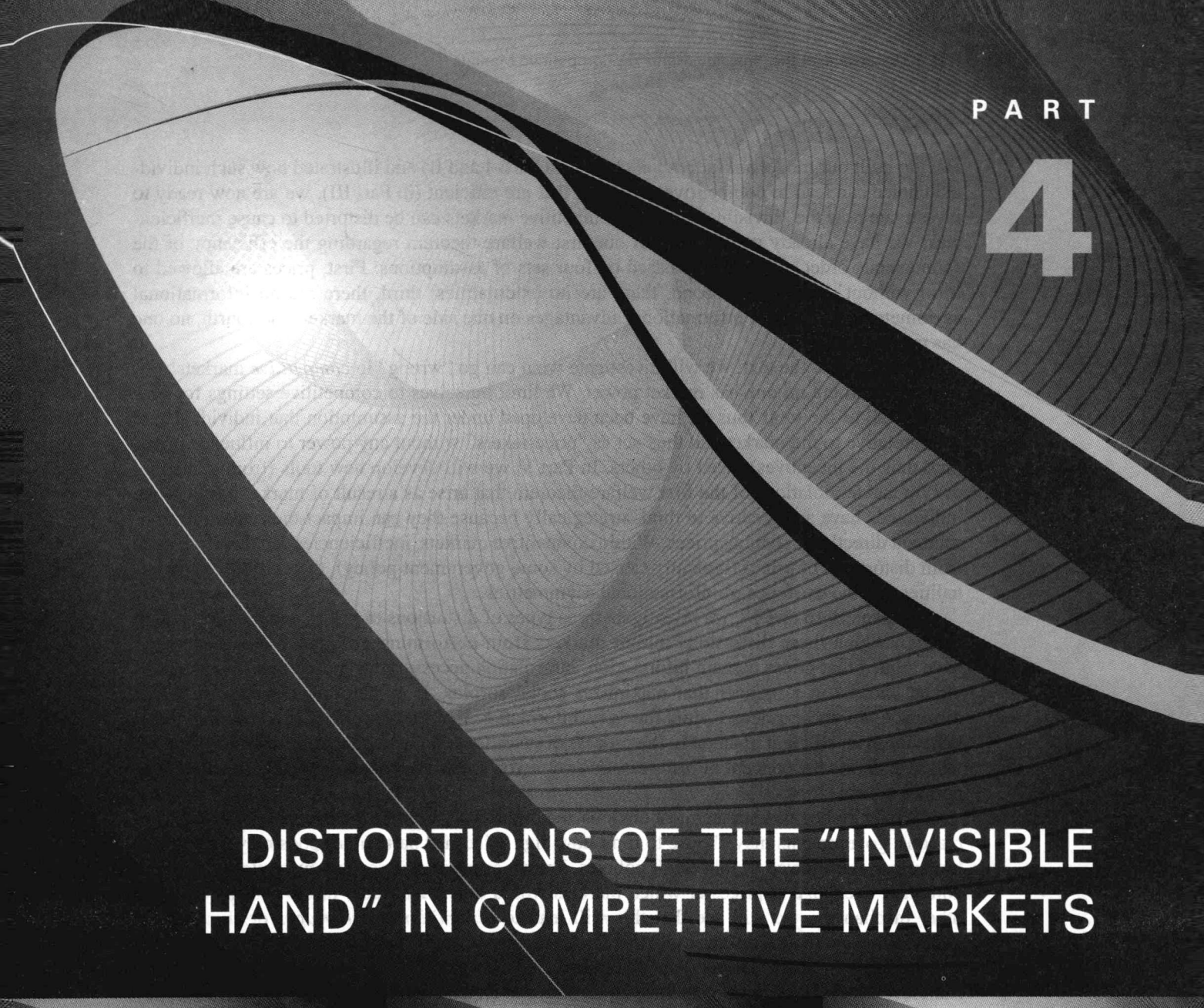


PART

4

DISTORTIONS OF THE "INVISIBLE HAND" IN COMPETITIVE MARKETS

Having built our models of individual choice (in Parts I and II) and illustrated how such individual choice can lead to competitive equilibria that are efficient (in Part III), we are now ready to investigate how the "invisible hand" of competitive markets can be distorted to cause inefficiencies. We have already mentioned that our first welfare theorem regarding the efficiency of the spontaneous order of markets is based on four sets of assumptions: First, prices are allowed to form without distortions; second, there are no externalities; third, there are no informational asymmetries that bestow informational advantages on one side of the market; and fourth, no one has market power.

In this part of the text, we will investigate what can go "wrong" in *competitive* markets; i.e., in markets where no one has market power. We limit ourselves to competitive settings for now because all of the tools thus far have been developed under the assumption that individuals are small relative to the market and thus act as "price-takers" without any power to influence prices (and thus the incentives) faced by others. In Part V, we will develop new tools (from game theory) to tackle violations of the first welfare theorem that arise as a result of market power when individuals have an incentive to think strategically because they can impact the economic environment directly by shaping prices. Within competitive markets, inefficiencies can therefore arise from distortions of prices (typically caused by some government policy), the existence of externalities and the existence of informational asymmetries.

In Chapters 16 and 17, we investigate three types of distortions of prices and the mechanism through which these distortions inhibit markets from performing efficiently. Recall that we have argued that prices contain information, information necessary for individuals to make individual choices in a manner that maximizes social surplus. It is therefore not surprising that distortions of these prices distort the very information that causes prices to guide individual behavior in an efficient manner. In the process of investigating the impact of price distortions, we will also define the concept of *price elasticity* that you may have encountered in a previous economics course.

Chapter 16 begins with the most obvious and direct types of price distortions. For a variety of reasons, governments may choose to limit how high prices for particular goods may rise or how low prices are allowed to fall. Such policies, known as *price ceilings* and *price floors*, prohibit voluntary exchange at prices at which markets would otherwise trade. In the absence of some other mechanism, we will see that this will lead to *disequilibrium shortages* or *surpluses* of goods. But we will also discover that there is no particular reason that such shortages or surpluses will persist. For instance, if a price ceiling artificially lowers price below its undistorted equilibrium level, individual consumers have an incentive to expend additional effort to make sure they are the ones who will get to buy at the lower price. They may, for instance, have to line up before stores open, thus spending their time as well as their money in pursuit of the goods. In the new equilibrium, a new *non-price rationing* mechanism will therefore arise to once again cause demand to equal supply at the mandated price. The important insight here is that the market price mechanism is one of many ways in which scarce goods are rationed: they are rationed to those who are willing to pay the most. If this rationing mechanism is disturbed and price cannot be used to ration fully, a new non-price mechanism has to emerge to determine who gets what. And this non-price mechanism, we will demonstrate, will introduce inefficiencies.

Our analysis will allow us to identify winners and losers from the imposition of price floors and price ceilings, and it will give us some insight about how such policies may arise in democratic policy making even though they are inefficient. In particular, for many such policies, it is the case that the "winners" are a concentrated few for whom it is easy to organize politically while the "losers" are a diffuse many who may barely notice why it is that they are losing. At the same time, we will also discover circumstances in which price ceilings or price floors are motivated by ethical concerns, such as in the case of human kidney markets where the government has in most countries set a price ceiling of zero that permits individuals to donate one of their kidneys but not to sell it (at a price above zero).

In Chapter 17, we revisit *taxes* and *subsidies*, which are by far the most common ways in which market prices are distorted through policy. We have previously discussed in Chapter 9 how taxes cause substitution effects and create deadweight losses. Now that we have built models of markets, however, we can see more clearly how taxes (and subsidies) translate into price changes, whether consumers or producers are affected more depending on relative price elasticities, and which types of taxes (and subsidies) are likely to result in greater or lesser inefficiencies. Throughout, we will emphasize that recognizing inefficiencies introduced through taxes (and subsidies) is not the same as arguing that taxes (and subsidies) should not be used. Government expenditures need to be funded somehow, and many expenditure programs may carry benefits that outweigh the efficiency cost of the taxes that are required to fund them. Nevertheless, it is important to be aware of the cost that taxes impose on society, and to understand how such costs are related to the types of taxes that are considered.

We do not, however, want to give the impression that government tax and price policies are the only factors that contribute to inefficiencies in competitive markets. Chapter 18 introduces the topic of *externalities*—impacts of individual actions that affect others who are not participating in a given market transaction. Pollution generated in the production of goods is a prime example, but other types of externalities, both positive and negative, are pervasive in the real world. Within competitive settings, Chapter 18 illustrates how such externalities can cause markets to over- or underproduce relative to what is efficient because individual actors within those markets no longer face the full costs or reap the full benefits of their actions. While taxes and subsidies in competitive markets are inefficient in the absence of such externalities, they can now become efficiency enhancing when applied in the right way. Alternatively, we will see that there exist policies that involve the creation of new markets that can in turn cause externality-emitters to face the full costs of their actions. Our main example in this regard is the establishment of *pollution voucher markets*.

The fact that the establishment of new markets can, in some instances, represent a solution to the efficiency problem faced by markets under externalities then points to a deeper issue regarding externalities. In particular, while we often call the inefficiencies arising from the presence of externalities in a competitive market a *market failure*, we could similarly say that the existence of an externality is evidence of a *failure of markets to exist*. Put differently, externalities arise because important markets are "missing." Although it is not always technologically possible to establish such missing markets, understanding the root cause of inefficiencies arising from externalities can then help us think more creatively of nonmarket institutions that can address such inefficiencies.

In addition, we will see that the problem of *missing markets* is not confined to externalities. In Chapter 19, we turn to informational asymmetries that result in opportunities for the more informed parties in a market to "take advantage" of the less informed. When such informational asymmetries become sufficiently pronounced, entire markets might in fact cease to exist at all since the less informed are too skeptical to engage in trades with the more informed. The phenomenon that leads to such problems for markets is known as *adverse selection*, with insurance markets providing a good example. In such markets, the person seeking insurance might have more information about the likely risk he or she faces than the insurance company can observe, with the insurance company as a result not offering certain types of insurance contracts. Put differently, if insurance companies have reason to believe that they are recipients of an adverse selection of high cost customers, they may not be able to offer insurance packages that low cost customers are willing to buy.

The problem of informational asymmetries is not, however, confined to insurance markets. One important example involves labor markets and, in particular, the emergence of racial and gender discrimination in such markets. While such discrimination might exist under competition if "bigots" in an economy derive utility from discriminating, we will see that asymmetric information may cause even "non-bigots" to discriminate as they infer individual characteristics from average characteristics of populations. Understanding how asymmetric information can lead to

problems of missing markets and related problems of discrimination can then help us understand better how nonmarket institutions might aid in resolving problems created by asymmetric information. In some cases, we will see that market-like institutions might in fact emerge "spontaneously" to deal with the problem, and in other cases we will see how government policies might be able to play a role.

CHAPTER

16

Elasticities, Price-Distorting Policies, and Non-Price Rationing

We have demonstrated in the last few chapters how prices form in competitive markets.[1] Prices, we have argued, send important signals to all the relevant actors in an economy, allowing each individual actor to then choose how to behave in the market while ensuring that the market produces output at the lowest possible cost and channels it to those that value the output the most. In a world defined by scarcity, prices therefore represent one way of *rationing* scarce resources, a way of determining who gets to consume what, how much everyone works, how much consumption will occur now as opposed to in the future, and how much risk each individual faces.

We may not always like the way in which the competitive price system rations scarce goods in the world. Maybe we do not like the fact that, in an unregulated labor market, some individuals will be able to earn only very low wages, at least until they get more experience or acquire more skills or education. We may not like the fact that housing in some areas is so expensive as to preclude the poor from consuming it, or that innovations in agriculture are pushing aside the traditional small family farm. As a result, we often ask the government to tinker with the price system, to come up with ways of getting toward outcomes that we like better. Examples of this include minimum wage laws, milk price regulations, rent control, and a variety of other policies aimed at improving in some way on the market outcome.

In the end, there may be good reasons why people disagree on the wisdom of such policies. But much of the disagreement comes from not understanding sufficiently the economics behind markets and policy interventions, and to the extent to which this is the cause of differing opinions, the economist has a role in clarifying the trade-offs involved. The most fundamental of these trade-offs rests on an understanding of the fact that, in a world of scarcity, *something* will always lead to rationing of goods. Put differently, there will always be some mechanism that determines who gets what goods and who is left out. Market prices represent one such rationing mechanism, and when we add other institutions in attempts to improve on market mechanisms, we will explicitly or implicitly add other rationing mechanisms on top of it. As some economists have put it, there is no "free lunch," no magic wand that eliminates the problem of scarcity, at least not in the world we occupy.

The goal of this chapter is then to use some commonly talked about policies that aim to improve on market outcomes to illustrate how such policies "distort" prices and thus change the rationing of scarce goods in the world. This is done most easily within the "partial equilibrium" model of Chapters 13 and 14. As we will see in this and upcoming chapters, the

[1]This chapter is built on a basic understanding of demand and supply as treated in Chapter 13. It furthermore uses the ideas of consumer and producer surplus as developed in Chapter 14, with distinctions between marginal willingness to pay and demand assumed away (through quasilinearity).

magnitude of the various impacts of price distortions will depend on the responsiveness of consumers and producers to price changes, on the *elasticity* of their behavior. We have waited to introduce the concept of elasticity until now as we will now begin to see it in action.

With some of the policies we discuss, it is then indeed the case that many economists end up on one side of the debate because they are persuaded that the *unintended consequences* of well-intentioned policies outweigh the intended benefits. But the point here is not to argue for or against particular policies; rather, we will try to simply use the logic of our models to illustrate trade-offs that we should be aware of in these policy debates, and then everyone can decide for themselves whether what we have learned leads them to favor or oppose particular policies. And by identifying the "winners" and "losers" from such policies, we will find that we can get a sense of why democratic political processes will sometimes implement certain policies over others, even if an economic analysis of those policies suggests that alternative policies should dominate.

16A Interactions of Markets and Price-Distorting Policies

This chapter begins our analysis of policy in competitive markets with two general classes of policies: those that aim to lower prices for the benefit of consumers, and those that aim to raise prices for the benefit of producers. We will see that such policies give rise to deadweight losses that can be quite large, but they may also make some individuals in the economy better off while making others worse off. There are many real-world examples of such policies, some of which you will be asked to analyze in end-of-chapter exercises. Within the chapter itself, I will simply focus on providing a framework within which you can conduct policy analysis on your own.

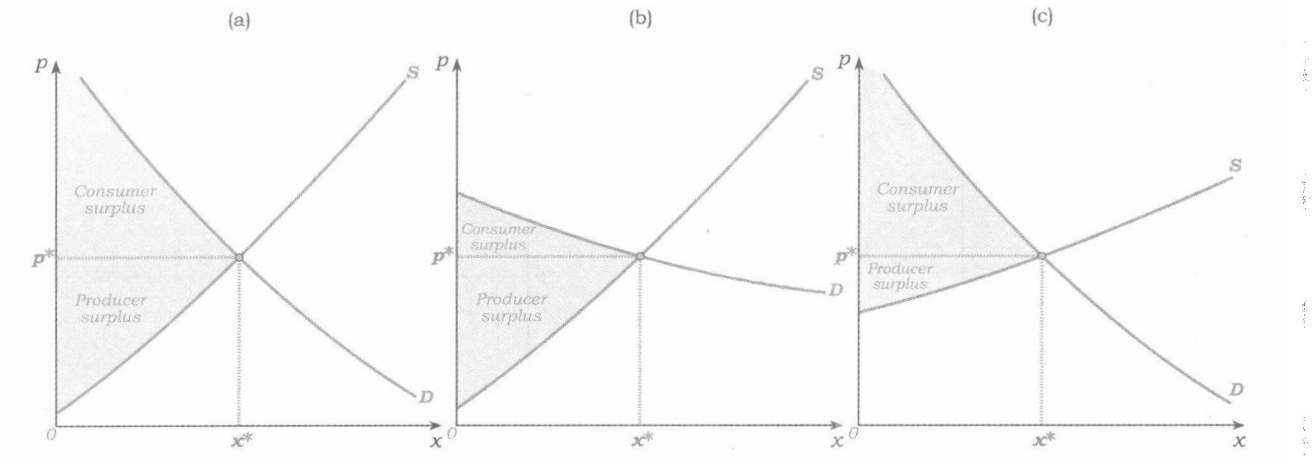
Before proceeding to these, however, I want to first revisit our picture of a competitive market equilibrium to illustrate how the benefits of market interactions are distributed by the market process between producers and consumers (or workers and employers). To keep the analysis as simple as possible, we will in this chapter focus on the special case where individual tastes are quasilinear in the good on which we are focusing. This will permit us for purposes of illustration to abstract away from the difference between marginal willingness to pay curves and demand curves and from general equilibrium considerations, and simply measure consumer and worker surpluses on output demand and labor supply curves. In the next chapter, we will then return to more general cases where we will have to be more careful as we measure consumer (and worker) surpluses.

16A.1 Elasticities and the Division of Surplus

Markets do more than just allocate scarce goods and services. They also, without anyone controlling the process so long as all economic agents are "small," determine how large a benefit from interacting in markets accrues to different economic agents.

Consider, for instance, the market demand and supply picture in Graph 16.1a which we developed in Chapter 14. Here we have the equilibrium price p^* emerging from the intersection of a demand and supply curve, and because we are assuming that tastes are quasilinear in the good x, we can interpret the demand curve as an aggregate marginal willingness to pay curve. The shaded areas representing consumer and producer surplus then represent the aggregate size of consumer and producer surplus that emerges in this market. Put differently, these areas represent how much of a benefit from the market interactions accrues to consumers and producers, or how total surplus in the market is divided among producers and consumers. Within each of these areas, there are of course some consumers and some producers who benefit relatively more; in particular, those consumers who value the good highly and those producers who can produce the good at very low cost.

Graph 16.1: Different Distributions of Consumer and Producer Surplus in a Market



Panel (a) of Graph 16.1 illustrates a case where it appears that the overall social benefits created in this market are divided pretty evenly between consumers and producers. But that's just because of the particular way we have drawn these curves. Panels (b) and (c) illustrate how it is equally plausible that benefits are distributed very differently when demand and supply curves have different shapes. In panel (b), most of the benefits accrue to producers because the demand (and marginal willingness to pay) curve is relatively shallow, while in panel (c) the opposite is true because the demand curve is steep relative to the supply curve.

Knowing what you do from previous chapters, how would the social benefits from market interactions be distributed between producers and consumers in a long-run competitive equilibrium in which all producers face the same costs?

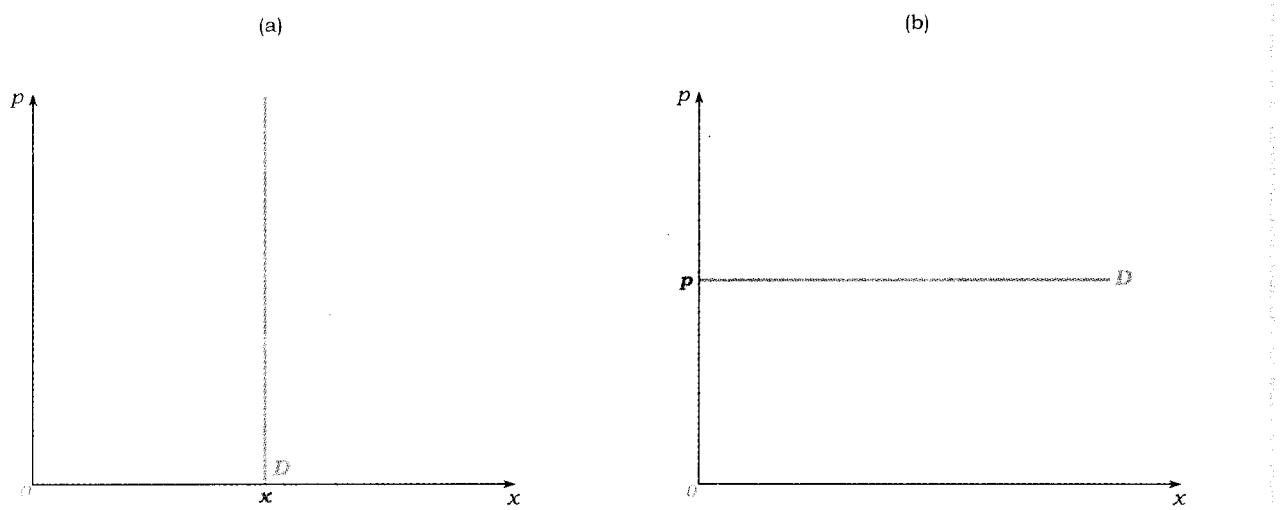
Exercise **16A.1**

At first glance, it would appear from Graph 16.1 that the relative division of society's surplus between consumers and producers depends on the relative slopes of demand and supply curves. This is correct, but economists have developed a somewhat better way of talking about this by using a concept known as "price elasticity."

The problem with focusing solely on slopes of such curves is that slopes depend on the units we use to measure quantities on the horizontal and vertical axes. Do we measure prices, for instance, in dollars or cents, in French francs or the British pound? If the x good represents beer, do we measure it in cans or in liters or in six-packs? As we change these units, we change the slopes without changing the fundamental underlying economic content of the curves. *Elasticities* get around this by converting changes in behavior from absolute changes to percentage changes.

16A.1.1 The Price Elasticity of Linear Demand Economists use the term "elasticity" to mean "responsiveness." My Econ 1 instructor would illustrate this quite graphically in his lecture by bringing into the lecture a pair of old and new underwear, with the old underwear having lost its "elasticity" and the new underwear being quite elastic. While the old underwear was no longer responsive to changes in waist size, the new underwear was quite responsive (or elastic). In economics, elasticity refers to responsiveness in behavior to changes in price

Graph 16.2: Perfectly Price Inelastic and Elastic Demand



(or some other economic variable) just as elasticity in my Econ 1 instructor's example refers to the responsiveness of waistbands to changes in stretch tensions.

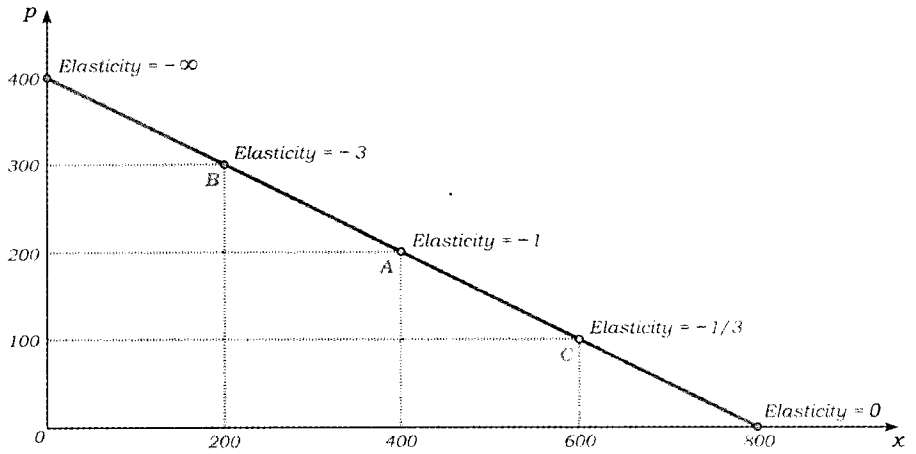
Consider first some very extreme linear demand curves in Graph 16.2. In panel (a), it does not matter what happens to the price of good x; the consumer will always buy exactly the same quantity. This is of course not an economic relationship that can persist for all levels of prices because it would imply that even as price goes to infinity the consumer would continue to purchase the same quantity of the good. Scarcity implies that eventually this demand curve must have a negative slope. But over the range of prices we have graphed, this consumer is extremely *unresponsive* to price changes, or we will say that the consumer's price elasticity of demand is zero and demand is *perfectly price inelastic*. In panel (b), on the other hand, even a miniscule increase in price from p will cause the consumer to no longer consume any of good x. Again, it can't be that this perfectly horizontal relationship between price and quantity persists forever because that would imply that the consumer is willing to buy an infinite amount of x at price p. Eventually, the demand curve must again have a negative slope. But over the range of quantity graphed in panel (b), this consumer is extremely responsive to increases in price. We will say that the consumer's price elasticity is minus infinity or his or her demand is *perfectly price elastic*.[2]

Exercise **16A.2** *True or False*: If an individual consumer's demand curve is perfectly inelastic, the good is borderline between regular inferior and Giffen.

Real demand curves are of course not this extreme, and the concept of price elasticity becomes a little more subtle along less extreme demand curves. Consider, for instance, the particular linear demand curve in Graph 16.3. With the units we are using in the graph, this demand

[2]When I teach the concept of price elasticity to my young children, I tell them a little trick to remember these extreme examples: You can remember that the demand curve in panel (a) is perfectly *I*nelastic by noticing that it represents the letter *I*, while you can remember that the demand curve in panel (b) is perfectly *E*lastic by noticing that it can be turned into a capital *E* by simply adding a horizontal line at the top of the graph.

Graph 16.3: Price Elasticity along a Linear Demand Curve



curve has a slope of −1/2 everywhere, indicating that whenever price goes up by $1, the quantity demanded falls by 2. But now suppose we asked: With a 1% change in price, how responsive is demand to a change in price?

Suppose first that price is currently $200, which implies consumption of 400 units (at point *A* in the graph). A 1% increase in price is equivalent to a $2 increase to $202, which would imply that the quantity demanded falls by 4 to 396. That is a 1% drop in quantity (from the original 400). Thus, when the price starts at 200, a 1% change in the price leads to a 1% change in the quantity demanded. If we had instead started at a price of $300 (point *B*), a 1% increase in the price would be equal to a $3 increase, which would lead to a drop in the quantity demanded from 200 to 194, or a 3% drop. Had we started at a price of $100, on the other hand, a 1% increase in price would be equivalent to a $1 increase leading to a drop in the quantity demanded from 600 to 598, or only 1/3% drop in quantity.

The *price elasticity of demand is defined as the percentage change in quantity resulting from a 1% change in price*. Thus, based on what we just calculated, the price elasticity of demand for the demand curve in Graph 16.3 is −1 at point *A*, −3 at point *B*, and −1/3 at point *C*. While the absolute response to a $1 price change is the same at all of these points, in each case leading to a 2 unit drop in quantity, the *percentage change* in the quantity demanded differs depending on where along the demand curve we are measuring it. Because we are measuring price elasticity in percentage changes, it is immune to any change in the units we use to measure either quantity or price.

The price in Graph 16.3 is measured in dollars. What would the demand curve look like if instead we measured price in terms of pennies? Can you recalculate price elasticity at 200, 400, and 600 units of output and demonstrate that you get the same answers we just derived?

Exercise **16A.3**

More generally, you can calculate approximate price elasticities for particular portions of demand curves whenever you are given at least two points on the demand curve. Suppose, for instance, that you did not know the full demand curve in Graph 16.3 but only knew that consumers demand 600 units of *x* when price is $100 (point *C*) and that they demand 200 units of *x*