

CHOICES AND TRADE-OFFS IN THE MARKET

LEARNING OBJECTIVES

After studying this chapter you should be able to:

- 2.1 Use a production possibility frontier to analyse opportunity costs and trade-offs.
- 2.2 Understand comparative advantage and explain how it is the basis for trade.
- 2.3 Explain the basic idea of how a market system works.
- 2.4 Understand why property rights are necessary for a well-functioning market.

Sample pages

MANAGERS MAKING CHOICES AT BMW

WHEN YOU THINK of cars that combine fine engineering, high performance and cutting-edge styling, you are likely to think of BMW. The Bayerische Motoren Werke, or Bavarian Motor Works, was founded in Germany in 1916 as a company devoted to manufacturing aircraft engines. In the early 1920s BMW began to make motorcycles. In 1928 it produced its first car. Today, BMW employs over 100 000 workers at 25 sites in 14 countries, and has worldwide sales of more than 1.8 million vehicles.

To compete in the car market the managers of BMW must make many strategic decisions, such as whether to introduce new car models. BMW now sells a hydrogen-powered version of the 7 Series sedan and in late 2013 began production of its i3 electric car. Another strategic decision faced by BMW's managers is where to advertise. In the late 1990s, for example, some of BMW's managers opposed advertising in mainland China because they did not think they would sell many cars there. Other managers, however, argued that rising incomes were rapidly increasing the size of the Chinese market. BMW decided to advertise in China, and today China has become the company's largest single market in the world.

BMW's managers have also faced the strategic decision of whether to concentrate production in factories in Germany or to build new factories in its overseas markets. Keeping production in Germany makes it easier for BMW's managers to supervise production and to employ German workers, who generally have high levels of technical training. BMW has eight production plants in Germany. Building factories in other countries, however, has two benefits. First, the lower wages paid to workers in other countries reduce the cost of manufacturing vehicles. Second, BMW can reduce political friction by producing vehicles in the same country in which they sell them. BMW has production plants in Austria, Brazil, China, South Africa, the United Kingdom and the United States, and assembly plants in Egypt, India, Indonesia, Malaysia, Russia and Thailand.

Managers also face smaller-scale—or tactical—business decisions. For instance, until the early 2000s BMW used two workers to attach the gearbox to the engine in each car. The company then developed an alternative method of attaching the gearbox using a robot rather than workers. In choosing which method to use, managers at BMW faced a trade-off because the robot method had a higher cost but installed the gearbox in exactly the correct position, which reduces engine noise when the car is driven. Ultimately, the managers decided to adopt the robot method. A similar type of tactical business decision must be made in scheduling production between different models. For instance, at BMW's Regensburg plant in Germany a number of different models are built, including both the Z4 Roadster and the 3 Series. A decision must be made each month on the quantity of each model to be produced.

SOURCE: BMW Group, at <www.bmwgroup.com>, viewed 2 October 2014.

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ECONOMICS
IN YOUR
LIFE

THE TRADE-OFFS WHEN YOU BUY A CAR

When you buy a car, you probably consider factors such as fuel efficiency and safety. One way car manufacturers increase fuel efficiency is by making cars smaller and lighter. In terms of safety, large cars absorb more of the impact during an accident than small cars do. As a result, people are usually safer driving large cars than small cars. What can we conclude from these facts about the relationship between safety and fuel efficiency? Under what circumstances would it be possible for car manufacturers to make cars safer and more fuel efficient? As you read the chapter, see if you can answer these questions. You can check your answers against those provided on page 47 at the end of this chapter.

Scarcity

The situation in which unlimited wants exceed the limited resources available to fulfil those wants.

IN A MARKET system, managers at most firms must make decisions like those made by BMW's managers. The decisions managers face reflect the key fact of economic life: **scarcity** requires *trade-offs*. As we learned in Chapter 1, scarcity exists because we have unlimited wants but only limited resources available to fulfil those wants. Goods and services are scarce. So, too, are the economic resources, or factors of production—workers, capital and machinery, natural resources and entrepreneurial ability—used to make them. Your time is scarce, which means you face trade-offs: if you spend an hour studying for an economics exam you have one less hour to spend studying for a management exam or going to the movies. If your university decides to use some of its scarce budget to buy new computers, those funds will not be available to buy new books for the library or to resurface the student car park. If BMW decides to devote some of the scarce workers and machinery in its Regensburg plant to producing more Z4 Roadster sports cars, those resources will not be available to produce more 3 Series cars.

Many of the decisions of households and firms are made in markets. One key activity that takes place in markets is trade. By engaging in trade, people can raise their standard of living. Trade involves the decisions of millions of households and firms spread around the world. In this chapter we provide an overview of how the market system coordinates the independent decisions of these millions of households and firms. We begin our analysis of the economic consequences of scarcity and the working of the market system by introducing an important economic model: the *production possibility frontier*.


2.1

Use a production possibility frontier to analyse opportunity costs and trade-offs.

LEARNING OBJECTIVE

Production possibility frontier

A curve showing the maximum attainable combinations of two products that may be produced with available resources.

PRODUCTION POSSIBILITY FRONTIERS AND REAL-WORLD TRADE-OFFS

As we saw in the opening case to this chapter, BMW operates a car factory in Regensburg, Germany, where it produces a number of models, including Z4 Roadster sports cars and the 3 Series car range. Because the firm's resources—workers, machinery, materials and entrepreneurial skills—are limited, BMW faces a trade-off: resources devoted to producing Z4s are not available for producing 3 Series, and vice versa. Chapter 1 explained that economic models can be useful in analysing many questions. We can use a simple model called the *production possibility frontier* to analyse the trade-offs BMW faces in its Regensburg plant. A **production possibility frontier** is a curve showing the maximum attainable combinations of two products that may be produced with available resources. We will use an example of two BMW products—Z4 Roadsters and 3 Series convertibles. The resources are BMW's workers, materials, robots and other machinery.

Graphing the production possibility frontier

Figure 2.1 uses a production possibility frontier to illustrate the trade-offs facing BMW. The numbers from the table are plotted on the graph. The curve in the graph is BMW's production possibility frontier. If BMW uses all its resources efficiently to produce Roadsters it can produce 800 per day—point *A* at one end of the production possibility frontier. If BMW uses all its resources to produce convertibles it can produce 600 per day—point *E* at the other end of the production possibility frontier. If BMW devotes resources to producing both vehicles it could be at a point like *B*, where it produces 600 Roadsters and 400 convertibles.

All the combinations either on the frontier—like *A*, *B*, *C*, *D* and *E*—or inside the frontier—like point *F*—are *attainable* with the resources available. Combinations on the frontier are *efficient* because all available resources are being fully utilised, and the fewest possible resources are being used to produce a given amount of output. Combinations inside the frontier—like point *F*—are *inefficient* because maximum output is not being obtained from the available resources—perhaps because the assembly line is not operating at capacity. For example, at point *F* only 300 Roadsters and 200 convertibles are being produced, but if the resources were combined efficiently more of both vehicles could be produced, as shown by points on the frontier, such as point *B*. BMW might like to be beyond the frontier—at a point like *G*

BMW's production choices per day		
Choice	Quantity of Roadsters produced	Quantity of convertibles produced
A	800	0
B	600	400
C	400	500
D	200	575
E	0	600

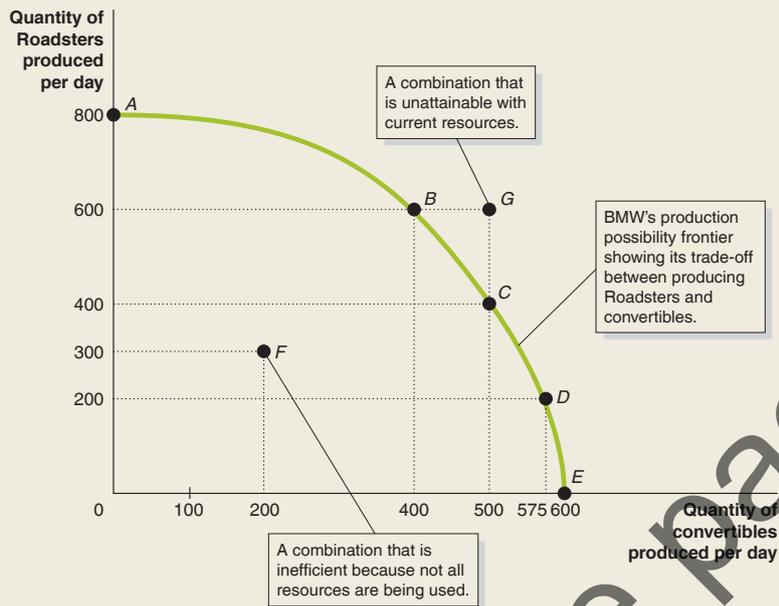


FIGURE 2.1

BMW's production possibility frontier

BMW faces a trade-off: to build more Roadsters it must build fewer convertibles. The production possibility frontier illustrates the trade-off BMW faces. Combinations on the production possibility frontier—like points A, B, C, D and E—are efficient because the maximum output is being obtained from the available resources. Combinations inside the frontier—like point F—are inefficient because some resources are not being used or are not being used efficiently. Combinations outside the frontier—like point G—are unattainable with the current amount of resources.

where it would be producing 600 Roadsters and 500 convertibles—but points beyond the production possibility frontier are *unattainable* given the firm's current resources. To produce the combination at G, BMW would need more machines or more workers.

Notice that if BMW is producing efficiently and is on the production possibility frontier, the only way to produce more of one vehicle is to produce less of the other vehicle. Recall from Chapter 1 that the **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. For BMW, the opportunity cost of producing one additional 3 Series convertible is the number of Z4 Roadsters the company will not be able to produce because it has already devoted those resources to producing convertibles. For example, in moving from point B to point C, the opportunity cost of producing 100 more convertibles per day (from 400 to 500 vehicles) is the 200 fewer Roadsters that can be produced (from 600 down to 400).

What point on the production possibility frontier is best? We can't tell without further information. If consumer demand for 3 Series convertibles is greater than demand for Z4 Roadsters the company is likely to choose a point closer to E. If demand for Roadsters is greater than demand for convertibles the company is likely to choose a point closer to A.

Increasing marginal opportunity costs

We can also use the production possibility frontier to explore issues concerning the economy as a whole. For example, suppose we assume that an economy produces just two types of goods: wool and wheat. Figure 2.2 shows a production possibility frontier for these two goods. If all the country's resources are devoted to producing wool, 400 million tonnes can be produced in one year. If all resources are devoted to producing wheat, 500 million tonnes can be produced in one year. Devoting resources to producing both goods results in the economy being at other points along the production possibility frontier.

Notice that the production possibility frontier is bowed outwards from the origin. Because the curve is bowed out (concave) the opportunity cost of wheat in terms of wool depends upon

Opportunity cost

The highest-valued alternative that must be given up to engage in an activity.

MAKING THE CONNECTION

2.1



Sourced from <http://www.ausaid.gov.au/media/gallery/yogya.cfm,AusAID>

More funds for emergency relief can mean fewer funds for other charities

TRADE-OFFS AND EMERGENCY AID RELIEF

When natural disasters such as earthquakes, hurricanes, floods and droughts strike populated areas substantial amounts of emergency aid from individuals and governments throughout the world are donated. However, both governments and individuals face limited budgets, and funds used for one purpose are unavailable to be used for another purpose.

Unfortunately, there is often a trade-off involved, with an increase in charitable giving to one cause resulting in a decrease in charitable giving to other causes following a disaster. This is not surprising as charities often experience what is sometimes referred to as ‘budget exhaustion’. Budget exhaustion suggests that people who give to charities put aside a certain sum of money to donate, and once given there is no more for other causes.

In October 2012, super-hurricane Sandy struck north-east USA, killing 285 people and damaging over 80 000 homes. During the first three weeks following the destruction, almost US\$220 million in donations was given. However, other charities in the New York City region unrelated to the hurricane relief effort

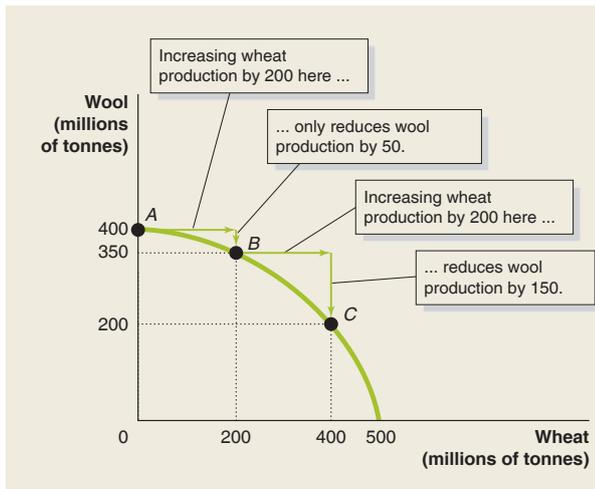
found that their usual donations were falling or had stopped altogether. For example, a charity serving wounded military personnel reported that donations had fallen to almost zero and a metropolitan poverty charity saw their donations fall by almost 30 per cent.

In January 2010 a massive earthquake struck the island of Haiti, killing more than 230 000 people and causing massive destruction to homes and infrastructure. Non-government aid organisations received substantial donations from individuals and businesses to assist the Haitian people. However, when a devastating earthquake hit Chile about one month later, non-government aid agencies reported that donations were less than hoped for. The Red Cross and the aid programs of churches reported that their regular donation levels to their other causes fell in the months following the two earthquakes. This trade-off was also seen following the December 2004 tsunami disaster, when an earthquake caused a tidal wave—or tsunami—to flood coastal areas of Indonesia, Thailand, Sri Lanka and other countries bordering the Indian Ocean, killing more than 280 000 people and destroying villages and homes. There was an influx of donations following this terrible event, but many charities in other parts of the world saw their donations fall. A difficult trade-off resulted: giving funds to victims of natural disasters meant fewer funds were available to aid other good causes.

SOURCE: Anjali Athavaley (2012), ‘Nonprofits fear donors have post-sandy ‘ask’ fatigue’, *The Wall Street Journal*, 9 December at <www.online.wsj.com>, viewed 5 October 2014; AllBusiness (2010); ‘Donations to Haiti might deprive local charities’, 26 January at <www.allbusiness.com>, viewed 11 January 2012; SwissInfo.ch (2005), ‘Charities fear post-tsunami donor fatigue’, 12 January at <www.swissinfo.ch>, viewed 5 October 2014.

where the economy currently is on the production possibility frontier. For example, to increase wheat production from zero to 200 units (millions of tonnes)—moving from point *A* to point *B*—the economy only has to give up 50 units of wool. But to increase wheat production by another 200 units—moving from point *B* to point *C*—the economy has to give up 150 units of wool.

As the economy moves down the production possibility frontier it experiences *increasing marginal opportunity costs* because increasing wheat production by a given quantity requires larger and larger decreases in wool production. Increasing marginal opportunity costs occur because some workers, machines and other resources are better suited to one use than to another. At point *A* some resources that are well suited to producing wheat are being forced to produce wool. Shifting these resources into producing wheat by moving from point *A* to point *B* allows a substantial increase in wheat production without much loss of wool production. But as the economy moves down the production possibility frontier more and more resources that are better suited to wool production are switched into wheat production. As a result, the increases in wheat production become increasingly smaller while the decreases in wool production become increasingly larger.

**FIGURE 2.2****Increasing marginal opportunity cost**

As the economy moves down the production possibility frontier it experiences increasing marginal opportunity costs because increasing wheat production by a given quantity requires larger and larger decreases in wool production. For example, to increase wheat production from 0 to 200 units (millions of tonnes)—moving from point A to point B—the economy only has to give up 50 units of wool. But to increase wheat production by another 200 units—moving from point B to point C—the economy has to give up 150 units of wool.

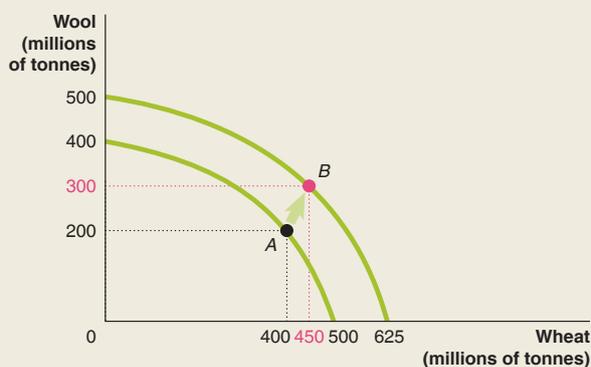
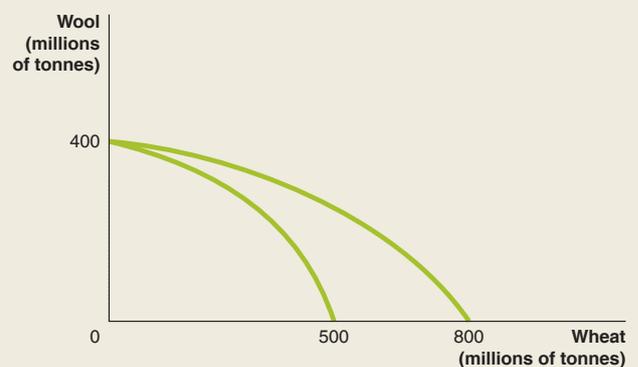
The idea of increasing marginal opportunity costs illustrates an important economic concept: *the more resources already devoted to an activity, the smaller the payoff to devoting additional resources to that activity.* The more hours you have already spent studying economics, the smaller the increase in your test grade from each additional hour you spend—and the greater the opportunity cost of using the hour in that way. The more funds a firm has devoted to research and development during a given year, the smaller the amount of useful knowledge it receives from each additional dollar—and the greater the opportunity cost of using the funds in that way.

Economic growth

At any given time the total resources available to any economy are fixed. Therefore, if Australia produces more wheat it must produce less of something else—wool in our example. Over time, though, the resources available to an economy may increase. For example, both the labour force and the capital stock—the amount of physical capital available in the country—may increase. The increase in the available labour force and the capital stock shifts the production possibility frontier outwards for the Australian economy and makes it possible to produce both more wheat and more wool. Figure 2.3(a) shows that the economy can move from point A to point B, producing more wool and more wheat.

FIGURE 2.3**Economic growth**

Figure 2.3(a) shows that as more economic resources become available and technological change occurs, the economy can move from point A to point B, producing more wool and more wheat. Figure 2.3(b) shows the results of technological advance in the wheat industry that increases the quantity of wheat that workers can produce per year, while leaving the maximum quantity of wool that can be produced unchanged. Shifts in the production possibility frontier represent economic growth.

**(a) Shifting out the production possibility frontier****(b) Technological change in the wheat industry**

Similarly, technological advance makes it possible to produce more goods with the same number of workers and the same amount of machinery, which also shifts the production possibility frontier outwards. Technological advance need not affect all sectors equally. Figure 2.3(b) shows the results of technological advance in the wheat industry that increases the quantity of wheat that workers can produce per year, while leaving unchanged the quantity of wool that can be produced.

Outward shifts in the production possibility frontier represent economic growth because they allow the economy to increase the production of goods and services, which ultimately raises the standard of living. In Australia and other high-income countries the market system has aided the process of economic growth, which over the past 200 years has greatly increased the health and wellbeing of the average person.

It is also possible for a production possibility frontier to shift inwards. This would occur if an economy experienced a reduction in its productive resources, causing the maximum amount of output that could be produced to fall. Disasters such as earthquakes, floods, fire or wars can lead to an inward shift of the production possibility frontier.



2.2

Understand comparative advantage and explain how it is the basis for trade.

LEARNING OBJECTIVE

Trade

The act of buying or selling a good or service in a market.

COMPARATIVE ADVANTAGE AND TRADE

Having discussed the important ideas of production possibility frontiers and opportunity cost, we can use them to understand the basic economic activity of trade. Markets are fundamentally about **trade**, which is the act of buying and selling. Many of the trades in which we engage take place indirectly. We sell our labour services as, say, an accountant, salesperson or nurse for money, and then use the money to buy goods and services. Ultimately an accountant, salesperson or nurse is trading their services for food, clothing and other goods and services. One of the great benefits of trade is that it makes it possible for people to become better off by increasing both their production and their consumption.

Specialisation and gains from trade

Consider the following situation: you and your neighbour both have fruit trees on your property. Initially, suppose that you only have apple trees and your neighbour only has cherry trees. In this situation, if you both like apples and cherries there is an obvious opportunity for both of you to gain from trade: you trade some of your apples for some of your neighbour's cherries, making you both better off. But what if there are apple and cherry trees growing on both of your properties? In that case there can still be gains from trade. For example, your neighbour might be very good at picking apples and you might be very good at picking cherries. Therefore, it makes sense that you both can benefit if your neighbour concentrates on picking apples and you concentrate on picking cherries. You can then trade some of your cherries for some of your neighbour's apples. But what if your neighbour is actually better at picking both apples and cherries than you are? It might not seem that in this case your neighbour has anything to gain from trading with you, but in fact they do.

Table 2.1 shows how many apples and how many cherries you and your neighbour can pick in one month. If you devote all your time to picking apples and none of your time to picking cherries, you can pick 20 kilograms of apples per month. If you devote all your time to picking cherries, you can pick 20 kilograms per month. Table 2.1 also shows that if your neighbour devotes all their time to picking apples they can pick 30 kilograms. If they devote all their time to picking cherries they can pick 60 kilograms.

TABLE 2.1 Fruit picked each month without trade

	YOU		YOUR NEIGHBOUR	
	APPLES	CHERRIES	APPLES	CHERRIES
All time devoted to picking apples	20 kg	0 kg	30 kg	0 kg
All time devoted to picking cherries	0 kg	20 kg	0 kg	60 kg

Suppose that when you don't trade with your neighbour you pick and consume 8 kilograms of apples and 12 kilograms of cherries per month. When they don't trade with you, your neighbour picks and consumes 9 kilograms of apples and 42 kilograms of cherries per month. After years of picking and consuming your own apples and cherries suppose your neighbour comes to you one day with the following proposition: they offer next month to trade you 15 kilograms of their cherries for 10 kilograms of your apples. Should you accept this offer? You will have more apples and more cherries to consume if you do.

To take advantage of their offer, first, rather than splitting your time between picking apples and picking cherries, you should specialise in picking apples only. We know this will allow you to pick 20 kilograms of apples. You can trade 10 of those 20 kilograms of apples to your neighbour for 15 kilograms of their cherries. The result is that you will be able to consume 10 kilograms of apples and 15 kilograms of cherries. You are clearly better off as a result of trading with your neighbour: you now can consume two more kilograms of apples and three more kilograms of cherries than you were consuming without trading.

Your neighbour has also benefited. By specialising in picking only cherries, they can pick 60 kilograms. They trade 15 kilograms of cherries to you for 10 kilograms of apples. The result is that they can consume 10 kilograms of apples and 45 kilograms of cherries. This is one more kilogram of apples and three more kilograms of cherries than they were consuming before trading with you. Table 2.2 summarises the changes in production and consumption that result from your trade with your neighbour.

TABLE 2.2 A summary of the gains from trade

	YOU		YOUR NEIGHBOUR	
	APPLES (kg)	CHERRIES (kg)	APPLES (kg)	CHERRIES (kg)
Production and consumption without trade	8	12	9	42
Production with trade	20	0	0	60
Consumption with trade	10	15	10	45
Gains from trade (increased consumption)	2	3	1	3

Absolute advantage versus comparative advantage

Perhaps the most remarkable aspect of the preceding example is that your neighbour benefits from trading with you even though they are better at picking both apples and cherries than you are. **Absolute advantage** is the ability to produce more of a good or service than other producers using the same amount of resources. Your neighbour has an absolute advantage over you in producing both apples and cherries because they can pick more of each fruit than you can in the same amount of time. This observation seems to suggest that your neighbour should pick their own apples *and* their own cherries. We have just seen, however, that they are better off if they specialise in cherry picking and leave the apple picking to you.

We can consider further why both you and your neighbour benefit from specialising in picking only one fruit. First, think about the opportunity cost to each of you of picking the two fruits. We saw from Table 2.1 that if you devoted all your time to picking apples you would be able to pick 20 kilograms of apples per month. As you shift time away from picking apples to picking cherries, you have to give up one kilogram of apples for each kilogram of cherries you pick. Therefore, your opportunity cost of picking one kilogram of cherries is one kilogram of apples. By the same reasoning, your opportunity cost of picking one kilogram of apples is one kilogram of cherries. Your neighbour faces a different trade-off. As they shift their time from picking apples to picking cherries, they have to give up 0.5 kilogram of apples for every one kilogram of cherries they pick. As they shift their time from picking cherries to picking apples, they give up two kilograms of cherries for every one kilogram of apples they pick. Therefore, their opportunity cost of picking one kilogram of apples is two kilograms of cherries, and their opportunity cost of picking one kilogram of cherries is 0.5 kilogram of apples.

Absolute advantage

The ability of an individual, firm or country to produce more of a good or service than other producers using the same amount of resources.

Table 2.3 summarises the opportunity costs for you and your neighbour of picking apples and cherries. Note that even though your neighbour can pick more apples in a month than you can, the *opportunity cost* of picking apples is higher for them than for you because when they pick apples they give up more cherries than you do. So, even though they have an absolute advantage over you in picking apples, it is more costly for them to pick apples than it is for you. The table also shows us that their opportunity cost of picking cherries is lower than your opportunity cost of picking cherries.

TABLE 2.3 Opportunity cost of picking apples and cherries

	OPPORTUNITY COST OF PICKING 1 KG OF APPLES	OPPORTUNITY COST OF PICKING 1 KG OF CHERRIES
You	1 kg of cherries	1 kg of apples
Your neighbour	2 kg of cherries	0.5 kg of apples

Comparative advantage

The ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers.

Comparative advantage is the ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers. In apple picking, your neighbour has an *absolute advantage* over you, but you have a *comparative advantage* over them. Your neighbour has both an absolute and a comparative advantage over you in picking cherries. As we have seen, you are better off specialising in picking apples, and your neighbour is better off specialising in picking cherries. Another way of thinking about why it would be costly for your neighbour to spend time picking apples is that even though they can pick 1.5 times as many apples in a month as you can—30 kilograms per month for them versus 20 kilograms per month for you—they can pick three times as many cherries—60 kilograms per month for them versus 20 kilograms for you. So, by specialising in picking cherries they are spending their time in the activity where their absolute advantage over you is the greatest.

DON'T
LET THIS
HAPPEN
TO
YOU

Don't confuse absolute advantage and comparative advantage

First, make sure you know the definitions:

- 1 **Absolute advantage:** The ability of an individual, firm or country to produce more of a good or service than other producers using the same amount of resources. In our example, your neighbour has an absolute advantage over you both in picking apples and in picking cherries.
- 2 **Comparative advantage:** The ability of an individual, firm or country to produce a good or service at a lower opportunity cost than other producers. In our example, your neighbour has a comparative advantage in picking cherries, but you have a comparative advantage in picking apples.

Keep these two key points in mind:

- 1 It is possible to have an absolute advantage in producing a good or service without having a comparative advantage. This would be the case with your neighbour picking apples.
- 2 It is possible to have a comparative advantage in producing a good or service without having an absolute advantage. This would be the case with you picking apples.

[YOUR TURN] Test your understanding by doing related problem 2.3 on page 52 at the end of this chapter.

Comparative advantage and the gains from trade

We have just derived an important economic principle: *the basis for trade is comparative advantage, not absolute advantage*. The fastest apple pickers do not necessarily do much apple picking. If the fastest apple pickers have a comparative advantage in some other activity—picking cherries, playing professional tennis or being industrial engineers—they are better off specialising in that other activity. Individuals, firms and countries are better off if they specialise in producing goods and services for which they have a comparative advantage and obtain the other goods and services they need by trading.

SOLVED PROBLEM 2.1 COMPARATIVE ADVANTAGE AND THE GAINS FROM TRADE

Consider this simple problem. Suppose that Australia and New Zealand both produce cheese and honey. These are the combinations of the two goods that each country can produce in one day:

AUSTRALIA		NEW ZEALAND	
HONEY (TONNES)	CHEESE (TONNES)	HONEY (TONNES)	CHEESE (TONNES)
0	60	0	50
10	45	10	40
20	30	20	30
30	15	30	20
40	0	40	10
		50	0

- Who has a comparative advantage in producing cheese? Who has a comparative advantage in producing honey?
- Suppose that Australia is currently producing 30 tonnes of honey and 15 tonnes of cheese and New Zealand is currently producing 10 tonnes of honey and 40 tonnes of cheese. Demonstrate that Australia and New Zealand can both be better off if they specialise in producing only one good and then engaging in trade.

Solving the problem

STEP 1: Review the chapter material. This problem concerns comparative advantage, so you may want to review the section 'Absolute advantage versus comparative advantage', which begins on page 39.

STEP 2: Answer question 1 by calculating who has a comparative advantage in each activity. Remember that a country has a comparative advantage in producing a good if it can produce the good at the lowest opportunity cost. When Australia produces one more tonne of honey, it produces 1.5 fewer tonnes of cheese. On the one hand, when New Zealand produces one more tonne of honey, it produces one less tonne of cheese. Therefore, New Zealand's opportunity cost of producing honey—one tonne of cheese—is lower than Australia's—1.5 tonnes of cheese. On the other hand, when Australia produces one more tonne of cheese, it produces two-thirds less of a tonne of honey. When New Zealand produces one more tonne of cheese, it produces one less tonne of honey. Therefore, Australia's opportunity cost of producing cheese—two-thirds of a tonne of honey—is lower than that of New Zealand's—one tonne of honey. We can conclude that New Zealand has a comparative advantage in the production of honey and Australia has a comparative advantage in the production of cheese.

STEP 3: Answer question 2 by showing that specialisation makes Australia and New Zealand better off. We know that Australia should specialise where it has a comparative advantage and New Zealand should specialise where it has a comparative advantage. If both countries specialise, Australia will produce 60 tonnes of cheese and 0 tonnes of honey, and New Zealand will produce 0 tonnes of cheese and 50 tonnes of honey. After both countries specialise, New Zealand could then trade 30 tonnes of honey to Australia (keeping the other 20 tonnes of honey itself) in exchange for 40 tonnes of cheese from Australia (which keeps the other 20 tonnes of cheese for itself). Note that other mutually beneficial trades are possible as well. We can summarise the results in a table:

	BEFORE TRADE		AFTER TRADE	
	HONEY (TONNES)	CHEESE (TONNES)	HONEY (TONNES)	CHEESE (TONNES)
Australia	30	15	30	20
New Zealand	10	40	20	40

New Zealand is better off after trade because it can consume the same amount of cheese and 10 more tonnes of honey. Australia is better off after trade because it can consume the same amount of honey and five more tonnes of cheese.

[YOUR TURN] For more practice do related problems 2.4 and 2.5 on page 52 at the end of this chapter.


2.3

Explain the basic idea of how a market system works.

LEARNING OBJECTIVE

Market

A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

Product markets

Markets for goods—such as computers—and services—such as medical treatment.

Factor markets

Markets for the factors of production, such as labour, capital, natural resources and entrepreneurial ability.

Factors of production

Labour, capital, natural resources and entrepreneurial ability used to produce goods and services.

Free market

A market with few government restrictions on how a good or service can be produced or sold, or on how a factor of production can be employed.

THE MARKET SYSTEM

We have seen that households, firms and the government face trade-offs and incur opportunity costs because of the scarcity of resources. We have also seen that trade allows people to specialise according to their comparative advantage. By engaging in trade, people can raise their standard of living. Of course, trade in the modern world is much more complex than the examples we have considered so far. Trade today involves the decisions of billions of people around the world. But how does an economy make trade possible, and how are the decisions of these billions of people coordinated? In Australia and most other countries trade is carried out in markets. Markets also determine the answers to the three fundamental questions discussed in Chapter 1:

What goods and services will be produced? *How* will the goods and services be produced? *Who* will receive the goods and services that are produced?

Recall that the definition of a **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. Markets take many forms, such as the local fruit and vegetable market, the stock exchange or eBay. In a market the buyers are demanders of goods or services, and the sellers are suppliers of goods or services. Households and firms interact in two types of markets: *product markets* and *factor markets*. **Product markets** are markets for goods—such as computers—and services—such as medical treatment. In product markets, households are demanders and firms are suppliers. **Factor markets** are markets for the *factors of production*. **Factors of production** are the inputs used to make goods and services. Factors of production are divided into four broad categories:

- **Labour.** This includes all types of work, from the part-time labour of teenagers working at McDonald's to the work of top managers in large corporations.
- **Capital.** This refers to physical capital, such as machines, tools and computers, that is used to produce other goods.
- **Natural resources.** These include land, water, oil, minerals and other raw materials that are used in producing goods.
- **Entrepreneurial ability.** An entrepreneur is someone who operates a business. Entrepreneurial ability is the ability to bring together the other factors of production to produce and sell goods and services successfully.

In factor markets, households are suppliers and firms are demanders. Most people earn most of their income by selling their labour services to firms in the labour market.

The gains from free markets

As we learned in Chapter 1, a **free market** exists when the government places few restrictions on how a good or a service can be produced or sold, or on how a factor of production can be employed. Relatively few government restrictions are placed on economic activity in Australia, the United States, Hong Kong and Singapore. In countries such as Cuba and North Korea the free market system has been rejected in favour of centrally planned economies with extensive government control over product and factor markets. Countries that come closest to the free market system have been more successful than countries with centrally planned economies in providing their people with rising living standards.

The Scottish philosopher Adam Smith is considered to be the father of modern economics because one of his books, *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776, was an early and very influential argument for the free market system. Smith was writing at a time when extensive government restrictions on markets were still very common. In many parts of Europe the guild system still prevailed. Under this system governments would give guilds, or organisations of producers, the authority to control the production of a good. For example, the shoemakers' guild controlled who was allowed to produce shoes, how many shoes they could produce and what price they could charge. In France, the cloth makers' guild even dictated the number of threads that were allowed in the weave of the cloth.

Smith argued that such restrictions reduced the income or wealth of a country and its people by restricting the quantity of goods produced. Some people at the time supported the restrictions of the guild system because it was in their financial interest to do so. If you were a

member of a guild the restrictions served to reduce the competition you would face. But other people sincerely believed that the alternative to the guild system was economic chaos. Smith argued that these people were wrong and that a country could enjoy a smoothly functioning economic system if firms were freed from guild restrictions.

The market mechanism

In Smith's day defenders of the guild system worried that if, for instance, the shoemakers' guild did not control shoe production either too many or too few shoes would be produced. Smith argued that prices would do a better job of coordinating the activities of buyers and sellers than the guilds could. A key to understanding Smith's argument is the assumption that *individuals usually act in a rational, self-interested way*. In particular, individuals take those actions most likely to make themselves better off financially. This assumption of rational, self-interested behaviour underlies nearly all economic analysis. Adam Smith understood—as economists today understand—that people's motives can be complex. But in analysing people in the act of buying and selling, the motivation of financial reward usually provides the best explanation for the actions people take.

For example, suppose that a significant number of consumers switch from buying sedan cars to buying sport utility vehicles (SUVs) as in fact happened in Australia during the 1990s and 2000s. Firms will find that they can charge higher prices for SUVs than they can for sedans. The self-interest of these firms will lead them to respond to consumers' wishes by producing more SUVs and fewer sedans. Or suppose that consumers decide that they want to eat less bread, pasta and other foods high in carbohydrates, as many did in the 1990s and early 2000s, following the increase in popularity of the Atkins diet. Then the prices firms can charge for bread and pasta will fall. The self-interest of firms will lead them to produce less bread and pasta, which in fact is what happened in the late 1990s and early 2000s.

In the case where consumers want more of a product, and in the case where they want less of a product, the market system responds without a guild or anyone else giving orders about how much to produce or what price to charge. In a famous phrase, Smith said that firms would be led by the 'invisible hand' of the market to provide consumers with what they wanted. Firms would respond to changes in prices by making decisions that ended up satisfying the wants of consumers. The effect that price changes have on the behaviour of firms and consumers is referred to in economics as the **price mechanism**.

Price mechanism

The system in a free market where price changes lead to producers changing production in accordance with the level of consumer demand.

STORY OF THE MARKET SYSTEM IN ACTION: I, PENCIL

The pencil appears to be a very simple product. In fact, its production requires the coordinated activities of many different people, spread around the world. The economist Leonard Read showed how markets achieve this coordination by writing an 'autobiography' of a pencil sold by the Eberhard Faber Pencil Company of California. It is one of the most famous accounts of how the market system works. The pencil writes that:

My family tree begins with a [cedar] tree that grows in Northern California and Oregon. Now contemplate all the saws and trucks and rope and the countless other gear used in harvesting and carting the cedar logs to the railroad siding ...

The logs are shipped to a mill in San Leandro, California ... The cedar logs are cut into small, pencil-length slats less than one-fourth of an inch in thickness ... Once in the pencil factory each slat is given eight grooves by a complex machine, after which another machine lays leads in every other slat ...

My 'lead' itself—it contains no lead at all—is complex. The graphite is mined in Ceylon ... [and] is mixed with clay from Mississippi in which ammonium hydroxide is used in the refining process ... To increase their strength and smoothness the leads are then treated with a hot mixture which includes candelilla wax from Mexico, paraffin wax, and hydrogenated natural fats.

MAKING THE CONNECTION 2.2



The market coordinates the activities of the many people spread around the world who contribute to the making of a pencil

My cedar receives six coats of lacquer. Do you know all the ingredients of lacquer? Who would think that the growers of castor beans and the refiners of castor oil are a part of it? They are.

My bit of metal—the ferrule—is brass. Think of all the persons who mine zinc and copper and those who have the skills to make shiny sheet brass from these products of nature.

Then there's my crowning glory ... the part man uses to erase the errors he makes with me ... It is a rubber-like product made by reacting rape-seed oil from the Dutch East Indies with sulfur chloride ... Then, too, there are numerous vulcanizing and accelerating agents. The pumice comes from Italy; and the pigment which gives [the eraser] its color is cadmium sulfide.

[M]illions of human beings have had a hand in my creation, no one of whom even knows more than a very few of the others ... There isn't a single person in all these millions, including the president of the pencil company, who contributes more than a tiny, infinitesimal bit of know-how ...

There is a fact still more astounding: the absence of a master mind, of anyone dictating or forcibly directing these countless actions which bring me into being. No trace of such a person can be found. Instead, we find the Invisible Hand at work.

SOURCE: Leonard E. Read (1958), *I, Pencil*, Irvington-on-Hudson, New York: Foundation for Economic Education Inc. Used with permission of the Foundation for Economic Education Inc. Available online at <<http://fee.org/library/books/i-pencil-2>>.

The role of the entrepreneur

Entrepreneur

Someone who operates a business, bringing together the factors of production—labour, capital and natural resources—to produce goods and services.

Entrepreneurs are central to the working of the market system. An **entrepreneur** is someone who operates a business. Entrepreneurs must first determine what goods and services they believe consumers want, and then decide how those goods and services might be produced most profitably, using the available factors of production—labour, capital and natural resources. Successful entrepreneurs are able to find opportunities to provide new goods and services. Often these opportunities are created by new technology.

Consumers and existing businesses often do not realise at first that the new technology makes new products feasible. For example, even after the development of the internal combustion engine made cars practicable, Henry Ford remarked, 'If I had asked my customers what they wanted, they would have said a faster horse'. Because consumers often cannot evaluate a new product before it exists, some of the most successful entrepreneurs, such as the late Steve Jobs of Apple, rarely use *focus groups*, or meetings in which consumers are asked what new products they would like to see. Instead, entrepreneurs think of products that consumers may not even realise they need, such as, in Jobs' case, an MP3 player—iPod—or a tablet computer—iPad.

Entrepreneurs are of great importance to the economy because they are often responsible for making new products widely available to consumers, as Henry Ford did with cars, and Steve Jobs did with the iPod. Table 2.4 lists some of the important products entrepreneurs at small firms introduced during the twentieth century.

Entrepreneurs put their own funds at risk when they start businesses. If they are wrong about what consumers want or about the best way to produce goods and services, they can lose those funds. In fact, it is not unusual for entrepreneurs who eventually achieve great success to fail at first. For instance, early in their careers, both Henry Ford of the Ford Motor Company and Sakichi Toyoda, who eventually founded the Toyota Motor Corporation, started earlier companies that quickly failed. The typical entrepreneur earns less than someone who is an employee in a large firm with the same education and characteristics. Few entrepreneurs make the fortunes of Henry Ford, Steve Jobs or Bill Gates.

Entrepreneurs make a vital contribution to economic growth through their roles in responding to consumer demand and in introducing new products. Therefore government policies that encourage entrepreneurship are also likely to increase economic growth and raise the standard of living. In the next section, we consider the legal framework required for a successful market in which entrepreneurs can succeed.

TABLE 2.4 Important products introduced by entrepreneurs at small firms

PRODUCT	INVENTOR	PRODUCT	INVENTOR
Air conditioning	William Haviland Carrier	Optical scanner	Everett Franklin Lindquist
Aeroplane	Orville and Wilbur Wright	Oral contraceptives	Carl Djerassi
Biomagnetic imaging	Raymond Damadian	Overnight delivery service	Fred Smith
Biosynthetic insulin	Herbert Boyer	Personal computer	Steve Jobs and Steve Wozniak
DNA fingerprinting	Alec Jeffries	Quick-frozen foods	Clarence Birdseye
FM radio	Edwin Howard Armstrong	Safety razor	King Gillette
Helicopter	Igor Sikorsky	Soft contact lens	Kevin Tuohy
High-resolution CAT scanner	Robert Ledley	Solid fuel rocket engine	Robert Goddard
Hydraulic brake	Malcolm Lockheed	Supercomputer	Seymour Cray
Integrated circuit	Jack Kilby	Vacuum tube	Philo Farnsworth
Microprocessor	Ted Hoff	Zips	Gideon Sundback

SOURCE: Based on William J. Baumol (2010), *The Microtheory of Innovative Entrepreneurship*, Princeton University Press, and various sources. Note that the person who first commercially developed a particular product is sometimes disputed by historians.

THE LEGAL BASIS OF A SUCCESSFUL MARKET SYSTEM

In a free market government does not restrict how firms produce and sell goods and services, or how they employ factors of production, but the absence of government intervention is not enough for the market system to work well. Government has to provide secure rights to private property for the market system to work at all. In addition, government can aid the working of the market by enforcing contracts between private individuals through an independent court system. Many economists would also say that the government has a role in facilitating the development of an efficient financial system as well as systems of education, transportation and communication. The protection of private property and the existence of an independent court system to enforce the law impartially provide a legal environment that will allow a market system to succeed.

Protection of private property

For the market system to work well individuals must be willing to take risks. Someone with \$250 000 can be cautious and keep it safely in a bank—or even in cash if the person doesn't trust the banking system. But the market system won't work unless a significant number of people are willing to risk their funds by investing them in businesses. Investing in businesses is risky in any country. Many businesses fail every year in Australia and other high-income countries. But in high-income, market-based countries someone who starts a new business or invests in an existing business usually doesn't have to worry that the government, the military or criminal gangs might decide to seize the business or demand payments in return for not destroying the business. Unfortunately, in many poor countries owners of businesses are not well protected from having their businesses seized by the government or from having their profits or assets taken by criminals. Where these problems exist, opening a business can be extremely risky. Cash can be concealed easily, but a business is difficult to conceal and difficult to move.

Property rights refer to the rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it. Property can be tangible, physical property, such as a shop or factory. Property can also be intangible, such as the rights to an idea. Guarantees exist in every high-income country. Unfortunately, in many developing countries such guarantees do not exist or are poorly enforced.



2.4

Understand why property rights are necessary for a well-functioning market.

LEARNING OBJECTIVE

Property rights

The rights individuals or firms have to the exclusive use of their property, including the right to buy or sell it.

MAKING THE CONNECTION

2.3



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Recording studios, movie studios and artists worry that the copyrights for their music and films are not being protected on the Internet

ILLEGAL DOWNLOADS FROM CYBERSPACE

The development of the Internet has led to new problems in protecting intellectual property rights. People can copy and email songs, newspaper and magazine articles and even entire movies and television programs, or post them on websites. Controlling unauthorised copying is more difficult today than it was when ‘copying’ meant making a physical copy of a book, CD or DVD.

Music companies have attempted to combat free downloads of music by offering inexpensive legal downloads. Some of these legal websites, such as Apple’s iTunes, Amazon’s MP3, Google Play, Spotify, Microsoft’s Xbox Music and Sony’s bandit.fm, have been very successful. In fact, global digital music trade revenue rose by 4.3 per cent in 2013, reaching US\$5.9 billion, with digital channels generating around 39 per cent of worldwide music sales. Just a decade earlier, revenue from digital sales of music was almost zero. However, according to the International Federation of the Phonographic Industry (IFPI), a very large proportion of music downloads are illegal. It estimates that over one quarter of Internet users regularly download from unlicensed sites. The inability to protect the property rights in the music industry fully has not only led to revenue falls for recording studios and music retailers, but has also been linked to reduced investment in potential new artists.

It is not just the music industry that is experiencing problems with unauthorised copying. For example, in 2014, an estimated 30 million unauthorised copies of the movie *Frozen* and over eight million copies of the TV series *Game of Thrones* were downloaded, which is likely to have had a significant impact on the DVD rental market, DVD sales and on-demand movie downloads. Illegal electronic copies of books also appear regularly on the Internet.

Music companies and movie studios have been lobbying governments to place legal responsibility on Internet Service Providers (ISPs), requiring them to warn users who download illegally, and then to suspend temporarily the accounts of people who continue with illegal downloads and file-sharing. This is known as the ‘graduated response’ approach. In 2011, ISPs in the United States agreed to establish a copyright alert system to notify subscribers of illegal downloading occurring on their Internet accounts. Further, ISPs in 18 countries have been legally required to block users’ access to sites that breach copyright, such as The Pirate Bay, after which usage fell by 69 per cent. These countries include 10 in the European Union, South Korea, Malaysia, Taiwan and New Zealand. Countries that did not block access experienced an increase in usage of 45 per cent.

In 2012, Google announced that it would help users find legitimate sites more easily by changing its search algorithm so that it would take into account the volume of infringements notices it had received from copyright holders regarding certain sites. To date this measure appears to have had little effect.

However, in Australia in 2012, Perth-based ISP iiNet won a High Court case which ruled that iiNet was not liable for the online piracy carried out by its customers, nor was it required to be responsible for policing piracy. The companies in the case against iiNet included Disney, Paramount Pictures, the Seven Network, Sony Pictures Entertainment, Village Roadshow, Warner Bros, Universal Pictures and 20th Century Fox. The issues raised in the lawsuit, which ran for over four years, including numerous rulings and appeals, demonstrate the complexities and difficulties in protecting intellectual property rights.

SOURCE: International Federation of the Phonographic Industry (IFPI) (2014), *IFPI Digital Music Report 2014*, at <www.ifpi.org>, 24 September 2014; Mashable (2014), ‘The most pirated TV shows and movies of 2014’, at <<http://mashable.com>>, viewed 7 February 2015; Andrew Colley (2012), ‘iiNet wins landmark copyright case against Hollywood studios’, *The Australian*, 21 April, at <www.theaustralian.com>, viewed 24 September 2014.

In any modern economy *intellectual property rights* are very important. Intellectual property includes books, films, music, software and ideas for new products or new ways of producing products. To protect intellectual property the federal government will grant a patent that gives an inventor—which is often a firm—the exclusive right to produce and sell a new product for a period of years from the date the product was invented. For instance, because Microsoft has a patent on the Windows operating system, other firms cannot sell their own versions of

Windows. The government grants patents to encourage firms to spend money on the research and development necessary to create new products. If other companies could freely copy Windows, Microsoft would not have spent the funds necessary to develop it. Just as a new product or a new method of making a product receives patent protection, so books, films, music and software receive copyright protection. Under Australian law the creator of a book, film, software or piece of music has the exclusive right to use the creation during the creator's lifetime. For books, sheet music and software, the creator's heirs retain this exclusive right for another 70 years, and for films and music recordings, copyright extends for 70 years from the year which the film or recording was produced.

Enforcement of contracts and property rights

Much business activity involves someone agreeing to carry out some action in the future. For example, you may borrow \$20 000 to buy a car and promise the bank—by signing a loan contract—that you will pay back the money over the next five years. Or Microsoft may sign a licensing agreement with a small technology company, agreeing to use that company's technology for a period of several years in return for a fee. Usually these agreements take the form of legal contracts. For the market system to work, businesses and individuals have to rely on these contracts being carried out. If one party to a legal contract does not fulfil its obligations—perhaps the small company had promised Microsoft exclusive use of its technology but then began licensing it to other companies—the other party can go to court to have the agreement enforced.

But going to court to enforce a contract or private property rights will only be successful if the court system is independent and judges are able to make impartial decisions on the basis of the law. In Australia and many other high-income countries the court systems have enough independence from other parts of the government and enough protection from intimidation by outside forces—such as criminal gangs—to enable them to make their decisions based on the law. In many developing countries the court systems lack this independence and may not provide a remedy if the government violates private property rights or if a person with powerful political connections decides to violate a business contract.

If property rights are not well enforced the production of goods and services will be reduced. This reduces economic efficiency, leaving the economy inside its production possibility frontier.

THE TRADE-OFFS WHEN YOU BUY A CAR

In 'Economics in your life' at the beginning of this chapter, we asked you to think about two questions. When buying a new car, what is the relationship between safety and fuel efficiency? Under what circumstances would it be possible for car manufacturers to make cars safer and more fuel efficient? To answer the first question, you have to recognise that there is normally a trade-off between safety and fuel efficiency. With the technology that is available at any particular time, a car manufacturer can increase fuel efficiency by making a car smaller and lighter. But driving a lighter car increases your chances of being injured if you have an accident. The trade-off between safety and fuel efficiency would look much like the relationship in Figure 2.1 on page 35. To get more of both safety and fuel efficiency, car manufacturers would have to discover new technologies that allow them to make cars lighter and safer at the same time. Such new technologies would make points like *G* in Figure 2.1 attainable.

ECONOMICS
IN YOUR
LIFE

(continued from
page 33)

CONCLUSION

We have seen that the key role of markets is to facilitate trade. In fact, the market system is a very effective means of coordinating the decisions of millions of consumers, workers and firms. At the centre of the market system is the consumer. To be successful, firms must respond to the desires of consumers. These desires are communicated to firms through prices. To explore how markets work we must study the behaviour of consumers and firms. We continue this exploration of markets in Chapter 3 when we develop the model of demand and supply.

Before moving on to Chapter 3, read the following 'An inside look' to learn how BMW has expanded its production possibility frontier over time.

AN INSIDE LOOK

BMW GROUP JANUARY 2015

Expansion and production mix at BMW

BMW builds and assembles its products at 29 sites in 14 countries. The backbone of BMW's production network is formed by six plants in Dingolfing, Leipzig, Munich, Regensburg, Rosslyn and Spartanburg, as well as a joint venture in Shenyang. Wherever appropriate, the BMW Group integrates external partners into serial production. But the BMW Group continues to retain the relevant expertise as well as maintaining overall control and decision-making authority when it comes to design, engine construction, purchasing, testing, service and warranty matters.

A It was in 1973 that BMW opened its first foreign plant, in the South African town of Rosslyn. Then, in order to develop new markets the world over, further production plants were established and joint assembly ventures in Asia commenced in the 1980s. In 1994 BMW opened its plant in Spartanburg, in South Carolina, USA. Towards the end of 2003, BMW cars were built for the first time in China in close cooperation with a local partner. Then, starting in 2005, BMW Plant Leipzig increased production capacities of the BMW Group to an even higher level. In early 2007, BMW's assembly plant in India served to penetrate yet another interesting market. In 2012 expansions of the Spartanburg and Rosslyn plants were carried out, in 2013 a new plant was completed in Brazil and in 2014 BMW announced plans to build a plant in Mexico.

The development of a new vehicle and the production facilities required would be quite inconceivable today without the use of virtual tools such as computer-based design programs and complex simulation models. Using 3D simulations and computer models of a virtual factory, BMW specialists are able to replicate the entire flow of production and simulate production conditions very close to subsequent reality. In the production of automobiles, over 80 per cent of all processes are now verified and confirmed in virtual reality in advance, long before the first production facilities are actually in place.

B Despite the constant increase in model diversity, the BMW Group's production network is sufficiently flexible to build different models and versions at every plant. An important feature in this context is the universal main assembly line in production, allowing assembly of various models in any sequence on one and the same production line. This enables the BMW Group to respond flexibly to fluctuations in the market and individual customer wishes, working to optimum capacity at all plants. In this context, BMW refers to its factories as 'living structures'.

BMW GROUP

Key points in the article

The article discusses the expansion in production of the BMW Group over time, both its expansion of production into other countries and in the capacity of specific plants.

Like all vehicle manufacturers, BMW constantly introduces new models, and produces numerous models at the same time. The article discusses BMW's very flexible production processes which enable it to substitute resources between models, and to produce variations of the same model, on the same assembly line. This allows it to meet the changes in the demand for vehicles while still fully utilising its machinery and equipment.

Analysing the news

A We can use the economic model of production possibility frontiers to analyse this article. First, note the expansion of plants over time. For example, the expansion of the production capacity in the Spartanburg and Rosslyn plants in 2012 can be represented by an outward shift in the production possibility frontier. Figure 1 shows a hypothetical production possibility frontier for motor vehicles and motorcycles produced by BMW during its expansion years, from 1951 to 2014. The expansion of production of motorcycles and motor vehicles of the entire BMW Group can be shown by an outward shift of a production possibility frontier.

B The introduction of new models, together with changes in consumer preferences for particular models at various times, means that the types of vehicles made on production assembly lines must change. The article states

that the assembly line production at BMW is very flexible, and that production of different models can occur on the same universal assembly line, in any sequence. For example, by 2014 BMW's largest plant at Dingolfing was producing a number of models, including the 6 Series and 7 Series. Once BMW is on the production possibility frontier at a plant, its opportunity cost of producing, for example, more 7 Series cars is the reduction in the quantity of other vehicles produced, for example, the 6 Series. We can show this in Figure 2 by drawing a production possibility frontier with the quantity of 6 Series produced in the plant on the horizontal axis and the quantity of 7 Series on the vertical axis. Once BMW is on the production possibility frontier for this plant, it can only produce more of one model by producing fewer of the other model. If the demand for the 7 Series became stronger relative to the demand for the 6 Series, this would lead BMW to substitute production between the models, which would lead to a move from point A to point B in Figure 2.

Thinking critically

- 1 Designing and selling new car models usually boosts sales. Therefore should BMW launch a new line of cars every year? Every month? Explain.
- 2 Explain what would cause BMW to shift its resources into the production of more 6 Series and fewer 7 Series vehicles? Should BMW continually shift its resources between the production of these two vehicles? Why or why not?

FIGURE 1 PRODUCTION OF MOTORCYCLES AND MOTOR VEHICLES AT BMW GROUP HAS EXPANDED SIGNIFICANTLY OVER TIME

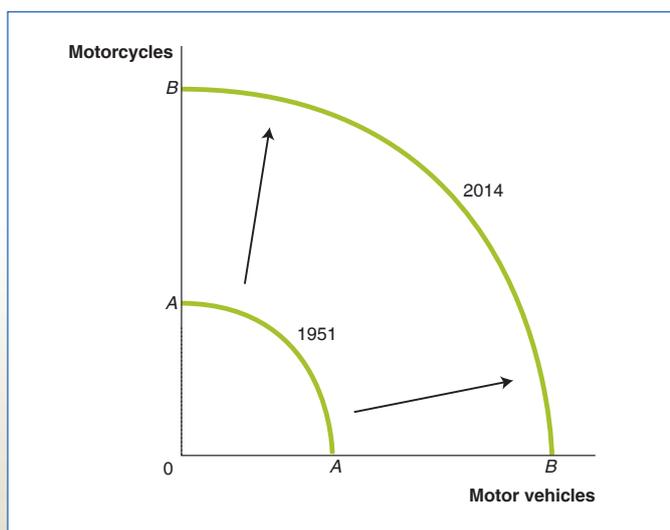
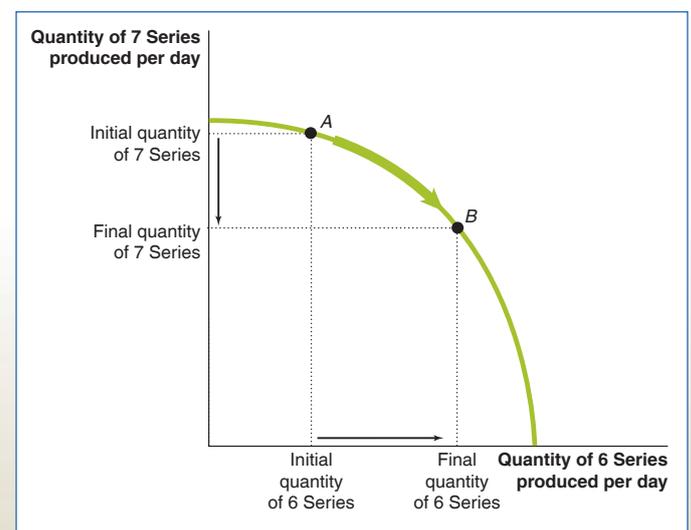


FIGURE 2 ONCE BMW IS ON THE PRODUCTION POSSIBILITY FRONTIER IN ITS DINGOLFING PLANT, A LARGER QUANTITY OF 7 SERIES VEHICLES PRODUCED IS ONLY POSSIBLE IF A SMALLER QUANTITY OF 6 SERIES IS PRODUCED



CHAPTER SUMMARY AND PROBLEMS

KEY TERMS

absolute advantage	39	free market	42	production possibility frontier	34
comparative advantage	40	market	42	property rights	45
entrepreneur	44	opportunity cost	35	scarcity	34
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PRODUCTION POSSIBILITY FRONTIERS AND REAL-WORLD TRADE-OFFS,

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LEARNING OBJECTIVE 2.1 Use a production possibility frontier to analyse opportunity costs and trade-offs.

SUMMARY

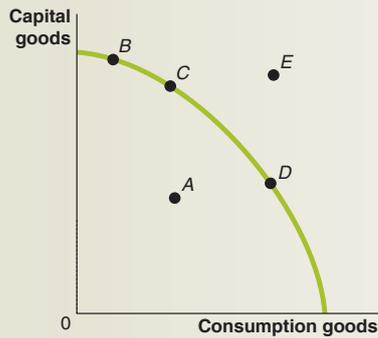
The **production possibility frontier** is a curve showing the maximum attainable combinations of two products that may be produced with available resources. It is used to illustrate the trade-offs that arise from **scarcity**. Points on the frontier are efficient. Points inside the frontier are inefficient and points outside the frontier are unattainable. The **opportunity cost** of any activity is the highest-valued alternative that must be given up to engage in that activity. Because of increasing marginal opportunity costs, production possibility frontiers are usually bowed out or concave, rather than straight lines. This illustrates the important economic concept that the more resources that are already devoted to any activity, the smaller the payoff from devoting additional resources to that activity is likely to be.

REVIEW QUESTIONS

- 1.1 What do economists mean by scarcity? Can you think of anything that is not scarce according to the economic definition?
- 1.2 What is a production possibility frontier? How can we show economic efficiency on a production possibility frontier? How can we show inefficiency? What causes a production possibility frontier to shift outward?
- 1.3 What is meant by increasing marginal opportunity costs? What are the implications of this idea for the shape of the production possibility frontier?

PROBLEMS AND APPLICATIONS

- 1.4 Draw a production possibility frontier showing the trade-off between the production of wheat and the production of barley.
 - a Show the effect that a prolonged drought would have on the initial production possibility frontier.
 - b Suppose genetic modification makes barley resistant to insects, allowing yields to double. Show the effect of this technological change on the initial production possibility frontier.
- 1.5 **[Related to the opening case]** One of the trade-offs faced by BMW is between safety and fuel economy. For example, adding steel to a car makes it safer but also heavier, which results in higher fuel consumption. Draw a hypothetical production possibility frontier facing BMW engineers that shows this trade-off.
- 1.6 Suppose you win free tickets to a movie plus all you can eat at the snack bar for free. Would there be a cost to you to attend this movie? Explain.
- 1.7 Suppose we can divide all the goods produced by an economy into two types: consumption goods and capital goods. Capital goods, such as machinery, equipment and computers, are goods used to produce other goods.
 - a Use a production possibility frontier graph to illustrate the trade-off to an economy between producing consumption goods and producing capital goods. Briefly explain why the curve is likely to be concave.
 - b Suppose that a technological advance occurs that affects the production of capital goods but not consumption goods. Show the effect on the production possibility frontier.
 - c Suppose that country *A* and country *B* currently have identical production possibility frontiers, but that country *A* devotes only 5 per cent of its resources to producing capital goods over each of the next 10 years, whereas country *B* devotes 30 per cent. Which country is likely to experience more rapid economic growth in the future? Illustrate using a production possibility frontier graph. Your graph should include production possibility frontiers for country *A* today and in 10 years, and for country *B* today and in 10 years.
- 1.8 Use the following production possibility frontier for a country to answer the questions.



- a Which point(s) are unattainable? Briefly explain why.
- b Which point(s) are efficient? Briefly explain why.
- c Which point(s) are inefficient? Briefly explain why.
- d At which point is the country's future growth rate likely to be the highest? Briefly explain why.
- 1.9 You have exams in economics and statistics coming up and five hours available for studying. The table shows the trade-offs you face in allocating the time you will spend in studying each subject.

CHOICE	HOURS SPENT STUDYING		EXAM SCORE	
	ECONOMICS	STATISTICS	ECONOMICS	STATISTICS
A	5	0	95	70
B	4	1	93	78
C	3	2	90	84
D	2	3	86	88
E	1	4	81	90
F	0	5	75	91

- a Use the data in the table to draw a production possibility frontier graph. Label your vertical axis 'Score on economics exam' and label your horizontal axis 'Score on statistics exam'. Make sure you label the values where your production possibility frontier intersects the vertical and horizontal axes.
- b Label the points representing choice C and choice D. If you are at choice C, what is your opportunity cost of increasing your statistics score?
- c Under what circumstances would A be a sensible choice?
- 1.10 Suppose the federal government is trying to decide whether to spend more on research to find a cure for heart disease. As one of the government's economic advisors, you are asked to prepare a report discussing the relevant factors that should be considered. Use the concepts of opportunity cost and trade-offs to discuss some of the main issues you would include in your report.
- 1.11 Cost-effective analysis looks at the various options that could be used to achieve a goal, with the aim of determining the least-cost strategy. Some individuals oppose cost-effectiveness analysis, arguing that you can't put a price

on health or life. Are health and life priceless? Are there any decisions you make during your everyday life that indicated whether you consider health and life to be priceless?

- 1.12 Suppose that the federal government is deciding which of one out of two different cancer treatments it will fund: Treatment A, which will prolong the average lifespan of patients receiving the treatment by 2 years and will cost \$750 000 per patient treated; and Treatment B, which will prolong the average lifespan of patients receiving the treatment by 1½ years and will cost \$25 000 per patient treated. What factors should the federal government take into account in making its decision?
- 1.13 During his 2007 election campaign, the soon to be Prime Minister of Australia, Kevin Rudd (now former Prime Minister), stated that climate change was:

*... the greatest moral, economic and environmental challenge of our generation.*¹

In 2009 he stated that only 'political cowards' argue that a country shouldn't act on climate change until other countries do. However, in 2010 he announced he would delay the government's legislation on major environmental policy until at least 2013, when other countries decide what they will do.

A director within President Obama's government in the United States, and former secretary of the treasury in the Clinton government, Lawrence Summers, has been quoted as giving the following moral defence of the economic approach to climate change:

*I don't think there is anything immoral about seeking to achieve environment benefits at the lowest possible costs.*²

Given that debate on climate change is often argued on moral grounds, would it be more moral to reduce pollution without worrying about the cost or by taking the cost into account? Explain.

- 1.14 In *The Wonderful Wizard of Oz* and his other books about the Land of Oz, L. Frank Baum observed that if people's wants were modest enough most goods would not be scarce. According to Baum, this was the case in Oz:

*There were no poor people in the Land of Oz, because there was no such thing as money. Each person was given freely by his neighbors whatever he required for his use, which is as much as anyone may reasonably desire. Some tilled the lands and raised great crops of grain, which was divided equally among the whole population, so that all had enough. There were many tailors and dressmakers and shoemakers and the like, who made things that any who desired them might wear. Likewise there were jewelers who made ornaments which pleased and beautified the people, and these ornaments also were free to those who asked for them. Each man and woman, no matter what he or she produced for the good of the community, was supplied by the neighbors with food and clothing and a house and furniture and ornaments and games. If by chance the supply ever ran short, more was taken from the great storehouses of the Ruler, which were afterward filled up again when there was more of any article than people needed...*³

You will know, by what I have told you here, that the Land of Oz was a remarkable country. I do not suppose such an arrangement would be practical with us.

Do you agree with Baum that the economic system in Oz wouldn't work in modern developed economies? Briefly explain why or why not.

COMPARATIVE ADVANTAGE AND TRADE, PAGES 38–41

LEARNING OBJECTIVE 2.2 Understand comparative advantage and explain how it is the basis for trade.

SUMMARY

Fundamentally, markets are about **trade**, which is the act of buying or selling. People trade on the basis of comparative advantage. An individual, firm or country has a **comparative advantage** in producing a good or service if it can produce the good or service at the lowest opportunity cost. People are usually better off specialising in the activity for which they have a comparative advantage and trading for the other goods and services they need. It is important not to confuse comparative advantage with absolute advantage. An individual, firm or country has an **absolute advantage** in producing a good or service if it can produce more of that good or service from the same amount of resources. It is possible to have an absolute advantage in producing a good or service without having a comparative advantage.

REVIEW QUESTIONS

- What is absolute advantage? What is comparative advantage? Is it possible for a country to have a comparative advantage in producing a good without also having an absolute advantage? Briefly explain.
- What is the basis for trade? What advantages are there to specialisation?

PROBLEMS AND APPLICATIONS

- [Related to Don't let this happen to you]** Using the same amount of resources, Australia and New Zealand can both produce apples and oranges as shown in the following table, measured in thousands of tonnes.

AUSTRALIA		NEW ZEALAND	
APPLES	ORANGES	APPLES	ORANGES
12	0	6	0
3	3	3	3
0	4	0	6

- Who has a comparative advantage in producing apples? Who has a comparative advantage in producing oranges? Explain your reasoning.
 - Does either country have an absolute advantage in producing both goods? Explain.
 - Suppose that both countries are currently producing 3000 tonnes of apples and 3000 tonnes of oranges. Show that both can be better off if they specialise in producing one good and then engage in trade.
- [Related to Solved problem 2.1]** Suppose Iran and Iraq both produce oil and olive oil. The table shows combinations

of both goods that each country can produce in a day, measured in thousands of barrels.

IRAN		IRAQ	
OIL	OLIVE OIL	OIL	OLIVE OIL
0	8	0	4
2	6	1	3
4	4	2	2
6	2	3	1
8	0	4	0

- Who has the comparative advantage in producing oil? Explain.
 - Can these two countries gain from trading oil and olive oil? Explain.
- [Related to Solved problem 2.1]** Suppose that France and Germany both produce schnitzel and wine. The following table shows combinations of the goods that each country can produce in a day.

FRANCE		GERMANY	
WINE (BOTTLES)	SCHNITZEL (kg)	WINE (BOTTLES)	SCHNITZEL (kg)
0	8	0	15
1	6	1	12
2	4	2	9
3	2	3	6
4	0	4	3
		5	0

- Who has a comparative advantage in producing wine? Who has a comparative advantage in producing schnitzel?
 - Suppose that France is currently producing one bottle of wine and 6 kg of schnitzel and Germany is currently producing three bottles of wine and 6 kg of schnitzel. Demonstrate that France and Germany can both be better off if they specialise in producing only one good and then engage in trade.
- Can an individual or a country produce beyond its production possibility frontier? Can an individual or a country consume beyond its production possibility frontier? Explain.
 - If country A can produce twice as much coffee as country B, using the same amount of resources, explain how country B could have the comparative advantage in producing coffee.

- 2.8 Is specialisation and trade between individuals and countries more about having a job or about obtaining a higher standard of living? Individually, if you go from a situation of not trading with others (you produce everything yourself) to a situation of trading with others, do you still have a job? Does your standard of living increase? Likewise, if a country goes from not trading with other countries to trading with other countries, does it still have jobs? Does its standard of living increase?
- 2.9 In the early colonial days of Australia the population was spread thinly over a large area and transportation costs

between the colonies (states) were very high because it was difficult to transport products by road for more than short distances. As a result, most of the population very rarely bought or sold anything from another state. Explain why the incomes of people were likely to rise as transportation costs fell.

- 2.10 During the global financial crisis, which began in late 2007, some countries, including the European Union and the United States, passed legislation that encouraged or required the reduction of imported goods in some industries. Do you think that this was good policy? Explain.

THE MARKET SYSTEM, PAGES 42–45

LEARNING OBJECTIVE 2.3 Explain the basic idea of how a market system works.

SUMMARY

A **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade. **Product markets** are markets for goods and services, such as computers and medical treatment. **Factor markets** are markets for the **factors of production**, such as labour, capital, natural resources and entrepreneurial ability. Adam Smith argued in his 1776 book *The Wealth of Nations* that in a **free market**, where the government does not control the production of goods and services, changes in prices lead firms to produce the goods and services most desired by consumers. If consumers demand more of a good its price will rise. Firms respond to rising prices by increasing production. If consumers demand less of a good its price will fall. Firms respond to falling prices by producing less of a good. An **entrepreneur** is someone who operates a business. In a market system, entrepreneurs are responsible for organising the production of goods and services.

REVIEW QUESTIONS

- 3.1 What are the two main categories of participants in markets? Which participants are of greatest importance in determining what goods and services are produced?
- 3.2 What is a free market? In what ways does a free market economy differ from a centrally planned economy?
- 3.3 What is an entrepreneur? Why do entrepreneurs play a key role in a market system?
- 3.4 Under what circumstances are firms likely to produce more of a good or service? Under what circumstances are firms likely to produce less of a good or service?

PROBLEMS AND APPLICATIONS

- 3.5 Identify whether each of the following transactions will take place in the factor market or in the product market, and whether households or firms are supplying the good or service, or demanding the good or service.
- George buys a BMW X5 SUV.
 - BMW increases employment at its Spartanburg plant.
 - George works 20 hours per week at McDonald's.
 - George sells land he owns to McDonald's so that it can build a new restaurant.
- 3.6 In *The Wealth of Nations* Adam Smith wrote the following (Book I, Chapter II):
- It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest.*
- Briefly discuss what he meant by this.
 - Explain what Adam Smith meant when he referred to the 'invisible hand' of the market.
- 3.7 Evaluate the following argument: 'Adam Smith's analysis is based on a fundamental flaw: he assumes that people are motivated by self-interest. But this isn't true. I'm not selfish, and most people I know aren't selfish.'
- 3.8 Do you agree that self-interest is an 'ignoble human trait'? What incentives does a market system provide to encourage self-interest?

THE LEGAL BASIS OF A SUCCESSFUL MARKET SYSTEM, PAGES 45–47

LEARNING OBJECTIVE 2.4 Understand why property rights are necessary for a well-functioning market.

SUMMARY

A market system will only work well if there is protection for **property rights**, which are the rights of individuals and firms to use their property. If firms are to risk their investment to develop a new product they must be awarded some form of protection from

competitors copying their product, in order to reap the rewards and returns on their investment. If the law cannot guarantee this, or the enforcement of the law cannot ensure the protection of property rights, there will be little incentive for firms to invest in research and development of new products. Therefore if property

rights do now exist, or are not well enforced, the production of goods and services will be reduced, leaving the economy inside its production possibility frontier and lower living standards.

REVIEW QUESTIONS

- 4.1 What are private property rights? What role do they play in the working of a market system?
- 4.2 Why are independent courts important for a well-functioning economy?

PROBLEMS AND APPLICATIONS

- 4.3 The International Property Rights Index (IPRI) is an annual ranking of the strength of physical and intellectual property rights across 131 countries, representing 98 per cent of the world's GDP. It is produced by the Property Rights Alliance, which argues that:

... the more effective the property rights regime, the better the expected economic performance ... countries with strong property rights regimes received more foreign investment. On average, countries in the top quintile of IPRI scores (i.e. top 20%) show a per capita income approximately seven times that of the bottom quintile countries.⁴

How would the creation of property rights be likely to affect the economic opportunities available to people in those countries ranking lowest in property rights protection?

- 4.4 There have been a large number of complaints directed at YouTube by major television companies regarding uploaded sports and TV clips. Do you think copyright holders suffer significant financial damage from having their material posted to YouTube? Is there any way copyright holders might benefit from having their material posted, without approval or compensation, on sites such as YouTube?

ENDNOTES

- 1 van Onselen, Peter (2010), 'Politics trumps a moral challenge', *The Australian*, 29 April 2010, News Limited, at <www.theaustralian.com.au/news>, viewed 5 October 2014.
- 2 Wessel, David (2002) 'Precepts from Professor Summers', *Wall Street Journal*, 17 October.
- 3 L. Frank Baum, *The Wonderful Wizard of Oz*, pp. 30–31. First edition published in 1910.
- 4 Property Rights Alliance (2013), *International Property Rights Index 2013 Report*, at <www.propertyrightsalliance.org>, viewed 5 October 2014.

Sample Responses