APPENDIX TO PART 1

LEARNING OBJECTIVES (LO)

After working your way through this appendix you should be able to answer the following questions.

A1 **Why does scarcity imply the existence of trade-offs?**

A2 **What is the cost–benefit principle and how does it relate to the idea that people act rationally?**

A3 **How does the cost–benefit principle lead to improved decision making?**

A4 **How are prices and quantities for goods and services determined?**

A5 **What factors cause the prices and quantities of goods and services to change?**

A6 **What is an economic surplus?**

A7 **To what extent does the market mechanism provide an efficient allocation of goods and services?**

INTRODUCTION

Economics is the systematic study of how societies cope with the problem of scarcity—the reality that, although human wants are unlimited, there is only a finite amount of resources available to satisfy those wants. This appendix outlines some of the most important and useful insights that economists have evolved to understand how society copes with the scarcity problem. The material here is an important precursor to our study of macroeconomics in the rest of this book. This is because macroeconomics builds on these fundamental economic ideas.

Many of you will be reading this book as part of an introductory course in economics. These courses have become very popular in recent years, so much so that class sizes of 1500 are now common in many of our universities. As with most things, large class sizes have advantages and disadvantages. On the plus side, there are opportunities for you to interact with many more people in a large class, to exchange ideas about your work and, of course, to socialise. Also, large classes are usually taught by experienced lecturers, with proven track records of excellence in teaching. On the minus side, it is impossible in a large class to have the subject tailored to your own background and ability, allowing you to cover the material at just the right pace for you. Although the level of instruction you receive in a large class could well be high, your preference might be to study economics in a smaller class with a custom-made study design.

How then do university administrators decide on what class size to adopt? One important consideration is cost. Take an extreme example, one where you are the only student in a class; that is, the university provides you with your own personal economics course. The direct cost of providing this to you—most notably, the lecturer's salary and the expense of providing a classroom in which to meet—might easily top $100 000. Someone has to pay these costs. In private universities, a large share of the cost would be recovered directly from higher tuition fee payments; in public universities the burden would be split between higher tuition fee payments and higher tax payments. In either case, the course would be unaffordable for many, if not most, students.

With a larger class size, of course, the cost per student goes down. For example, in a class of 1000 students, the cost of an introductory economics course might come to as little as $100 per student. Compared to the custom-made course format, this would be dramatically more affordable.

In choosing what size introductory economics course to offer, then, university administrators confront a classic economic trade-off. In making the class larger, they preclude the design of individual, custom-made courses but, at the same time, they reduce costs and hence the tuition fees students must pay.

SECTION A: ECONOMICS AND THE MARKET

A.1 ECONOMICS: STUDYING CHOICE IN A WORLD OF SCARCITY

LEARNING OBJECTIVE A1

Economics
The study of how people make choices under conditions of scarcity, and of the results of those choices for society.

Core economic principles
The scarcity principle: Although we have boundless needs and wants, the resources available to us are limited. So having more of one good thing usually means having less of another.

Core economic principles
The cost–benefit principle: An individual (or a firm or a society) should take an action if, and only if, the extra benefits from taking the action are at least as great as the costs.

Even in rich societies like Australia, Singapore, New Zealand and the United States, scarcity is a fundamental fact of life. There is never enough time, money or energy to do everything we want to do or have everything we would like to have. Economics is the study of how people make choices under conditions of scarcity, and of the results of those choices for society.

In the class-size example just discussed, an **economics** student might prefer to be in a class of 20 rather than a class of 1000, everything else being equal. But other things, of course, are not equal. Students can enjoy the benefits of having smaller classes but only at the price of having less money for other activities. The student's choice inevitably will come down to the relative importance of competing activities.

That such trade-offs are widespread and important is one of the core principles of economics. We call it the **scarcity principle**, because the simple fact of scarcity makes trade-offs necessary.

Inherent in the idea of a trade-off is the fact that choice involves compromise between competing interests. Economists resolve such trade-offs by using cost–benefit analysis, which is based on the disarmingly simple principle that an action should be taken if, and only if, its benefits exceed its costs. We call this statement the **cost–benefit principle**, and it, too, is one of the core principles of economics.

With the cost–benefit principle in mind, let us think about our class-size question again. Imagine that classrooms come in only two sizes—100-seat lecture theatres and 20-seat classrooms—and that your university currently offers introductory economics courses to classes of 100 students. *Question*: Should administrators reduce the class size to 20 students? *Answer*: Reduce if, and only if, the value of this change outweighs its additional cost.

This rule sounds simple but to apply it we need some way to measure the relevant costs and benefits—a task that is often difficult in practice. If we make a few simplifying assumptions, however, we can see how the analysis might work. On the cost side, the primary expense of reducing class size from 100 to 20 is that we will now need five lecturers instead of just one. We will also need five smaller classrooms rather than a single big one, and this too may add slightly to the expense of the move. For the sake of discussion, suppose that the cost with a class size of 20 turns out to be $1000 per student more than the cost per student when the class size is 100. Should administrators switch to the smaller class size? If they apply the cost–benefit principle they will realise that the reduction in class size makes sense only if the value of attending the smaller class is at least $1000 per student greater than the value of attending the larger class.

Would you (or your family) be willing to pay an extra $1000 for a smaller economics class? If not, and if other students feel the same way, then sticking with the larger class size makes sense. But if you and others would be willing to pay the extra tuition, then reducing the class size to 20 makes good economic sense.

Notice that the 'best' class size, from an economic point of view, will generally not be the same as the 'best' size from the point of view of an educational psychologist. The difference arises because the economic definition of 'best' takes into account both the benefits and the costs of different class sizes. The psychologist ignores costs and looks only at the learning benefits of different class sizes.

A.1.1 APPLYING THE COST–BENEFIT PRINCIPLE

LEARNING OBJECTIVE A2

Rational person
Someone with well-defined goals who tries to fulfil those goals as best they can.

In studying choice under scarcity we usually begin with the premise that people are **rational**, which means that they have well-defined goals and try to fulfil them as best they can. The cost–benefit principle illustrated in the class-size example is a fundamental tool for the study of how rational people make choices.

As in the class-size example, often the only real difficulty in applying the cost–benefit rule is to come up with reasonable measures of the relevant benefits and costs. Only in rare instances will exact dollar measures be conveniently available. But the cost–benefit framework can lend structure to your thinking, even when no relevant market data are available.

To illustrate how we proceed in such cases, the following example asks you to decide whether to perform an action whose cost is described only in vague, qualitative terms.

SHOULD YOU WALK INTO TOWN TO SAVE $10 ON A $25 COMPUTER GAME?

A.1 EXAMPLE

Imagine you are about to buy a $25 computer game at the nearby university store, when a friend tells you that the same game is on sale at a city store for only $15. If the city store is a 30-minute walk away, where should you buy the game?

The cost–benefit principle tells us that you should buy it in the city if the benefit of doing so exceeds the cost. The benefit of taking any action is the dollar value of everything you gain by taking it. Here, the benefit of buying in the city is exactly $10, since that is the amount you will save on the purchase price of the game. The cost of taking any action is the dollar value of everything you give up by taking it. Here, the cost of buying in the city is the dollar value you assign to the time and trouble it takes to make the trip. But how do we estimate that dollar value?

One way is to perform the following hypothetical auction. Imagine that a stranger has offered to pay you to do an errand that involves the same walk into the city. If she offered you a payment of, say, $1000, would you accept? If so, we know that your cost of walking to the city and back must be less than $1000. Now imagine her offer being reduced in small increments until you finally refuse the last offer. For example, if you would agree to walk to the city and back for $9 but not for $8.99, then your cost of making the trip is $9. In this case you should buy the game in the city because the $10 you will save (your benefit) is greater than your $9 cost of making the trip.

But suppose, alternatively, that your cost of making the trip had been greater than $10. In that case your best bet would have been to buy the game from the nearby campus store. Confronted with this choice, different people may choose differently, depending on how costly they think it is to make the trip to the city. Although there is no uniquely correct choice, most people who are asked what they would do in this situation say they would buy the game in the city.

A.1.2 ECONOMIC SURPLUS

Suppose that in Example A.1 your 'cost' of making the trip to the city was $9. Compared to the alternative of buying the game at the campus store, buying it in the city resulted in an **economic surplus** of $1, the difference between the benefit of making the trip and its cost. In general, your goal as an economic decision maker is to choose those actions that generate the largest possible economic surplus. This means taking all actions that yield a positive total economic surplus, which is just another way of restating the cost–benefit principle.

Economic surplus
The gain that results from taking an action where the benefits outweigh the costs.

Note that the fact that your best choice was to buy the game in the city does not imply that you enjoy making the trip, any more than choosing a large class means that you prefer large classes to small ones. It simply means that the trip is less unpleasant than the prospect of paying $10 extra for the game. Once again, you have faced a trade-off—in this case the choice between a cheaper game and the free time gained by avoiding the trip.

A.1.3 OPPORTUNITY COST

Of course your mental auction could have produced a different outcome. Suppose, for example, that the time required for the trip is the only time you have left to study for a difficult exam the next day. Or suppose you are watching one of your favourite movies on television, or that you are tired and would love a short nap. In such cases, we say that the **opportunity cost** of making the trip—that is, the value of what you must sacrifice to walk to the city and back—is high, and you are more likely to decide against making the trip.

Opportunity cost
The value of the next-best alternative to taking a particular action.

In this example, if watching the last hour of the television movie is the most valuable opportunity that conflicts with the trip to the city, the opportunity cost of making the trip is the dollar value you place on pursuing that opportunity—that is, the largest amount you would be willing to pay to avoid missing the end of the movie. Note that the opportunity cost of making the trip is not the combined value of all possible activities you could have pursued, but only the value of your best alternative—the one you would have chosen had you not made the trip.

The notion of opportunity cost is all-pervasive in economics. Any time a scarce resource is used—for example, a car manufacturer using a rare lightweight metal to make a more fuel-efficient passenger car, or an individual choosing to purchase a new plasma television—the question of what else could those resources have been used for must be faced. Would the metal have been better employed in making commercial vehicles more fuel efficient, or could the money spent on the plasma television have been used for an overseas holiday?

Throughout the text we will pose exercises like the one that follows. You will find that pausing to answer them will help you to master key concepts in economics. Because doing these exercises is not very costly (indeed, many students report that they are actually fun), the cost–benefit principle indicates that it is well worth your while to do them.

You would again save $10 by buying the game in the city rather than at the campus store, but your cost of making the trip is now $12, not $9. How much economic surplus would you get from buying the game in the city? Where should you buy it?

A.1.4 THE ROLE OF ECONOMIC MODELS

Economists use the cost–benefit principle as an abstract model of how an idealised rational individual would choose between competing alternatives. (By 'abstract model' we mean a simplified description that captures the essential elements of a situation and allows us to analyse them in a logical way.) A computer model of a complex phenomenon like climate change, which must ignore many details and include only the major forces at work, is an example of an abstract model.

Non-economists are sometimes harshly critical of the economist's cost–benefit model, on the grounds that people in the real world never conduct hypothetical mental auctions before deciding whether to make trips to the city. But this criticism betrays a fundamental misunderstanding of how abstract models can help to explain and predict human behaviour. Economists know perfectly well that people do not conduct hypothetical mental auctions when they make simple decisions. All the cost–benefit principle really says is that a rational decision is one that is explicitly or implicitly based on a weighing of costs and benefits.

Most of us make sensible decisions most of the time, without being consciously aware that we are weighing costs and benefits, just as most people ride a bike without being consciously aware of what keeps them from falling. Through trial and error, we gradually learn what kinds of choices tend to work best in different contexts, just as bicycle riders internalise the relevant laws of physics, usually without being conscious of them.

Even so, learning the explicit principles of cost–benefit analysis can help us make better decisions, just as knowing about physics can help in learning to ride a bicycle. For instance, when a young economist was teaching his oldest son to ride a bike he followed the time-honoured tradition of running alongside the bike and holding onto his son, then giving him a push and hoping for the best. After several hours and painfully skinned elbows and knees his son finally got it. A year later, someone pointed out that the trick to riding a bike is to turn slightly in whichever direction the bike is leaning. Of course! The economist passed this information along to his second son, who learned to ride almost instantly. Just as knowing a little physics can help you learn to ride a bike, so knowing a little economics can help you make better decisions.

REVIEW

Economics is the study of how societies respond to the problem of scarcity. The presence of scarcity means that some criterion must be used to make decisions about the way scarce resources are used. Economists analyse these choices through a comparison of the costs and benefits of any action or decision.

The economic surplus that results from any particular decision is a measure of the difference between the costs and benefits associated with that decision. A positive economic surplus indicates that the decision should proceed.

We assume that economic decisions are made on the basis of a rational comparison of the costs and benefits. This means that an action will be taken only if it appears to be in people's best interest according to a comparison of the associated costs and benefits. The relevant concept of cost used by economists is opportunity cost—an evaluation of the opportunities forgone by taking a decision is the best measure of that decision's costs.

Economic models are stylised representations of reality; they are not meant to give a complete picture of the real world with all of its complexities. Instead, the role of models in economics is to enable complicated real-world problems to be broken down into simple analytical frameworks where the factors that are most important in any economic scenario can be isolated and studied.

IMPLICATIONS OF RATIONALITY FOR GOOD DECISION MAKING

A.2

LEARNING OBJECTIVE A3

(The examples in this section are inspired by the pioneering research of Daniel Kahneman and the late Amos Tversky. Kahneman was awarded the 2002 Nobel Prize in economics for his efforts to integrate insights from psychology into economics.)

Rational people will apply the cost–benefit principle most of the time, although probably in an intuitive and approximate way, rather than through explicit and precise calculation. Knowing that rational people tend to compare costs and benefits enables economists to predict their likely behaviour.

We will now take you through four examples that show how the cost–benefit principle proves helpful in guiding people's decision making. The examples demonstrate that people are not born with an infallible instinct for weighing the relevant costs and benefits of many daily decisions. However, one of the rewards of studying economics is that it can improve the quality of your decisions.

RATIONALITY MEANS TO MEASURE COSTS AND BENEFITS AS ABSOLUTE DOLLAR AMOUNTS RATHER THAN AS PROPORTIONS

A.2 EXAMPLE

You are about to buy a $2020 laptop computer at the nearby university store when a friend tells you that the same computer is on sale at a city store for only $2010. If the city store is half an hour's walk away, where should you buy the computer?

Assuming that the laptop is light enough to carry without effort, the structure of this example is exactly the same as that of Example A.1 (p. 4)—the only difference being that the price of the laptop is dramatically higher than the price of the computer game. As before, the benefit of buying in the city is the dollar amount you will save, namely, $10. And, since it is exactly the same trip, its cost must also be the same as before. So, if you are perfectly rational you should make the same decision in both cases. Yet when people are asked what they would do in these situations the overwhelming majority say they would walk to the city to buy the game but would buy the laptop at the university store. When asked to explain, most of them say something like, 'The trip was worth it for the game because you save 40 per cent, but not worth it for the laptop because you save only $10 out of $2020.'

This is faulty reasoning. The benefit of the trip to the city is not the proportion you save on the original price. Rather, it is the absolute dollar amount you save. Since the benefit of walking to the city to buy the laptop is $10—exactly the same as for the computer game—and since the cost of the trip must also be the same in both cases, the economic surplus from making both trips must be exactly the same. And that means that a rational decision maker would make the same decision in both cases. Yet, as noted, most people choose differently.

Which is more valuable, saving $100 on a $2000 plane ticket to Tokyo or saving $90 on a $200 plane ticket to Sydney?

A.2 EXERCISE

The pattern of faulty reasoning in the decision just discussed is one of several decision pitfalls to which people are often prone. In the discussion that follows we will identify three additional decision pitfalls. In some cases people ignore costs or benefits that they ought to take into account, while on other occasions they are influenced by costs or benefits that are irrelevant. In all of these cases thinking rationally would result in better decisions being made.

RATIONALITY MEANS TAKING ACCOUNT OF OPPORTUNITY COSTS

A.3 EXAMPLE

Sherlock Holmes, Arthur Conan Doyle's legendary detective, was successful because he saw details that most others overlooked. In *Silver Blaze* Holmes is called on to investigate the theft of an expensive racehorse from its stable. A Scotland Yard inspector assigned to the case asks Holmes whether some particular aspect of the crime requires further study. 'Yes,' Holmes replies, and describes 'the curious incident of the dog in the night time'. 'The dog did nothing in the night time,' responds the puzzled inspector. But, as Holmes realised, that

continued ↪

↵ Example A.3 *continued*

was precisely the problem. The watchdog's failure to bark when Silver Blaze was stolen meant that the watchdog knew the thief. This clue ultimately proved the key to unravelling the mystery.

Just as we often do not notice when a dog fails to bark, so many of us tend to overlook the implicit value of activities that fail to happen. As discussed earlier, however, intelligent decisions require taking the value of forgone opportunities properly into account.

The opportunity cost of an activity, once again, is the value of the next-best alternative that must be forgone in order to engage in that activity. If buying a computer game in the city means not watching the last hour of a movie, then the value to you of watching the end of that movie is an opportunity cost of the trip. Many people make bad decisions because they tend to ignore the value of such forgone opportunities. To avoid overlooking opportunity costs, economists often translate questions like 'Should I walk into the city?' into ones like 'Should I walk into the city or watch the end of the movie?'.

Should you use your frequent-flyer points to fly to Surfers Paradise for the mid-semester break?

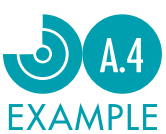
With the break only a week away, you are still undecided about whether to go to Surfers Paradise with a group of classmates at the University of Melbourne. The round-trip airfare is $500, but you have frequent-flyer points you could use to pay for the trip. All other relevant costs for the holiday week at the beach total exactly $1000. The most you would be willing to pay for the Surfers Paradise holiday is $1350. That amount is your benefit of taking the trip. Your only alternative use for your frequent-flyer points is for your plane trip to Adelaide the weekend after the mid-semester break to attend your brother's wedding. (Your points expire shortly thereafter.) If the round-trip airfare to Adelaide is $400, should you use your frequent-flyer points to fly to Surfers Paradise for the mid-semester break?

The cost–benefit principle tells us that you should go to Surfers Paradise if the benefits of the trip exceed its costs. If not for the complication of the frequent-flyer points, solving this problem would be a straightforward matter of comparing your benefit from the week at the beach to the sum of all relevant costs. And since your airfare and other costs would add up to $1500, or $150 more than your benefit from the trip, you would not go to Surfers Paradise.

But what about the possibility of using your frequent-flyer points to make the trip? Using your points for that purpose might make the flight to Surfers Paradise seem free, suggesting you would reap an economic surplus of $350 by making the trip. But doing so would also mean you would have to pay $400 for your airfare to Adelaide. So the opportunity cost of using your coupon to go to Surfers Paradise is really $400. If you use it for that purpose, the trip still ends up being a loser, because the cost of the holiday, $1400, exceeds the benefit by $50. In cases like these you are much more likely to decide sensibly if you ask yourself, 'Should I use my frequent-flyer points for this trip or save it for an upcoming trip?'.

We cannot emphasise strongly enough that the key to using the concept of opportunity cost correctly lies in recognising precisely what taking a given action prevents us from doing. The following exercise illustrates this point by modifying the details of Example A.3 slightly.

This is the same as Example A.3, except that now your frequent-flyer points expire in a week, so your only chance to use them will be for the Surfers Paradise trip. Should you use them?



RATIONALITY MEANS THAT SUNK COSTS ARE IGNORED

The opportunity cost pitfall is one in which people ignore costs they ought to take into account.

In another common pitfall the reverse is true: people are influenced by costs they ought to ignore. The only costs that should influence a decision about whether to take an action are those that we can avoid by not taking the action. As a practical matter, however, many decision makers appear to be influenced by **sunk costs**—costs that are beyond recovery at the moment a decision is made. For example, money spent on a non-transferable, non-refundable airline ticket is a sunk cost.

Because sunk costs must be borne whether or not an action is taken, they are irrelevant to the decision of whether to take the action. The sunk-cost pitfall (the mistake of being influenced by sunk costs) is illustrated clearly in the following example.

Sunk cost
A cost that, once incurred, cannot be recouped, even if the proposed action no longer takes place.

How much should you eat at an all-you-can-eat restaurant?

Sangam, an Indian restaurant in Melbourne, offers an all-you-can-eat lunch buffet for $15. Customers pay $15 at the door, and no matter how many times the customers refill their plates, there is no additional charge. One day, as a goodwill gesture, the owner of the restaurant tells 20 randomly selected guests that their lunch is on the house. The remaining guests pay the usual price. If all diners are rational, will there be any difference in the average quantity of food consumed by people in these two groups?

Having eaten their first helping, diners in each group confront the following question: 'Should I go back for another helping?'. For rational diners, if the benefit of doing so exceeds the cost, the answer is yes; otherwise it is no. Note that at the moment of decision about a second helping, the $15 charge for the lunch is a sunk cost. Those who paid it have no way to recover it. Thus, for both groups the (extra) cost of another helping is exactly zero. And since the people who received the free lunch were chosen at random there is no reason to suppose that their appetites or incomes are different from those of other diners. The benefit of another helping thus should be the same, on average, for people in both groups. And since their respective costs and benefits of an additional helping are the same, the two groups should eat the same number of helpings, on average.

Psychologists and economists have experimental evidence, however, that people in such groups do not eat similar amounts (see, for example, Thaler 1980). In particular, those for whom the luncheon charge is not waived tend to eat substantially more than those for whom the charge is waived. People in the former group seem somehow determined to 'get their money's worth'. Their implicit goal is apparently to minimise the **average cost** per bite of the food they eat. Yet minimising average cost is not a particularly sensible objective. It brings to mind the man who drove his car on the highway at night, even though he had nowhere to go, because he wanted to boost his average fuel economy. The irony is that diners who are determined to get their money's worth usually end up eating too much, as evidenced later by their regrets about having gone back for their last helpings.

Average cost
The total cost of undertaking n units of any activity divided by n.

The fact that the cost–benefit criterion failed the test of prediction in this example does nothing to invalidate its advice about what people should do. If you are letting sunk costs influence your decisions you can do better by changing your behaviour.

RATIONALITY MEANS MAKING A DISTINCTION BETWEEN AVERAGE AND MARGINAL COSTS

A.5 EXAMPLE

Often we are confronted with the choice of whether or not to engage in an activity (for example, whether or not to shop in the city). But in many situations the issue is not whether to pursue the activity at all, but rather the extent to which it should be pursued. We can apply the cost–benefit principle in such situations by repeatedly asking the question, 'Should I increase the level at which I am currently pursuing the activity?'.

In attempting to answer this question the focus should always be on the benefit and cost of an additional unit of activity. To emphasise this focus economists refer to the cost of an additional unit of activity as the **marginal cost** of the activity. Similarly, the benefit of an additional unit of the activity is the **marginal benefit** of the activity.

Marginal cost
The increase in costs associated with a small increase in the level of some activity.

Marginal benefit
The increase in benefits associated with a small increase in the level of some activity.

When the problem is to discover the proper level at which to pursue an activity, the cost–benefit rule is to keep increasing the level as long as marginal benefit of the activity exceeds its marginal cost. As the following example illustrates, however, people often fail to apply this rule correctly.

Should the National Aeronautics and Space Administration (NASA) expand its space shuttle program from four launches per year to five?

Professor Kösten Banifoot, a prominent supporter of NASA's space shuttle program, estimated that the gains from the program are currently US $24 billion per year (an average of $6 billion per launch)

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↵ Example A.5 *continued*

and that its costs are currently $20 billion per year (an average of $5 billion per launch). On the basis of these estimates Professor Banifoot testified before the United States Congress that NASA should definitely expand its space shuttle program. Should Congress follow his advice?

Average benefit The total benefit of undertaking *n* units of an activity divided by *n*.

To discover whether expanding the program makes economic sense we must compare the marginal cost of a launch to its marginal benefit. The professor's estimates, however, tell us only the average cost and **average benefit** of the program—which are, respectively, the total cost of the program divided by the number of launches and the total benefit divided by the number of launches. Knowing the average benefit and average cost per launch for all shuttles launched thus far is simply not useful for deciding whether to expand the program. Of course, the average cost of the launches undertaken so far might be the same as the cost of adding another launch. But it might also be either higher or lower than the marginal cost of a launch. The same statement holds true with regard to average and marginal benefits.

Suppose, for the sake of discussion, that the benefit of an additional launch is in fact the same as the average benefit per launch thus far: $6 billion. Should NASA add another launch? Not if the cost of adding the fifth launch would be more than $6 billion. The fact that the average cost per launch is only $5 billion simply does not tell us anything about the marginal cost of the fifth launch.

Suppose, for example, that the relationship between the number of shuttles launched and the total cost of the program is as described in Table A.1. The average cost per launch (third column) when there are four launches would then be $20 billion/4 = $5 billion per launch, just as Professor Banifoot testified. But note in the second column of the table that adding a fifth launch would raise costs from $20 billion to $32 billion, making the marginal cost of the fifth launch $12 billion. So, if the benefit of an additional launch is $6 billion, increasing the number of launches from four to five would make absolutely no economic sense.

The following illustrates how to apply the cost–benefit principle correctly—in this case to decide how many space shuttles NASA should launch.

We know that the benefit of each launch is estimated to be $6 billion, and the total cost of the program again depends on the number of launches in the manner shown in Table A.1.

Table A.1 How total cost varies with the number of launches

NUMBER OF LAUNCHES	TOTAL COST ($ BILLION)	AVERAGE COST ($ BILLION/LAUNCH)
0	0	0
1	3	3
2	7	3.5
3	12	4
4	20	5
5	32	6.4

In deciding how many shuttles to launch, the rule NASA should use is to continue to launch shuttles as long as the marginal benefit of the program exceeds its marginal cost. In this example the marginal benefit is constant at $6 billion per launch, regardless of the number of shuttles launched. NASA should thus keep launching shuttles as long as the marginal cost per launch is less than or equal to $6 billion.

Applying the definition of marginal cost to the total cost entries in the second column of Table A.1 yields the marginal cost values in the third column of Table A.2. (Because marginal cost is the change in total cost that results when we change the number of launches by one, we place each marginal cost entry midway between the rows showing the corresponding total cost entries.) Thus, for example, the marginal cost of increasing the number of launches from one to two is $4 billion, the difference between the $7 billion total cost of two launches and the $3 billion total cost of one launch.

As we see from a comparison of the $6 billion marginal benefit per launch with the marginal cost entries in the third column of Table A.2, the first three launches satisfy the cost–benefit test but the fourth and fifth launches do not. NASA should thus launch three space shuttles.

Table A.2 How marginal cost varies with the number of launches

NUMBER OF LAUNCHES	TOTAL COST ($ BILLION)	MARGINAL COST ($ BILLION/LAUNCH)
0	0	0
1	3	3
2	7	4
3	12	5
4	20	8
5	32	12

If the marginal benefit of each launch had been not $6 billion but $9 billion, how many shuttles should NASA have launched?

A.4 EXERCISE

The cost–benefit framework emphasises that the only relevant costs and benefits when deciding whether to pursue an activity further are marginal costs and benefits—measures that correspond to the increment of activity under consideration. In many contexts, however, people seem more inclined to compare the average cost and benefit of the activity. As Example A.5 (p. 9) made clear, increasing the level of an activity may not be justified, even though its average benefit at the current level is significantly greater than its average cost.

The preceding examples make the point that people sometimes choose irrationally. We must stress that our purpose in discussing these examples is not to suggest that people generally make irrational choices. On the contrary, most people appear to choose sensibly most of the time, especially when their decisions are important or familiar ones. The economist's focus on rational choice thus offers not only useful advice about making better decisions but also a basis for predicting and explaining human behaviour.

What does it mean, then, to 'think like an economist'? It means to take full consideration of the *relevant* costs and benefits associated with the taking of an action, and to proceed with that action only if the benefits outweigh the costs. As the various 'pitfalls in decision making' outlined in this section show, it is not uncommon for decision making to proceed that produces results inconsistent with the process of thinking as an economist. Hopefully we have convinced you that, in these cases, the act of thinking as an economist would have resulted in better decisions being made.

SUPPLY AND DEMAND

A.3

LEARNING OBJECTIVE A4

We have now established some important concepts that provide the foundation for thinking as an economist. In this next section we investigate the most significant application of these concepts, the analytical tool of supply and demand. This is one of the most enduring contributions made by economists to our understanding of human society. The principles embodied by supply and demand analysis are widely used in all branches of economics, be it microeconomics or, more importantly for our purposes, macroeconomics. Without a solid grounding in supply and demand analysis much of economics will remain a mystery—it is the key, central concept of our discipline.

A.3.1 WHAT, HOW AND FOR WHOM? CENTRAL PLANNING VERSUS THE MARKET

No city, state or society—regardless of how it is organised—can escape the need to answer certain basic economic questions. For example, how much of our limited time and other resources should we devote to building housing, how much to the production of food and how much to providing other goods and services? What techniques should we use to produce each good? Who should be assigned to each specific task? And how should the resulting goods and services be distributed among people?

In the thousands of different societies for which records are available issues like these have been decided in essentially one of two ways. One approach is for all economic decisions to be made centrally, by an individual or

small number of individuals on behalf of a larger group. For example, throughout history, in many agrarian societies families or other small groups consumed only those goods and services that they produced for themselves, and a single clan or family leader made most of the important production and distribution decisions. On an immensely larger scale, the economic organisation of the former Soviet Union (and other communist countries) was also largely centralised. In centrally planned communist nations a central bureaucratic committee established production targets for the country's farms and factories, developed a master plan for how to achieve the targets (including detailed instructions concerning who was to produce what) and set up guidelines for the distribution and use of the goods and services produced.

Neither form of centralised economic organisation is much in evidence today. When implemented on a small scale, as in a self-sufficient family enterprise, centralised decision making is certainly feasible. However, with the fall of the Soviet Union and its satellite nations in the late 1980s there are few communist economies left in the world.

At the beginning of the twenty-first century we are therefore left, for the most part, with the second major form of economic system, one in which production and distribution decisions are left to individuals interacting in private markets. In the capitalist, or free-market economies, people decide for themselves which careers to pursue and which products to produce or buy. In fact, there are no pure free-market economies today. Modern industrial countries are more properly described as 'mixed economies', meaning that goods and services are allocated by a combination of free markets, regulation and other forms of collective control. Still, it makes sense to refer to such systems as free-market economies because people are for the most part free to start businesses, to shut them down or to sell them. And, within broad limits, the distribution of goods and services is determined by individual preferences backed by individual purchasing power, which in most cases comes from the income people earn in the labour market.

In country after country, markets have replaced centralised control for the simple reason that they tend to assign production tasks and consumption benefits much more effectively. The popular press, and the conventional wisdom, often asserts that economists disagree about important issues. (As someone once quipped, 'If you lay all the economists in the world end to end, they still wouldn't reach a conclusion.') The fact is, however, that there is overwhelming agreement among economists about a broad range of issues, with the great majority accepting the efficacy of markets as means for allocating society's scarce resources.

A.3.2 BUYERS AND SELLERS IN MARKETS

Beginning with some simple concepts and definitions, we will explore how the interactions between buyers and sellers in markets determine the prices and quantities of the various goods and services traded in those markets. We begin by defining a **market**: the market for any good consists of all the buyers and sellers of that good. So, for example, the market for pizza on a given day in a given place is just the set of people (or other economic actors, for example, firms) potentially able to buy or sell pizza at that time and location.

Market
The bringing together of buyers and sellers of a commodity for the purpose of mutually beneficial exchange.

In the market for pizza, sellers comprise the individuals and companies that either do or might, under the right circumstances, sell pizza. Similarly, buyers in this market include all individuals who either buy or might buy pizza.

In most parts of the country a decent pizza—or some other life-sustaining meal—can still be had for less than $20. Where does the market price of pizza come from? Looking beyond pizza to the vast array of other goods that are bought and sold every day, we may ask, 'Why are some goods cheap and others expensive?'. Aristotle had no idea. Nor did Plato, or Copernicus, or Newton. On reflection, it is astonishing that, for almost the entire span of human history, not even the most intelligent and creative minds on earth had any real inkling of how to answer that seemingly simple question. Even Adam Smith, whose great work, *The wealth of nations* (1776), is considered the first systematic treatment of the operation of markets, suffered confusion on this issue.

Smith and other early economists (including Karl Marx) thought that the market price of a good was determined by its cost of production. But, although costs surely do affect prices, they cannot explain why one of Pablo Picasso's paintings sells for so much more than one of Jackson Pollock's.

Stanley Jevons and other nineteenth-century economists tried to explain price by focusing on the value people derived from consuming different goods and services. It certainly seems plausible that people will pay a lot for a good they value highly. Yet willingness to pay cannot be the whole story, either. Deprive a person in the desert of water, for example, and they will be dead in a matter of hours, and yet tap water sells for less than a cent a litre. By contrast, human beings can get along perfectly well without gold, and yet gold sells for more than $250 a gram.

Cost of production? Value to the user? Which is it? The answer, which seems obvious to today's economists, is that both matter. Writing in the late nineteenth century, the British economist Alfred Marshall was among the first to show clearly how costs and value interact to determine both the prevailing market price for a good and the amount of it that is bought and sold. Our task in the pages ahead will be to explore Marshall's insights and gain some practice in applying them. As a first step, we introduce the two main components of Marshall's path-breaking analysis: the demand curve and the supply curve.

A.3.3 THE DEMAND CURVE

In the market for pizza, the **demand curve** for pizza is a simple schedule or graph that tells us how many slices people would be willing to buy at different prices. By convention, economists usually put price on the vertical axis of the demand curve and quantity on the horizontal axis.

Demand curve
A representation of the amount of a particular good or service demanded by consumers at each possible price.

A fundamental property of the demand curve is that it is downward sloping with regard to price. For example, the demand curve for pizza tells us that as the price of pizza falls buyers will buy more slices. Thus, the daily demand curve for pizza in Hobart on a given day might look like the curve seen in Figure A.1 (p. 12). (Although economists usually refer to demand and supply 'curves', we often draw them as straight lines in examples.)

The demand curve in Figure A.1 tells us that when the price of pizza is low—say, $2 per slice—buyers will want to buy 16 000 slices per day, whereas they will want to buy only 12 000 slices at a price of $3 and only 8000 at a price of $4. The demand curve for pizza—as for any other good—slopes downward for many reasons. Some of these reasons have to do with the individual consumer's reactions to price changes. Thus, as pizza becomes more expensive a consumer may switch to chicken sandwiches, hamburgers or other foods that substitute for pizza. This is called the **substitution effect** of a price change. In addition, a price increase reduces the quantity demanded because it reduces purchasing power: a consumer simply cannot afford to buy as many slices of pizza at higher prices as at lower prices. This is called the **income effect** of a price change.

Substitution effect
The change in demand for a good or service, caused by a change in price, that is attributable to the good or service being more or less expensive than other commodities.

Income effect
The change in demand for a good or service, caused by a change in price, that is attributable to the effect of that price change on the real purchasing power of consumers' incomes.

Another reason that the demand curve slopes downward is that consumers differ in terms of how much they are willing to pay for the good. The cost–benefit principle tells us that a given person will buy the good if the benefit they expect to receive from it exceeds its cost. The benefit is the **buyer's reservation price**, the highest dollar amount they would be willing to pay for the good. The cost of the good is the actual *amount* that the buyer actually must pay, which is the market price of the good. In most markets different buyers have different reservation prices. Thus, when the good sells for a high price, it will satisfy the cost–benefit test for fewer buyers than when it sells for a lower price.

Buyer's reservation price
The largest dollar amount the buyer would be willing to pay for a good.

To put this same point another way, the fact that the demand curve for a good is downward sloping reflects the fact that the reservation price of the marginal buyer declines as the quantity of the good bought increases. Here, the marginal buyer is the person who purchases the last unit of the good that is sold. If buyers are currently purchasing 12 000 slices of pizza a day in Figure A.1, for example, the reservation price for the buyer of the 12 000th slice must be $3. (If someone had been willing to pay more than that, the quantity demanded at a price of $3 would have been more than 12 000 to begin with.) By similar reasoning, when the quantity sold is 16 000 slices per day, the marginal buyer's reservation price must be only $2.

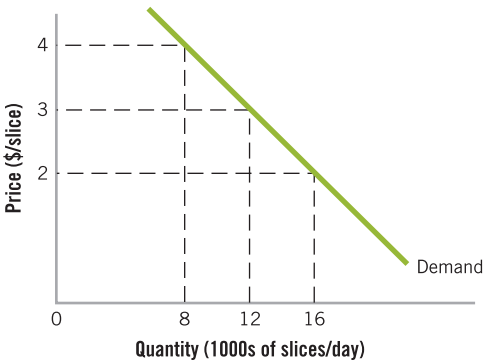


Figure A.1 **The daily demand curve for pizza in Hobart** The demand curve for any good is a downward-sloping function of its price.

We defined the demand curve for any good as a schedule telling how much of it consumers wish to purchase at various prices. This is called the *horizontal interpretation* of the demand curve. Using the horizontal interpretation, we start with price on the vertical axis and read the corresponding quantity demanded on the horizontal axis. Thus, at a price of $4 per slice, the demand curve in Figure A.1 tells us that the quantity of pizza demanded will be 8000 slices per day.

The demand curve can also be interpreted in a second way, which is to start with quantity on the horizontal axis and then read the marginal buyer's reservation price on the vertical axis. Thus, when the quantity of pizza sold is 8000 slices per day, the demand curve in Figure A.1 tells us that the marginal buyer's reservation price is $4 per slice. This second way of reading the demand curve is called the *vertical interpretation*.

A.5 EXERCISE

In Figure A.1 what is the marginal buyer's reservation price when the quantity of pizza sold is 10 000 slices per day? For the same demand curve, what will be the quantity of pizza demanded at a price of $2.50 per slice?

A.3.4 THE SUPPLY CURVE

Supply curve A representation of the amount of a particular good or service supplied by firms at each possible price.

In the market for pizza, the **supply curve** is a simple schedule or graph that tells us, for each possible price, the total number of slices that all pizza vendors would be willing to sell at that price. What does the supply curve of pizza look like? The answer to this question is based on the logical assumption that suppliers should be willing to sell additional slices as long as the price they receive is sufficient to cover their opportunity costs of supplying them. Thus, if what someone could earn by selling a slice of pizza is insufficient to compensate for what they could have earned if they had spent their time and invested their money in some other way, they will not sell that slice. Otherwise, they will.

Core economic principles
The low-hanging-fruit principle (also called the principle of increasing opportunity cost): In expanding the production of any good or service, first employ those resources with the lowest opportunity cost, and only afterwards turn to resources with higher opportunity costs.

Just as buyers differ with respect to the amounts they are willing to pay for pizza, so sellers also differ with respect to their opportunity costs of supplying pizza. For those with limited education and work experience, the opportunity cost of selling pizza is relatively low (because such individuals typically do not have a lot of high-paying alternatives). For others, the opportunity cost of selling pizza is of moderate value, and for still others—like rock stars and professional athletes—it is prohibitively high. In part, because of these differences in opportunity cost between people, the daily supply curve of pizza will be upward sloping with respect to price. As an illustration see Figure A.2, which shows a hypothetical supply curve for pizza in the Hobart market on a given day.

The fact that the supply curve slopes upwards may be seen as a consequence of the **low-hanging-fruit principle**. This principle tells us that as we expand the production of pizza we turn first to those whose opportunity costs of producing pizza are lowest, and only then to others with higher opportunity costs.

Like the demand curve, the supply curve can be interpreted either horizontally or vertically. Under the horizontal interpretation, we begin with a price then go over to the supply curve to read the quantity that sellers wish to sell at that price on the horizontal axis. For instance, at a price of $2 per slice sellers in Figure A.2 wish to sell 8000 slices per day.

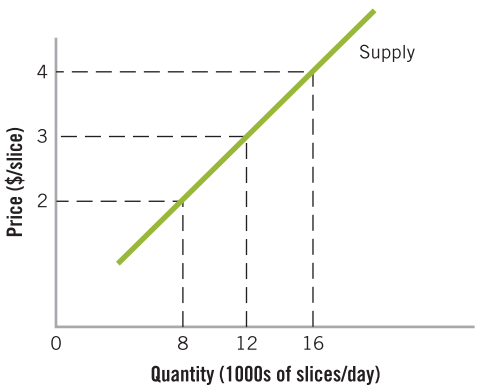


Figure A.2 **The daily supply curve for pizza in Hobart** At higher prices sellers generally offer more units for sale.

Under the vertical interpretation, we begin with a quantity then go up to the supply curve to read the corresponding marginal cost on the vertical axis. Thus, if sellers in Figure A.2 are currently supplying 12 000 slices per day the opportunity cost of the marginal seller is $3 per slice. In other words the supply curve tells us that the marginal cost of producing the 12 000th slice of pizza is $3. (If someone could produce a 12 001st slice for less than $3, they would have an incentive to supply it, so the quantity of pizza supplied at $3 per slice would not have been 12 000 slices per day to begin with.) By similar reasoning, when the quantity of pizza supplied is 16 000 slices per day, the marginal cost of producing another slice must be $4. The **seller's reservation price** for selling an additional unit of a good is their marginal cost of producing that good. It is the smallest dollar amount for which they would not be financially worse off if they sold an additional unit.

Seller's reservation price
The smallest dollar amount for which a seller would be willing to sell an additional unit, generally equal to marginal cost.

In Figure A.2 what is the marginal cost of a slice of pizza when the quantity of pizza sold is 10 000 slices per day? For the same supply curve, what will be the quantity of pizza supplied at a price of $3.50 per slice?

A.6 EXERCISE

A.3.5 MARKET EQUILIBRIUM

The concept of **equilibrium** is employed in both the physical and social sciences, and it is of central importance in economic analysis. In general, a system is in equilibrium when all forces at work within the system are cancelled by others, resulting in a stable, balanced or unchanging situation. In physics, for example, a ball hanging from a spring is said to be in equilibrium when the spring has stretched sufficiently that the upward force it exerts on the ball is exactly counterbalanced by the downward force of gravity. In economics, a market is said to be in equilibrium when no participant in the market has any reason to alter their behaviour, so that there is no tendency for production or prices in that market to change.

Equilibrium
Any situation in which a system is at rest; for example, where neither price nor quantity of a good or service is changing.

If we want to determine the final position of a ball hanging from a spring we need to find the point at which the forces of gravity and spring tension are balanced and the system is in equilibrium. Similarly, if we want to find the price at which a good will sell (which we will call the equilibrium price) and the quantity that will be sold (the equilibrium quantity), we need to find the equilibrium in the market for that good. The basic tools for finding the equilibrium in a market for a good are the supply and demand curves for that good. For reasons that we will explain, the **equilibrium price and equilibrium quantity** of a good are the price and quantity at which the supply and demand curves for the good intersect. For the hypothetical supply and demand curves shown earlier for the pizza market in Hobart, the equilibrium price will therefore be $3 per slice, and the equilibrium quantity of pizza sold will be 12 000 slices per day, as shown in Figure A.3.

Equilibrium price and equilibrium quantity
The values of price and quantity for which quantity demanded and quantity supplied are equal.

In Figure A.3 note that, at the equilibrium price of $3 per slice, both sellers and buyers are 'satisfied' in the following sense: buyers are buying exactly the quantity of pizza they wish to buy at that price (12 000 slices per day) and sellers are selling exactly the quantity of pizza they wish to sell (also 12 000 slices per day). And, since they are satisfied in this sense, neither buyers nor sellers face any incentives to change their behaviour.

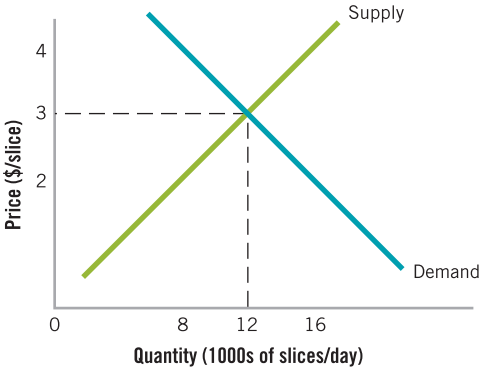


Figure A.3 **The equilibrium price and quantity of pizza in Hobart** The equilibrium quantity and price of a product are the values that correspond to the intersection of the supply and demand curves for that product.

Market equilibrium Occurs in a market when all buyers and sellers are satisfied with their respective quantities at the market price.

Note the limited sense of the term 'satisfied' in the definition of **market equilibrium**. It does not mean that sellers would not be pleased to receive a price higher than the equilibrium price. Rather, it means only that they are able to sell all they wish to sell at that price. Similarly, to say that buyers are satisfied at the equilibrium price does not mean that they would not be happy to pay less than the equilibrium price. Rather, it means only that they are able to buy exactly as many units of the good as they wish to at the equilibrium price.

Excess supply The amount by which quantity supplied exceeds quantity demanded when the price of a good exceeds the equilibrium price.

Note also that if the price of pizza in our Hobart market were anything other than $3 per slice, either buyers or sellers would be frustrated. Suppose, for example, that the price of pizza were $4 per slice, as shown in Figure A.4. At that price, buyers wish to buy only 8000 slices per day, but sellers wish to sell 16 000. Since no one can force someone to buy a slice of pizza against their wishes, this means that buyers will buy only the 8000 slices they wish to buy. So when the price exceeds the equilibrium price, it is sellers who end up being frustrated. At a price of $4 in this example, they are left with an **excess supply** of 8000 slices per day.

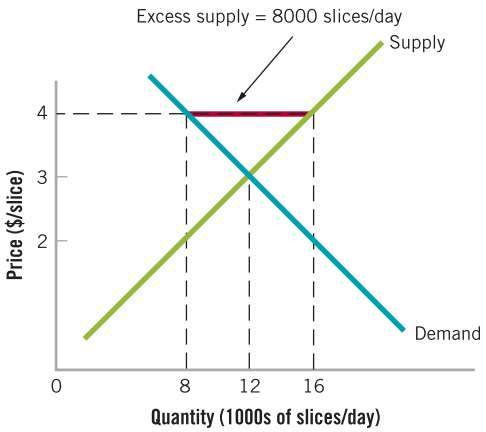


Figure A.4 **Excess supply** When price exceeds the equilibrium price there is excess supply, or surplus: the difference between quantity supplied and quantity demanded.

Excess demand A situation in which price is below its equilibrium such that demand exceeds supply.

Conversely, suppose that the price of pizza in our Hobart market were less than the equilibrium price—say, $2 per slice. As shown in Figure A.5, buyers want to buy 16 000 slices per day at that price, whereas sellers want to sell only 8000. And since sellers cannot be forced to sell pizza against their wishes, this time it is the buyers who end up being frustrated. At a price of $2 per slice in this example, they experience an **excess demand** of 8000 slices per day.

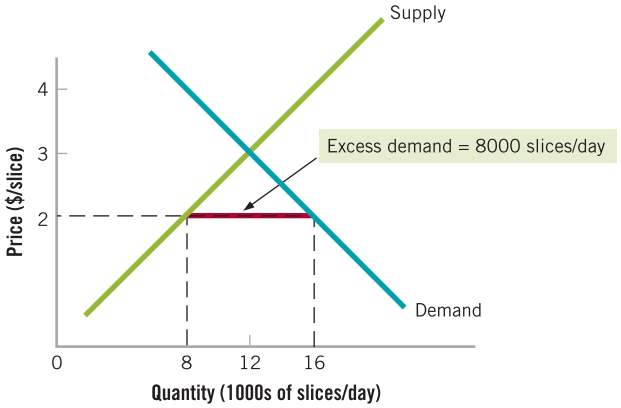


Figure A.5 **Excess demand** When price lies below the equilibrium price there is excess demand: the difference between quantity demanded and quantity supplied.

An extraordinary feature of private markets for goods and services is their automatic tendency to gravitate towards their respective equilibrium prices and quantities. The mechanisms by which this happens are implicit in our definitions of excess supply and excess demand. Suppose, for example, that the price of pizza in our hypothetical market was $4 per slice, leading to excess supply, as shown in Figure A.4. Because sellers are frustrated in the sense

of wanting to sell more pizza than buyers wish to buy, sellers have an incentive to take whatever steps they can to increase their sales. The simplest strategy available to them is to cut their price slightly. Thus, if one seller reduced their price from $4 to, say, $3.95 per slice, they would attract many of the buyers who had been paying $4 per slice for pizza supplied by other sellers. Those sellers, in order to recover their lost business, would then have an incentive to match the price cut. But, notice that if all sellers lowered their prices to $3.95 per slice, there would still be considerable excess supply. So sellers would face continuing incentives to cut their prices. This pressure to cut prices will not go away until price falls all the way to $3 per slice.

Conversely, suppose that price starts out less than the equilibrium price—say, $2 per slice. This time it is buyers who are frustrated. A person who cannot get all the pizza they want at a price of $2 per slice has an incentive to offer a higher price, hoping to obtain pizza that would otherwise have been sold to other buyers. And sellers, for their part, will be only too happy to post higher prices as long as queues of frustrated buyers remain.

The upshot is that price has a tendency to gravitate to its equilibrium level under conditions of either excess supply or excess demand. And when price reaches its equilibrium level both buyers and sellers are satisfied in the technical sense of being able to buy or sell precisely the amounts of their choosing.

DEMAND AND SUPPLY CURVES OF A PIZZA MARKET

A.6 EXAMPLE

Samples of points on the demand and supply curves of a pizza market are provided in Table A.3. Graph the demand and supply curves for this market, and find its equilibrium price and quantity.

Table A.3 Points along the demand and supply curves of a pizza market

DEMAND FOR PIZZA		SUPPLY OF PIZZA	
PRICE ($/SLICE)	QUANTITY DEMANDED (1000S OF SLICES/DAY)	PRICE ($/SLICE)	QUANTITY SUPPLIED (1000S OF SLICES/DAY)
1	8	1	2
2	6	2	4
3	4	3	6
4	2	4	8

The points in the table are plotted in Figure A.6 and then joined to indicate the supply and demand curves for this market. These curves intersect to yield an equilibrium price of $2.50 per slice and an equilibrium quantity of 5000 slices per day.

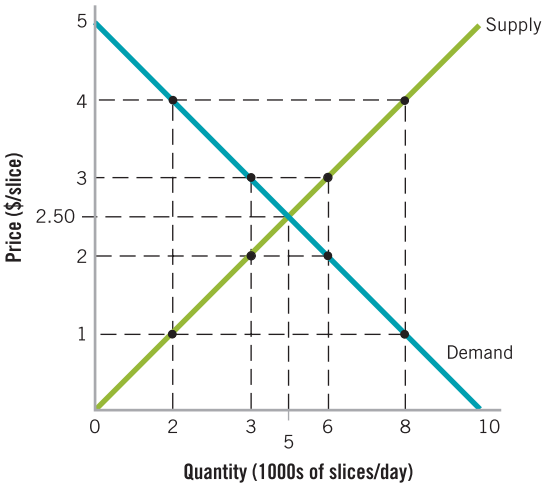


Figure A.6 **Graphing supply and demand and finding the equilibrium price and quantity** To graph the demand and supply curve plot the relevant points given in the table and then join them with a line. The equilibrium price and quantity occur at the intersection of these curves.

We emphasise that market equilibrium does not necessarily produce an ideal outcome for all market participants. Thus, in the example just considered market participants are satisfied with the amount of pizza they buy and sell at a price of $2.50 per slice; but for a poor buyer this may signify little more than that they cannot buy additional pizza without sacrificing other more highly valued purchases.

Indeed, buyers with extremely low incomes often have difficulty purchasing even basic goods and services, prompting governments in almost every society to attempt to ease the burdens of the poor. Yet the laws of supply and demand cannot be repealed simply by an act of the legislature. In the next example we will see that when legislators attempt to prevent markets from reaching their equilibrium prices and quantities, they often do more harm than good.

A.7 EXAMPLE

PIZZA PRICE CONTROLS?

What would happen if concern for the poor led Hobart's council leaders to implement price controls on pizza? Suppose, for example, that the supply and demand curves for pizza are as shown in Figure A.7, and that the city imposes a price ceiling of $2 per slice, making it unlawful to charge more than that amount. At $2 per slice buyers want to buy 16 000 slices per day but sellers want to sell only 8000.

Price ceiling A maximum allowable price, specified by law.

At a price of $2 per slice every pizza restaurant in the city will have long queues of buyers trying unsuccessfully to purchase pizza. Frustrated buyers will behave rudely to pizza sellers, who will respond in kind. Friends of restaurant managers will begin to get preferential treatment. Devious pricing strategies will begin to emerge (such as the $2 slice of pizza sold in combination with a $5 cup of soft drink). Pizza will be made from poorer-quality ingredients. Rumours will begin to circulate about sources of black-market pizza. And so on.

The very idea of not being able to buy a pizza seems absurd, yet precisely such things happen routinely in markets in which prices are held below the equilibrium levels. For example, prior to the collapse of communist governments it was considered normal in those countries for people to stand in line for hours to buy basic goods, while the politically connected had first choice of those goods that were available.

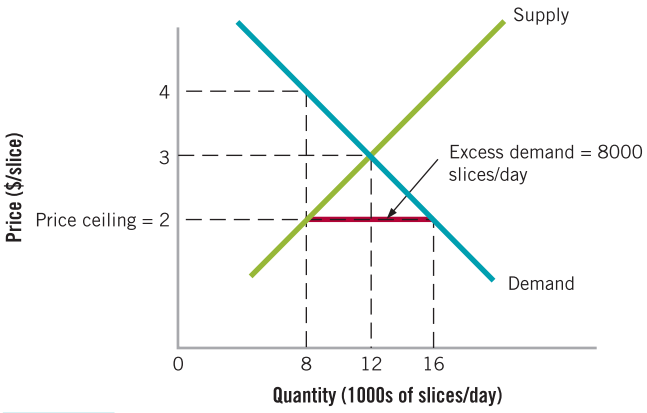


Figure A.7 **Price controls in the pizza market** A price ceiling below the equilibrium price of pizza would result in excess demand for pizza.

Change in demand A shift in the entire demand curve for a commodity.

LEARNING OBJECTIVE A5

A.3.6 PREDICTING AND EXPLAINING CHANGES IN PRICES AND QUANTITIES

If we know how the factors that govern supply and demand curves are changing we can make informed predictions about how prices and the corresponding quantities will change. But, when describing changing circumstances in the marketplace, we must take care to recognise some important terminological distinctions. For example, we must distinguish between the meanings of the seemingly similar expressions, 'change in the quantity demanded' and **change in demand**. When we speak of a **change in the quantity demanded**, this means the change in the quantity that people wish to buy that occurs in response to a change in price. For instance, Figure A.8(a) depicts an increase in the quantity demanded that occurs in response to a reduction in the price of tuna. When the price falls from $5 to $4 per can the quantity demanded rises from 2000 to 4000 cans per day. By contrast, when we speak of a

Change in the quantity demanded Change in the quantity that people wish to buy that occurs in response to a change in prices.

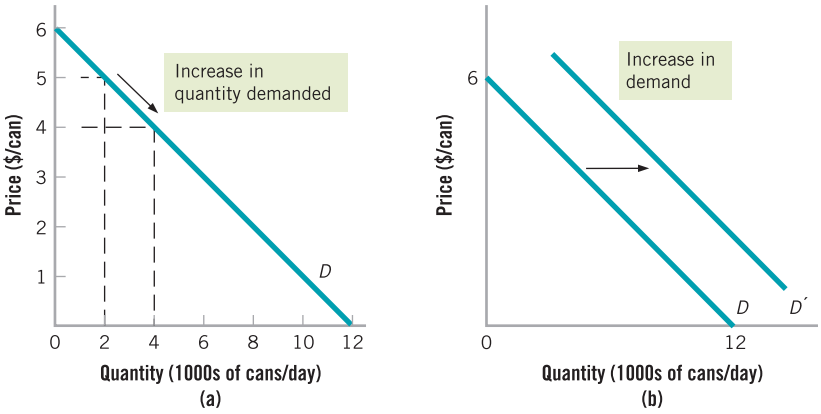


Figure A.8 **An increase in the quantity demanded vs an increase in demand** (a) An increase in quantity demanded describes a downward movement along the demand curve as price falls. (b) An increase in demand describes an outward shift of the demand curve.

'change in demand', this means a shift in the entire demand curve. For example, Figure A.8(b) depicts an increase in demand, meaning that at every price the quantity demanded is higher than before. In summary, a 'change in the quantity demanded' refers to a movement along the demand curve.

A similar terminological distinction applies on the supply side of the market. A **change in supply** means a shift in the entire supply curve, whereas a **change in the quantity supplied** refers to a movement along the supply curve.

Change in supply
A shift in the entire supply curve.

Change in the quantity supplied
A movement along the supply curve that occurs in response to a change in price.

A.3.7 SHIFTS IN DEMAND

To get a better feel for how the supply and demand model enables us to predict and explain price and quantity movements, it is helpful to begin with a few simple examples.

DEMAND SHIFT RESULTING FROM EVENTS OUTSIDE A PARTICULAR MARKET

What will happen to the equilibrium price and quantity of tennis balls if court rental fees decline?

Let the initial supply and demand curves for tennis balls be as shown by the curves *S* and *D* in Figure A.9, where the resulting equilibrium price and quantity are $1 per ball and 40 million balls per month, respectively. Tennis courts and tennis balls are what economists call **complements**: goods that are more valuable when used in combination than when used alone. Tennis balls, for example, would be of little value if there were no tennis courts on which to play. (Tennis balls would still have some value even without courts, for example to the

A.8 EXAMPLE

Complements
Two goods are complements in consumption if an increase in the price of one causes a leftward shift in the demand curve for the other (or if a decrease causes a rightward shift).

Figure A.9 **The effect on the market for tennis balls of a decline in court rental fees** When the price of a complement falls demand shifts right, causing equilibrium price and quantity to rise.

continued ↪

FIGURE A.7 **of Internet access** When the price of a substitute falls, demand shifts left, causing equilibrium price and quantity to fall.

To summarise, economists define goods as substitutes if an increase i in the demand curve for the other. By contrast, goods are complements if a leftward shift in the demand curve for the other.

The concepts of substitutes and complements enable you to answer questions lik exercise.

A.7 EXERCISE

How will a decline in airfares affect bus fares and the price of hotel rooms in holiday destinations?

Demand curves are shifted not only by changes in the prices of substitutes and complements, but also by other factors that change the amounts that people are willing to pay for a given good or service. One of the most important such factors is income. Work through the following exercise to see how income affects demand.

Suppose Commonwealth government public servants are given large pay increases. How will this affect the fees charged by private schools in Canberra?

A.8 EXERCISE

A.3.8 SHIFTS IN THE SUPPLY CURVE

The preceding examples involved changes that gave rise to shifts in demand curves. Next we will look at what happens when supply curves shift. Because the supply curve is based on costs of production anything that changes production costs will shift the supply curve, and will thus result in a new equilibrium quantity and price.

CHANGE TO PRODUCTION COST WILL SHIFT SUPPLY CURVE

A.10 EXAMPLE

What will happen to the equilibrium price and quantity of skateboards if the price of sugar maple veneer, the material from which skateboard decks are made, rises?

Suppose the initial supply and demand curves for skateboards are as shown by the curves *S* and *D* in Figure A.11, resulting in an equilibrium price and quantity of $60 per skateboard and 1000 skateboards per month, respectively. Since sugar maple veneer is one of the ingredients used to produce skateboards, the effect of an increase in its price is to raise the marginal cost of producing skateboards. How will this affect the supply curve of skateboards?

Recall that the supply curve is upward sloping, because when the price of skateboards is low only those potential sellers whose marginal cost of making skateboards is low can sell boards profitably; whereas at higher prices those with higher marginal costs can also enter the market profitably (the low-hanging-fruit principle). So, if the cost of one of the ingredients used to produce skateboards rises, the number of potential sellers who can profitably sell skateboards at any given price will fall. And this, in turn, implies a leftward shift in the supply curve for skateboards. Note that a 'leftward shift' in a supply curve can also be viewed as an 'upward shift' in the same curve. The first corresponds to the horizontal interpretation of the supply curve, while the second corresponds to the vertical interpretation. We will use these expressions to mean exactly the same thing. The new supply curve (after the price of sugar maple veneer rises) is the curve labelled *S′* in Figure A.11.

Does an increase in the cost of sugar maple veneer have any effect on the demand curve for skateboards? The demand curve tells us how many skateboards buyers wish to purchase at each price. Any given buyer is

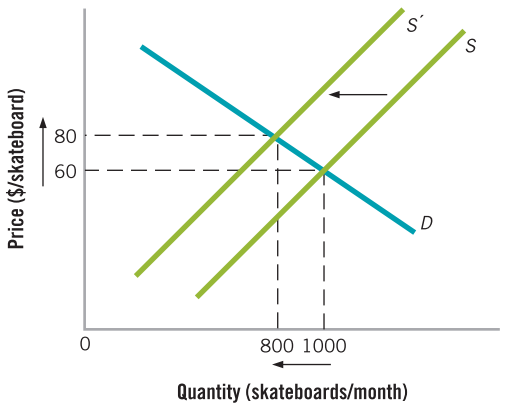


Figure A.11 **The effect on the skateboard market of an increase in the price of sugar maple veneer** When input prices rise supply shifts left, causing equilibrium price to rise and equilibrium quantity to fall.

continued ↪

↵ Example A.10 *continued*

willing to purchase a skateboard if their reservation price for it exceeds its market price. And, since each buyer's reservation price, which is based on the benefits of owning a skateboard, does not depend on the price of sugar maple veneer, there should be no shift in the demand curve for skateboards.

In Figure A.11 we can now see what happens when the supply curve shifts leftward and the demand curve remains unchanged. For the illustrative supply curve shown, the new equilibrium price of skateboards, $80, is higher than the original price, and the new equilibrium quantity, 800 per month, is lower than the original quantity. (These new equilibrium values are merely illustrative. There is insufficient information provided in the example to determine their exact values.) People who do not place a value of at least $80 on owning a skateboard will choose to spend their money on something else.

Now work through the following exercise to determine the effects on equilibrium price and quantity run when the marginal costs of production decline.

A.9 EXERCISE

What will happen to the equilibrium price and quantity of new houses if the wage rate of carpenters falls?

The preceding example and exercise involved changes in the cost of an ingredient, or input, in the production of the good in question—sugar maple veneer in the production of skateboards and carpenters' labour in the production of houses. As the next example illustrates, supply curves also shift when technology changes.

A.11 EXAMPLE

CHANGE IN TECHNOLOGY WILL SHIFT SUPPLY CURVE

Why do students' essays go through so many more revisions today than in the 1970s?

In the dark days before computers were in widespread use, students could not make even minor revisions to their essays without having to retype their entire manuscripts from scratch. The availability of computer technology has of course radically changed the picture. Now, instead of having to retype the entire text, only the changes need to be entered.

In Figure A.12, the curves labelled *S* and *D* depict the supply and demand curves for revisions in the days before word processing, and the curve *S′* depicts the supply curve for revisions today. As the diagram shows, the

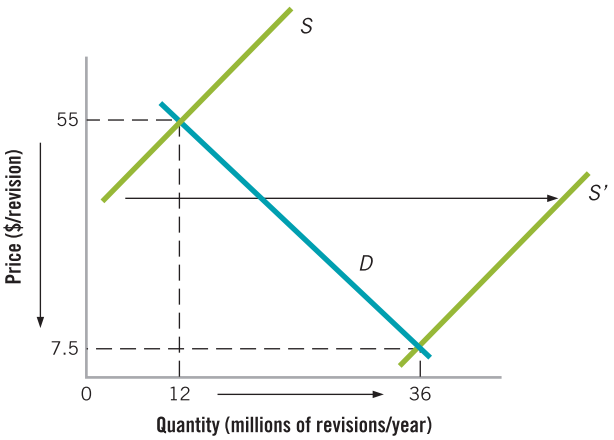


Figure A.12 **The effect of technological change on the market for essay revisions** When a new technology reduces the cost of production supply shifts right, causing equilibrium price to fall and equilibrium quantity to rise.

result is not only a sharp decline in the price per revision, but also a corresponding increase in the equilibrium number of revisions.

Note that in the preceding discussion we implicitly assumed that students purchased typing services in a market. In fact, however, many students type their own papers. Does that make a difference? Even if no money actually changes hands, students pay a price when they revise their papers—namely, the opportunity cost of the time it takes to perform that task. Because technology has radically reduced that cost we would expect to see a large increase in the number of revisions, even if most students type their own work.

REVIEW

Central planning economies rely on a central authority allocating resources. Market economies allocate resources using the decentralised mechanism of the price system. In general, market economies allocate resources much more effectively than centrally planned economies.

Prices are determined in markets through the interactions of buyers and sellers. For sellers, a key feature of the market is the cost of producing output. For buyers, it is the value they place on the output.

The demand curve summarises consumers' subjective evaluation of output in terms of the maximum price they are prepared to pay for different quantities of output on offer.

The supply curve summarises firms' decisions about how much to produce in terms of the maximum price they need to receive to produce various quantities of output.

The demand curve for a commodity is shifted by changes in the price of complementary and substitute goods, and by factors such as income, that affect the maximum price consumers are willing to pay to purchase different amounts of the product.

The supply curve for a commodity is shifted by changes in the price of inputs and by any other factor that affects the costs of production. These changes influence the maximum price that firms require to supply different amounts of the product.

Market equilibrium is the situation in which all buyers and sellers are satisfied with their respective quantities at the market price; it occurs at the intersection of the supply and demand curves. The corresponding price and quantity are called the *equilibrium price* and the *equilibrium quantity*.

Unless prevented by regulation, prices and quantities are driven towards their equilibrium values by the actions of buyers and sellers. If the price is initially too high, so that there is excess supply, frustrated sellers will cut their price in order to sell more. If the price is initially too low, so that there is excess demand, competition between buyers drives the price upwards. This process continues until equilibrium is reached.

SIMPLE RULES

A.4

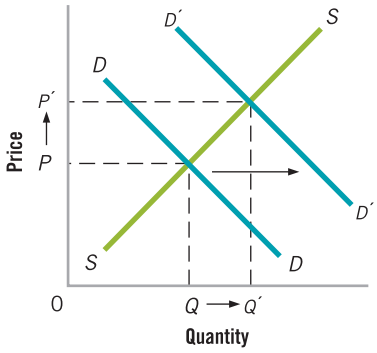
For supply and demand curves that have the conventional slopes (upward sloping for supply curves, downward sloping for demand curves), the preceding examples illustrate some basic rules that govern how shifts in supply and demand affect equilibrium prices and quantities. These rules are summarised in Figure A.13.

The qualitative rules summarised in Figure A.13 hold for supply or demand shifts of any magnitude, provided the curves have their conventional slopes. But, as the next exercise demonstrates, when both supply and demand curves shift at the same time, the direction in which equilibrium price or quantity changes will depend on the relative magnitudes of the shifts.

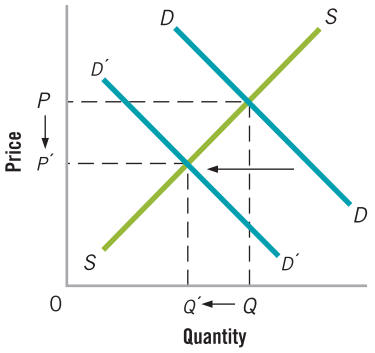
What will happen to the equilibrium price and quantity in the corn chip market if both of the following events occur:

1) **researchers discover that a vitamin found in corn helps protect against cancer and heart disease**
2) **a swarm of locusts destroys part of the corn crop?**

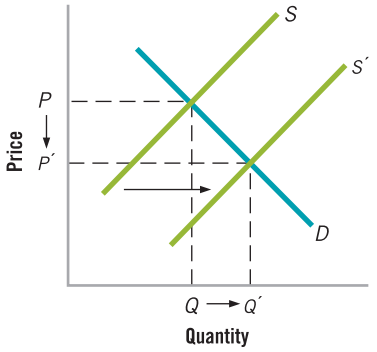
A.10 EXERCISE



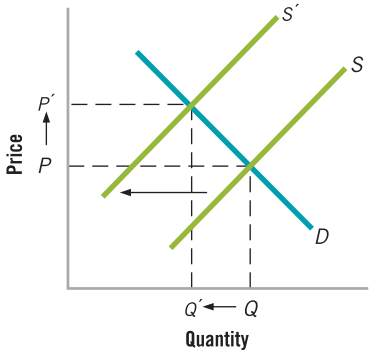
An increase in demand will lead to an increase in both the equilibrium price and quantity.



A decrease in demand will lead to a decrease in both the equilibrium price and quantity.



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



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

Figure A.13 **Four rules governing the effects of supply and demand shifts** An increase in demand will lead to an increase in both the equilibrium price and quantity. A decrease in demand will lead to a decrease in both the equilibrium price and quantity. An increase in supply will lead to a decrease in the equilibrium price and an increase in the equilibrium quantity. A decrease in supply will lead to an increase in the equilibrium price and a decrease in the equilibrium quantity.

REVIEW

Factors that cause an increase (rightward or upward shift) in demand:

1. a decrease in the price of complements to the good or service
2. an increase in the price of substitutes for the good or service
3. an increase in income (for a **normal good**)
4. an increased preference by demanders for the good or service
5. an increase in the population of potential buyers
6. an expectation of higher prices in the future

Normal good A commodity for which the demand increases as real income increases.

When these factors move in the opposite direction demand will shift left.

Factors that cause an increase (rightward or downward shift) in supply:

1. a decrease in the cost of materials, labour or other inputs used in the production of the good or service
2. an improvement in technology that reduces the cost of producing the good or service
3. an improvement in the weather (especially for agricultural products)

4. an increase in the number of suppliers
5. an expectation of lower prices in the future

When these factors move in the opposite direction supply will shift left.

MARKETS AND SOCIAL WELFARE

A.5

Markets represent a highly effective system of allocating resources. When a market for a good is in equilibrium, the equilibrium price conveys important information to potential suppliers about the value that potential demanders place on that good. At the same time the equilibrium price informs potential demanders about the opportunity cost of supplying the good. This rapid, two-way transmission of information is the reason that markets can coordinate an activity as complex as supplying a large city such as Sydney or Auckland with food and drink, even though no one person or organisation oversees the process.

But are the prices and quantities determined in market equilibrium socially optimal, in the sense of maximising total economic surplus? That is, does equilibrium in unregulated markets always maximise the difference between the total benefits and total costs experienced by market participants? The answer is, 'it depends': a market that is out of equilibrium always creates opportunities for individuals to arrange transactions that will increase their individual economic surplus.

As we will see, however, a market for a good that is in equilibrium makes the largest possible contribution to total economic surplus only when its supply and demand curves fully reflect the costs and benefits associated with the production and consumption of that good.

A.5.1 CASH ON THE TABLE

LEARNING OBJECTIVE A6

In economics we assume that all exchange is purely voluntary. This means that a transaction cannot take place unless the buyer's reservation price for the good exceeds the seller's reservation price. When that condition is met and a transaction takes place, both parties receive an economic surplus. The **buyer's surplus** from the transaction is the difference between their reservation price and the price they actually pay. The **seller's surplus** is the difference between the price they receive and their reservation price. The **total surplus** from the transaction is the sum of the buyer's surplus and the seller's surplus.

Buyer's surplus
The difference between the buyer's reservation price and the price they actually pay.

Seller's surplus
The difference between the price received by the seller and their reservation price.

Total surplus
The difference between the buyer's reservation price and the seller's reservation price.

A regulation that prevents the price of a good from reaching its equilibrium level unnecessarily prevents exchanges of this sort from taking place and in the process reduces total economic surplus. Consider again the effect of price controls imposed in the market for pizza. The demand curve in Figure A.14 tells us that if a price ceiling of $2 per slice were imposed, only 8000 slices of pizza per day would be sold. At that quantity, the vertical interpretations of the supply and demand curves tell us that a buyer would be willing to pay as much as $4 for an additional slice and that a seller would be willing to sell one for as little as $2. The difference—$2 per slice—is the additional economic

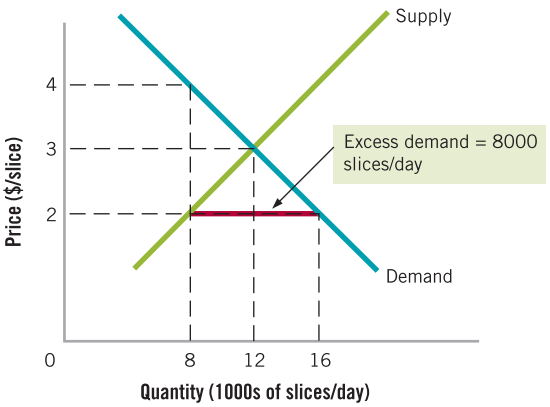


Figure A.14 **Price controls in the pizza market** A price ceiling below the equilibrium price of pizza would result in excess demand for pizza.

surplus that would result if an additional slice were produced and sold. As noted earlier, an extra slice sold at a price of $3 would result in an additional $1 of economic surplus for both buyer and seller.

When a market is out of equilibrium it is always possible to identify mutually beneficial exchanges of this sort. When people have failed to take advantage of all mutually beneficial exchanges, we often say that there is **cash on the table**—the economist's metaphor for unexploited opportunities. When the price in a market is below the equilibrium price there is cash on the table because the reservation price of sellers (marginal cost) will always be lower than the reservation price of buyers. In the absence of a law preventing buyers paying more than $2 per slice, restaurant owners would quickly raise their prices and expand their production until the equilibrium price of $3 per slice was reached. At that price, buyers would be able to get precisely the 12 000 slices of pizza they want to buy each day. All mutually beneficial opportunities for exchange would have been exploited, leaving no more cash on the table.

Cash on the table
An economic metaphor for any unexploited gains from exchange.

A.5.2 IS THE MARKET ALWAYS EFFICIENT?

LEARNING OBJECTIVE A7

The **socially optimal quantity** of any good is the quantity that maximises the total economic surplus that results from producing and consuming the good. From the cost–benefit principle, we know that we should keep expanding production of the good as long as its marginal benefit is at least as great as its marginal cost. This means that the socially optimal quantity is that level for which the marginal cost and marginal benefit of the good are the same.

When the quantity of a good is less than the socially optimal quantity, boosting its production will increase total economic surplus. By the same token, when the quantity of a good exceeds the socially optimal quantity, reducing its production will increase total economic surplus. **Economic efficiency, or efficiency**, occurs when all goods and services in the economy are produced and consumed at their respective socially optimal levels.

Efficiency is an important social goal. Failure to achieve efficiency means that total economic surplus is smaller than it could have been. Movements towards efficiency make the total economic pie larger, making it possible for everyone to have a larger slice. The importance of efficiency will be a recurring theme as we move forward, and the **efficiency principle** is one of the core principles of economics.

Socially optimal quantity
The quantity of a good or service that results in the maximum possible economic surplus from producing and consuming that good.

Economic efficiency, or efficiency
Occurs when all goods and services are produced and consumed at their respective socially optimal levels.

Core economic principles
The **efficiency principle:** Efficiency achieved when all production and consumption in the economy is occurring at their respective socially optimal levels. Efficiency is an important social goal, because when the economic pie grows larger everyone can potentially have a larger slice.

Is the market equilibrium quantity of a good efficient? That is, does it maximise the total economic surplus received by participants in the market for that good? When the private market for a given good is in equilibrium we can say that the cost to the seller of producing an additional unit of the good is the same as the benefit to the buyer of having an additional unit. If all costs of producing the good are borne directly by sellers, and if all benefits from the good accrue directly to buyers, it follows that the market equilibrium quantity of the good will equate the marginal cost and marginal benefit of the good. And this means that the equilibrium quantity also maximises total economic surplus. If, however, the market is not in equilibrium there is always the chance to do better. Suppose, for example, that less than the equilibrium amount is being produced. This means that buyers would be willing to pay more for an additional unit of the commodity than it would cost to sellers to provide that extra unit of the commodity. In this case it would be efficient to go ahead and expand production. On the other hand, if more than the equilibrium quantity is produced resources are being used to produce units of the commodity that have a greater value than buyers place on those extra units of the commodity. Here, it would make sense—and would be efficient—to cut back on production of the commodity.

But sometimes the production of a good entails costs that fall on people other than those who sell the good. This will be true, for instance, for goods whose production generates significant levels of environmental pollution. As extra units of these goods are produced the extra pollution harms other people besides sellers. In the market equilibrium for such goods the benefit to buyers of the last good produced is, as before, equal to the cost incurred by sellers to produce that good. But since producing that good also imposes pollution costs on others, we know that the full marginal cost of the last unit produced—the seller's private marginal cost plus the marginal pollution cost borne by others—must be higher than the benefit of the last unit produced. So, in this case the market equilibrium quantity of the good will be larger than the socially optimal quantity. Total economic surplus would be higher if output of the good were lower. Yet neither sellers nor buyers have any incentive to alter their behaviour.

Another possibility is that people other than those who buy a good may receive significant benefits from it. For instance, when someone purchases a vaccination against measles from their doctor, they not only protect themselves against measles but also make it less likely that others will catch this disease. From the perspective of society as a whole, we should keep increasing the number of vaccinations until their marginal cost equals their marginal benefit. The marginal benefit of a vaccination is the value of the protection it provides the person vaccinated plus the

value of the protection it provides to others. Private consumers, however, will choose to be vaccinated only if the marginal benefit to them exceeds the price of the vaccination. In this case, then, the market equilibrium quantity of vaccinations will be smaller than the quantity that maximises total economic surplus. Again, however, individuals would have no incentive to alter their behaviour.

Situations like the ones just discussed provide examples of behaviours that we may call 'smart for one but dumb for all'. In each case the individual actors are behaving rationally. They are pursuing their goals as best they can, and yet there remain unexploited opportunities for gain from the point of view of the whole society (the **equilibrium principle**). The difficulty is that individuals acting alone cannot exploit these opportunities. Some form of collective action, for example through the government intervening in the market to promote a more socially efficient outcome, may be required.

Core economic principles
The **equilibrium principle:** A market in equilibrium leaves no unexploited opportunities for individuals, but may not exploit all gains achievable through collective action.

REVIEW

A market that is out of equilibrium leaves opportunities for improvement in consumers' and producers' surplus. This is because, as long as there are no restrictions on the price system, prices will adjust until all possible economic surplus is obtained.

Although a market in equilibrium will normally ensure that economic surplus is maximised, and hence that resources are allocated efficiently, there are instances where this does not happen. Typically, these involve situations where benefits or costs associated with either consuming or producing a commodity fall more widely than on just those involved in transacting directly for a commodity. Such situations may require government intervention to secure a more efficient allocation of resources.

MICROECONOMICS AND MACROECONOMICS

A.6

This appendix has introduced you to some basic principles of economics. The examples and exercises, and the mode of analysis in this appendix, draw heavily from the field of microeconomics. As you will see throughout the book which this appendix accompanies, macroeconomists draw very heavily on the concepts used by our microeconomic colleagues. For example, a theme we touch on throughout the book and will look at in depth in Chapters 13 to 15 is that economies do not exist in isolation of each other. With increasing globalisation the implications of these interrelationships are likely to assume even more importance as time goes on. These questions, although given contemporary relevance by the growing debate about the effects of globalisation, are among the oldest questions in economics. To answer them, we draw on many of the basic microeconomic principles outlined in this appendix.

SUMMARY

- Economics is the study of how people make choices under conditions of scarcity, and of the consequences of those choices for society. Economic analysis of human behaviour begins with the assumption that people are rational—that they have well-defined goals and try to achieve them as best they can. In trying to achieve their goals, people normally face trade-offs: because material and human resources are limited, having more of one good thing means making do with less of some other good thing.

- Our focus in this appendix has been on how rational people make choices between alternative courses of action. Our basic tool for analysing these decisions is cost–benefit analysis. The cost–benefit principle says

that a person should take an action if, and only if, the benefit of that action is at least as great as its cost. The benefit of an action is defined as the largest dollar amount the person would be willing to pay in order to take the action. The cost of an action is defined as the dollar value of everything the person must give up in order to take the action.

- Often the question is not whether to pursue an activity but, rather, how many units of it to pursue. In these cases the rational person pursues additional units as long as the marginal benefit of the activity (the benefit from pursuing an additional unit of it) exceeds its marginal cost (the cost of pursuing an additional unit of it).

- In using the cost–benefit framework, we need not presume that people choose rationally all the time. Indeed, we identified four common pitfalls that plague decision makers in all walks of life:
  - a tendency to treat small proportional changes as insignificant
  - a tendency to ignore opportunity costs
  - a tendency not to ignore sunk costs
  - a tendency to confuse average and marginal costs and benefits.

- The demand curve is a downward-sloping line that tells what quantity buyers will demand at any given price. The supply curve is an upward-sloping line that tells what quantity sellers will offer at any given price. Market equilibrium occurs when the quantity buyers demand at the market price is exactly the same as the quantity that sellers offer. The equilibrium price–quantity pair is the one at which the demand and supply curves intersect. In equilibrium, market price measures both the value of the last unit sold to buyers and the cost of the resources required to produce it.

- When the price of a good lies above its equilibrium value there is an excess supply of that good. Excess supply motivates sellers to cut their prices, and price continues to fall until the equilibrium price is reached. When price lies below its equilibrium value there is excess demand. With excess demand frustrated buyers are motivated to offer higher prices, and the upward pressure on prices persists until equilibrium is reached. A remarkable feature of the market system is that, relying only on the tendency of people to respond in self-interested ways to market price signals, it somehow manages to coordinate the actions of literally billions of buyers and sellers worldwide. When excess demand or excess supply occurs it tends to be small and brief, except in markets where regulations prevent full adjustment of prices.

- The efficiency of markets in allocating resources does not eliminate social concerns about how goods and services are distributed among different people. For example, we often lament the fact many buyers enter the market with too little income to buy even the most basic goods and services. Concern for the wellbeing of the poor has motivated many governments to intervene in a variety of ways to alter the outcomes of market forces. Sometimes these interventions take the form of laws that peg prices below their equilibrium levels. Such laws almost invariably generate harmful, if unintended, consequences. Programs like rent control laws, for example, lead to severe housing shortages, black marketeering and a rapid deterioration of the relationship between property owners and tenants.

- The basic supply and demand model is a primary tool of economists. Changes in the equilibrium price of a good, and in the amount of it traded in the marketplace, can be predicted on the basis of shifts in its supply or demand curves.

- Incomes, tastes, population, expectations and the prices of substitutes and complements are among the factors that shift demand schedules. Supply schedules, in turn, are primarily governed by such factors as technology, input prices, expectations, the number of sellers and, especially for agricultural products, the weather.

- When the supply and demand curves for a good reflect all significant costs and benefits associated with the production and consumption of that good, the market equilibrium price will guide people to produce and consume the quantity of the good that results in the largest possible economic surplus. This conclusion, however, does not apply if others, beside buyers, benefit from the good (as when someone benefits from their neighbour's purchase of a vaccination against measles), or if others beside sellers bear costs because of the good (as when its production generates pollution). In such cases market equilibrium does not result in the greatest gain for all.

Core economic principles

The scarcity principle (also called 'the no-free-lunch principle')
Although we have boundless needs and wants, the resources available to us are limited. So having more of one good thing usually means having less of another.

The cost–benefit principle
An individual (or a firm, or a society) should take an action if, and only if, the extra benefits from taking the action are at least as great as the extra costs.

The principle of increasing opportunity cost (also called 'the low-hanging-fruit principle')
In expanding the production of any good, first employ those resources with the lowest opportunity cost, and only afterwards turn to resources with higher opportunity costs.

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

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

KEY TERMS

average benefit 8
average cost 7
buyer's reservation price 11
buyer's surplus 23
cash on the table 24
change in demand 16
change in supply 17
change in the quantity demanded 16
change in the quantity supplied 17
complements 17
demand curve 11
economic efficiency, or efficiency 24
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equilibrium 13
equilibrium price and equilibrium quantity 13
excess demand 14
excess supply 14
income effect 11
marginal benefit 7
marginal cost 7
market 10
market equilibrium 14
normal good 22
opportunity cost 3
price ceiling 16
rational person 2
seller's reservation price 13
seller's surplus 23
socially optimal quantity 24
substitutes 18
substitution effect 11
sunk cost 7
supply curve 12
total surplus 23

REVIEW QUESTIONS

1. A friend of yours on the tennis team says, 'Private tennis lessons are definitely better than group lessons'. Explain what you think he means by this statement. Then use the cost–benefit principle to explain why private lessons are not necessarily the best choice for everyone. LO A2

2. Many people think of their air travel as being free when they use frequent-flyer coupons. Explain why these people are likely to make wasteful travel decisions. LO A3
3. Why is knowing the cost of producing a good not sufficient to predict its market price? LO A4
4. Distinguish between the meaning of the expressions 'change in demand' and 'change in the quantity demanded'. LO A5
5. Last year a government official proposed that petrol price controls be imposed to protect the poor from rising petrol prices. What evidence could you consult to discover whether this proposal was enacted? LO A4
6. Are there any circumstances in which government intervention in a market would create more, rather than less, economic surplus? LO A7

PROBLEMS

1. Residents of your city are charged a fixed weekly fee of $6 for rubbish collection. They are allowed to put out as many bins as they wish. The average household disposes of three bins of rubbish per week under this plan. Now suppose that your city changes to a 'tag' system. Each bin of rubbish to be collected must have a tag affixed to it. The tags cost $2 each and are not reusable. What effect do you think the introduction of the tag system will have on the total quantity of rubbish collected in your city? Explain. LO A5
2. Once a week Smith purchases a six-pack of soft drink and puts it in his refrigerator for his two children. He invariably discovers that all six cans are gone on the first day. Jones also purchases a six-pack of soft drink once a week for his two children but, unlike Smith, he tells them that each may drink no more than three cans. If the children use cost–benefit analysis each time they decide whether to drink a can of soft drink, explain why the soft drink lasts much longer at Jones's house than at Smith's. LO A2
3. Indicate how you think each of the following would shift demand in the indicated market:
   a) Incomes of buyers in the market for Tasmanian holidays increase.
   b) Buyers in the market for pizza read a study linking hamburger consumption to heart disease.
   c) Buyers in the market for CDs learn of an increase in the price of audio cassettes (a substitute for CDs).
   d) Buyers in the market for CDs learn of an increase in the price of CDs. LO A5
4. How will an increase in the birth rate affect the equilibrium price of land? LO A5
5. What will happen to the equilibrium price and quantity of fish if fish oils are found to help prevent heart disease? LO A5
6. What will happen to the equilibrium price and quantity of beef if the price of chickenfeed increases? LO A5
7. What will happen to the equilibrium quantity and price of potatoes if population increases and a new, higher-yielding variety of potato plant is developed? LO A5
8. Twenty-five years ago tofu was available in the West only from small businesses operating in predominantly Asian sections of large cities. Today tofu has become popular as a high-protein health food and is widely available in supermarkets. At the same time tofu production has evolved to become factory based, using modern food-processing technologies. Draw a diagram with demand and supply curves, depicting the market for tofu 25 years ago and the market for tofu today. Given the information above, what does the demand–supply model predict about changes in the volume of tofu sold between then and now? What does it predict about changes in the price of tofu? LO A5

REFERENCE

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