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# chapter eight

8

## Firms in Perfectly Competitive Markets

## 完全競爭市場的廠商

### *Perfect Competition in the Market for Organic Apples*

➤ The market for organically grown food has expanded rapidly in the United States. As recently as 15 years ago, organic food was sold primarily in small health food stores. Today, organic food makes up an increasing fraction of all the food sold in supermarkets. By 2001, more than two-thirds of U.S. consumers were buying at least some organic food, and 12 percent of consumers were buying organic food almost exclusively. In 2002, the U.S. Department of Agriculture (USDA) established standards for organic food labeling. The standards were intended to protect consumers from false and misleading claims and to make it easier for U.S. farmers to export to foreign countries whose governments also require organic food labeling. According to the USDA, a firm can label and advertise food as "organic" only if that food is "produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation." The USDA inspects the farm where the food is grown and all firms that handle the food before it arrives at the supermarket or restaurant.

More organic fresh fruits and vegetables are sold than any other food category. Organically grown apples became popular with consumers during the late 1990s. Farmers growing apples organically use only organic fertilizers and control insects with sprays made from soil compounds. These growing methods add about 15 percent to the cost of growing apples. The Yakima Valley of Washington State is particularly suited to growing apples organically because of the absence of certain insects. In 2004, Washington State accounted for more than half of U.S. organic apple production. In 1997, Yakima Valley apple farmers were able to sell organically grown apples for a price 50 percent higher than the price of regular apples, more than offsetting the higher costs of organic growing methods. This price difference made organically grown apples considerably more profitable than apples grown using traditional methods.

Between 1997 and 2001, many apple farmers switched from tradi-




tional to organic growing methods, increasing production of organically grown apples from 1.2 million boxes per year to more than 3 million boxes. The additional supply of organically grown apples forced down prices and made them no more profitable than apples grown using traditional methods. As one farmer in the Yakima Valley put it, "It's like anything else in agriculture. If people see an economic opportunity, usually it only lasts for a few years."

What the organic apple farmer experienced is not unique to agriculture. Throughout the economy, entrepreneurs are continually introducing new products, which—when successful—enable them to earn economic profits in the short run. But in the long run, competition among firms forces prices to the level where they just cover the costs of production. This process of competition is at the heart of the market system and is the focus of this chapter. *An Inside Look* on page 256 discusses how the increasing demand for organic food has affected the sales of organic snacks.

**Sources:** USDA Web site: www.ams.usda.gov/nop/Consumers/brochure.html, "Organic Food Industry Taps Growing American Market," *Agricultural Outlook*, October 2002; Emily Green, "Study Gives Nod to Organic Apples, but It's Crunch Time for All State Growers," *Seattle Times*, April 19, 2001; quote from farmer from the NPR Web site: www.npr.org, National Public Radio, *All Things Considered*, April 18, 2001.

## LEARNING OBJECTIVES

**After studying this chapter, you should be able to:**

① Define a perfectly competitive market, and explain why a perfect competitor faces a horizontal demand curve.

② Explain how a perfect competitor decides how much to produce.

③ Use graphs to show a firm's profit or loss.

④ Explain why firms may shut down temporarily.

⑤ Explain how entry and exit ensure that perfectly competitive firms earn zero economic profit in the long run.

⑥ Explain how perfect competition leads to economic efficiency.

**讀完本章後，你將具有下列能力：**

① 定義完全競爭市場和解釋為何完全競爭廠商面對一條水平線的需求曲線。

② 解釋完全競爭廠商如何決定生產多少。

③ 使用圖形來展示廠商之利潤或損失。

④ 解釋為何廠商暫時關廠。

⑤ 解釋完全競爭廠商如何因廠商之進入或退出而在長期賺取的經濟利潤為0。

⑥ 解釋完全競爭帶來經濟效率。

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➤ 學習完全競爭產業的運作是了解我們在第一章討論過的經濟基本議題最好方式：

➤ Organic apple growing is an example of a *perfectly competitive* industry. Firms in perfectly competitive industries are unable to control the prices of the products they sell and are unable to earn an economic profit in the long run. There are two main reasons for this result: (1) Firms in these industries sell identical products; and (2) It is easy for new firms to enter these industries. Studying how perfectly competitive industries operate is the best way to understand how markets answer the fundamental economic questions we discussed in Chapter 1:

➤ 那些商品或服務將破生產。
➤ 這些商品或服務應如何生產？
➤ 誰將取得這些生產出來的商品或服務。

- What goods and services will be produced?
- How will the goods and services be produced?
- Who will receive the goods and services produced?

In fact, though, most industries are not perfectly competitive. In most industries, firms do *not* produce identical products, and in some industries it may be difficult for new firms to enter. There are thousands of industries in the United States. Although in some ways each industry is unique, industries share enough similarities that economists group them into four market structures. In particular, any industry has three key characteristics:

可以下列三種主要特性來判別該產業所屬之市場結構：
➤ 產業中的廠商數。
➤ 產業中廠商生產的商品或服務之相似度。
➤ 新廠商進入產業之容易度

- The number of firms in the industry
- The similarity of the good or service produced by the firms in the industry
- The ease with which new firms can enter the industry

Economists use these characteristics to classify industries into the four market structures listed in Table 8-1.

Many industries, including restaurants, hardware stores, and other retailers, have many firms selling products that are differentiated, rather than identical, and fall into the category of *monopolistic competition.* Some industries, such as computers and automobiles, have only a few firms and are *oligopolies.* Finally, a few industries, such as the delivery of first-class mail by the U.S. Postal Service, have only one firm and are *monopolies.* After discussing perfect competition in this chapter, we will devote a chapter to each of these other market structures.

**TABLE 8-1 The Four Market Structures 四種市場結構**

| | MARKET STRUCTURE 市場結構 | | | |
|---|---|---|---|---|
| 特性 CHARACTERISTIC | 完全競爭 PERFECT COMPETITION | 獨佔性競爭 MONOPOLISTIC COMPETITION | 寡佔 OLIGOPOLY | 獨佔 MONOPOLY |
| Number of firms 廠商數目 | Many 很多 | Many 很多 | Few 不多 | One 唯一 |
| Type of product 產品種類 | Identical 同質 | Differentiated 異質 | Identical or differentiated 同質或異質 | Unique 獨一無二 |
| Ease of entry 進出市場容易度 | High 高 | High 高 | Low 低 | Entry blocked 有障礙 |
| Examples of industries 產業例子 | • Wheat 小麥<br>• Apples 蘋果 | • Selling DVDs 銷售DVDs<br>• Restaurants 餐廳 | • Manufacturing computers 電腦製造<br>• Manufacturing automobiles 汽車製造 | • First-class mail delivery 郵件快遞<br>• Tap water 自來水 |

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## Perfectly Competitive Markets

① LEARNING OBJECTIVE

Define a perfectly competitive market, and explain why a perfect competitor faces a horizontal demand curve.

學習目標 ①

定義完全競爭市場和解釋為何完全競爭廠商面對一條水平線的需求曲線

Why are firms in a **perfectly competitive market** unable to control the prices of the goods they sell, and why are the owners of these firms unable to earn economic profits in the long run? We can begin our analysis by listing the three conditions that make a market perfectly competitive:

1. There must be many buyers and many firms, all of whom are small relative to the market.
2. The products sold by all firms in the market must be identical.
3. There must be no barriers to new firms entering the market.

All three of these conditions hold in the market for organic apples. No single consumer or producer of organic apples buys or sells more than a tiny fraction of the total apple crop. The apples sold by each apple grower are identical, and there are no barriers to a new firm entering the organic apple market by purchasing land and planting apple trees. As we will see, it is the existence of many firms, all selling the same good, that keeps any single organic apple farmer from affecting the price of organic apples.

Although the market for organic apples meets the conditions for perfect competition, the markets for most goods and services do not. In particular, the second and third conditions are very restrictive. In most markets that have many buyers and sellers, firms do not sell identical products. For example, not all restaurant meals are the same, nor is all women's clothing the same. In Chapter 10, we will explore the common situation of monopolistic competition where many firms are selling similar but not identical products. In this chapter, we concentrate on perfectly competitive markets so we can use as a benchmark the situation in which firms are facing the maximum possible competition.

**Perfectly competitive market** A market that meets the conditions of (1) many buyers and sellers, (2) all firms selling identical products, and (3) no barriers to new firms entering the market.

**完全競爭市場** 一個市場如果滿足下列三個條件即屬完全競爭市場：(1) 購買者及銷售者的數目眾多 (2) 所有廠商銷售同質的產品 (3) 新廠商沒有進入障礙。

列屬完全競爭市場的三個條件：

1. 該市場有非常多的消費者和廠商，每一個單獨的消費者或廠商對於該市場而言影響力相當小。
2. 這市場所有廠商銷售的商品同質。
3. 新廠商進入市場沒有障礙。

### A Perfectly Competitive Firm Cannot Affect the Market Price

Prices in perfectly competitive markets are determined by the interaction of demand and supply. The actions of any single consumer or any single firm have no effect on the market price. Consumers and firms have to accept the market price if they want to buy and sell in a perfectly competitive market.

Because a firm in a perfectly competitive market is very small relative to the market and because it is selling exactly the same product as every other firm, it can sell as much as it wants without having to lower its price. But if a perfectly competitive firm tries to raise its price, it won't sell anything at all, because consumers will switch to buying from the firm's competitors. Therefore, the firm will be a **price taker,** and will have to charge the same price as every other firm in the market. Although we don't usually think of firms as being too small to affect the market price, consumers are often in the position of being price takers. For instance, suppose your local supermarket is selling bread for $1.50 per loaf. You can load up your shopping cart with 10 loaves of bread and the supermarket will gladly sell them all to you for $1.50 per loaf. But if you go to the cashier and offer to buy the bread for $1.49 per loaf, he or she will not sell it to you. As a buyer, you are too small relative to the bread market to have any effect on the equilibrium price. Whether you leave the supermarket and buy no bread or you buy 10 loaves, you are unable to change the market price of bread by even one cent.

The situation you face as a bread buyer is the same one a wheat farmer faces as a wheat seller. More than 225,000 farmers grow wheat in the United States. The market price of wheat is determined not by any individual wheat farmer but by the interaction in the wheat market of all the buyers and all the sellers. If any one wheat farmer has the best crop the farmer has ever had, or if any one wheat farmer stops growing wheat altogether, the market price of wheat will not be affected *because the market supply curve for wheat will not shift by enough to change the equilibrium price by even one cent.*

**Price taker** A buyer or seller that is unable to affect the market price.

**價格接受者** 購買者或銷售者因為力量微不足道，而無影響市場價格的能力。

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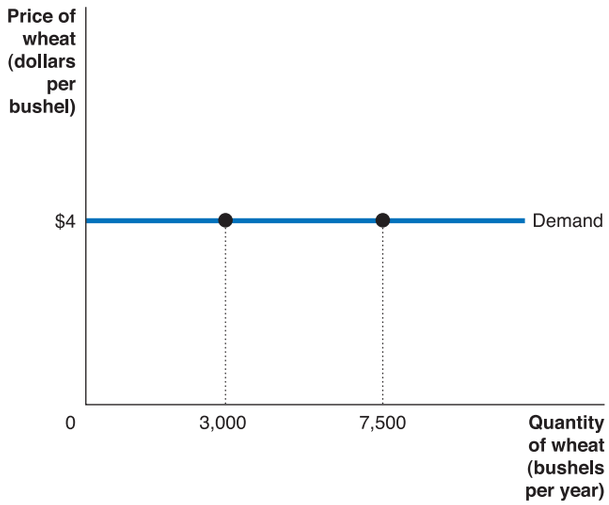
**FIGURE 8-1**

**完全競爭廠商面對一條水平線的需求曲線**

完全競爭市場廠商，跟該市場其他眾多的廠商販售的產品是一模一樣(同質)的。以目前之市場價格販售，它可以銷售任何它想要銷售的數量，但是如果提高價格，即使只有一毛錢，則它一單位也賣不出去。因此，完全競爭廠商面對的是一條水平線之需求曲線。在右圖，不管該小麥農銷售3,000或7,500單位，都無法影響$4的市場價格。




### The Demand Curve for the Output of a Perfectly Competitive Firm

Suppose Robert Whaples grows wheat on a 250-acre farm in Washington State. Farmer Whaples is selling wheat in a perfectly competitive market, so he is a price taker. Because he can sell as much wheat as he chooses at the market price—but can't sell any wheat at all at a higher price—the demand curve for his wheat has an unusual shape: It is horizontal, as shown in Figure 8-1. With a horizontal demand curve, Farmer Whaples must accept the market price, which in this case is $4. Whether Farmer Whaples sells 3,000 bushels per year or 7,500 has no effect on the market price.

The demand curve for Farmer Whaples's wheat is very different from the market demand curve for wheat. Panel (a) of Figure 8-2 shows the market for wheat. The demand curve in panel (a) is the *market demand curve for wheat* and has the normal downward slope we are familiar with from the market demand curves in Chapter 3. Panel (b) of Figure 8-2 shows the demand curve for Farmer Whaples's wheat, which is a horizontal line. By viewing these graphs side by side, you can see that the price Farmer Whaples receives for his wheat in panel (b) is determined by the interaction of all sellers and all buyers of wheat in the wheat market in panel (a). Keep in mind, however, that the scales on the horizontal axes in the two panels are very different. In panel (a), the equilibrium quantity of wheat is 2 *billion* bushels. In panel (b), Farmer Whaples is producing only 7,500 bushels, or less than 0.0004 percent of market output. We need to use different scales in the two panels so we can display both of them on one page. Keep in mind the key point: Farmer Whaples's output of wheat is very small relative to the total market output.

## How a Firm Maximizes Profit in a Perfectly Competitive Market

② **LEARNING OBJECTIVE**

Explain how a perfect competitor decides how much to produce.

**學習目標** ②

解釋完全競爭廠商如何決定生產多少。

We have seen that Farmer Whaples cannot control the price of his wheat. In this situation, how does he decide how much wheat to produce? We assume that Farmer Whaples's objective is to maximize profits. This is a reasonable assumption for most firms, most of the time. Remember that **profit** is the difference between total revenue (*TR*) and total cost (*TC*):

$$\text{Profit} = TR - TC.$$

To maximize his profit, Farmer Whaples should produce the quantity of wheat where the difference between the total revenue he receives and his total cost is as large as possible.

**Profit** Total revenue minus total cost.

**利潤** 總收益減掉總成本。

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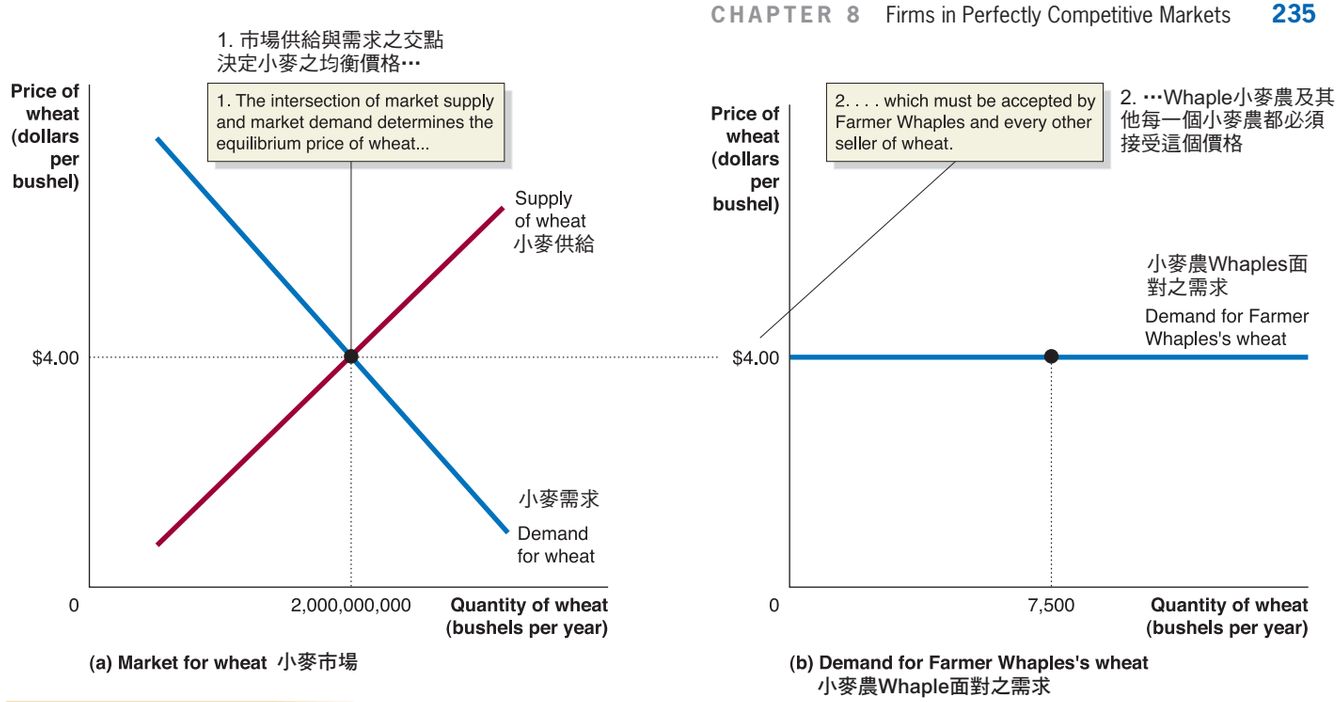


**FIGURE 8-2** 小麥的市場需求對應某農場的小麥之需求

在完全競爭市場，價格決定於市場需求與市場供給的交點。在圖(a)，小麥的需求曲線與供給曲線交在每單位$4之處。單獨的小麥農，像Whaples，沒有能力去影響市場價格。因此如圖(b)所示：對Whaples的小麥之需求曲線為水平線。為了解這個圖，需要特別注意的是兩個圖橫軸的刻度是非常的不同。在圖(a)，小麥的均衡數量為2 billion (20億)單位，而圖(b)只生產7,500單位的小麥。

### *Revenue for a Firm in a Perfectly Competitive Market*

To understand how Farmer Whaples maximizes profits, let's first consider his revenue. To keep the numbers simple, we will assume that he owns a very small farm and produces at most 10 bushels of wheat per year. Table 8-2 shows the revenue Farmer Whaples will earn from selling various quantities of wheat if the market price for wheat is $4.



## *Don't Let This Happen To You!*

DON'T LET THIS HAPPEN TO YOU!

### Don't Confuse the Demand Curve for Farmer Whaples's Wheat with the Market Demand Curve for Wheat

The demand curve for wheat has the normal downward-sloping shape. If the price of wheat goes up, the quantity of wheat demanded goes down, and if the price of wheat goes down, the quantity of wheat demanded goes up. But the demand curve for the output of a single wheat farmer is *not* downward-sloping: It is a horizontal line. If an individual wheat farmer tries to increase the price he charges for his wheat, the quantity demanded falls to zero because buyers will purchase from one of the other 225,000 wheat farmers. But any one farmer can sell as much wheat as the farmer can produce without needing to cut the price. Both of these things are true because each wheat farmer is very small relative to the overall market for wheat.

When we draw graphs of the wheat market, we usually show the market equilibrium quantity in millions or billions of bushels. When we draw graphs of the demand for wheat produced by one farmer, we usually show the quantity produced in thousands of bushels. It is important to remember this difference in scale when interpreting these graphs.

Finally, it is not just wheat farmers who have horizontal demand curves for their products; any firm in a perfectly competitive market faces a horizontal demand curve.

***YOUR TURN:*** **Test your understanding by doing related problem 2 on page 259 at the end of this chapter.**