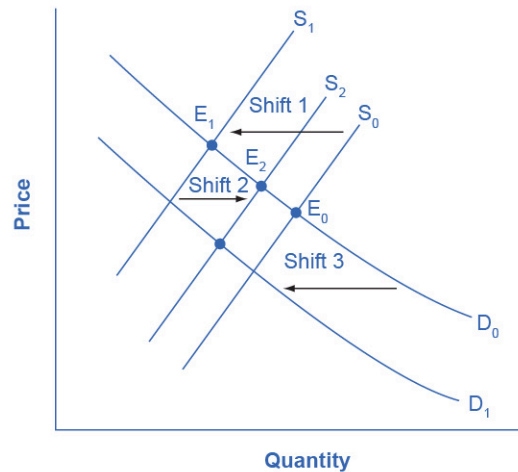


shift from the original demand curve,  $D_0$  to  $D_1$  on the diagram (labeled Shift 3), and the equilibrium moves from  $E_2$  to  $E_3$ .”



**FIGURE 3.20** Shifts of Demand or Supply versus Movements along a Demand or Supply Curve A shift in one curve never causes a shift in the other curve. Rather, a shift in one curve causes a movement along the second curve.

At about this point, Lee suspects that this answer is headed down the wrong path. Think about what might be wrong with Lee’s logic, and then read the answer that follows.

*Answer:* Lee’s first step is correct: that is, a drought shifts back the supply curve of wheat and leads to a prediction of a lower equilibrium quantity and a higher equilibrium price. This corresponds to a movement along the original demand curve ( $D_0$ ), from  $E_0$  to  $E_1$ . The rest of Lee’s argument is wrong, because it mixes up shifts in supply with quantity supplied, and shifts in demand with quantity demanded. A higher or lower price never shifts the supply curve, as suggested by the shift in supply from  $S_1$  to  $S_2$ . Instead, a price change leads to a movement along a given supply curve. Similarly, a higher or lower price never shifts a demand curve, as suggested in the shift from  $D_0$  to  $D_1$ . Instead, a price change leads to a movement along a given demand curve. Remember, a change in the price of a good never causes the demand or supply curve for that good to shift.

Think carefully about the timeline of events: What happens first, what happens next? What is cause, what is effect? If you keep the order right, you are more likely to get the analysis correct.

In the four-step analysis of how economic events affect equilibrium price and quantity, the movement from the old to the new equilibrium seems immediate. As a practical matter, however, prices and quantities often do not zoom straight to equilibrium. More realistically, when an economic event causes demand or supply to shift, prices and quantities set off in the general direction of equilibrium. Even as they are moving toward one new equilibrium, a subsequent change in demand or supply often pushes prices toward another equilibrium.

### 3.4 Price Ceilings and Price Floors

#### LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain price controls, price ceilings, and price floors
- Analyze demand and supply as a social adjustment mechanism

To this point in the chapter, we have been assuming that markets are free, that is, they operate with no government intervention. In this section, we will explore the outcomes, both anticipated and otherwise, when government does intervene in a market either to prevent the price of some good or service from rising “too high” or to prevent the price of some good or service from falling “too low”.

Economists believe there are a small number of fundamental principles that explain how economic agents

respond in different situations. Two of these principles, which we have already introduced, are the laws of demand and supply.

Governments can pass laws affecting market outcomes, but no law can negate these economic principles. Rather, the principles will become apparent in sometimes unexpected ways, which may undermine the intent of the government policy. This is one of the major conclusions of this section.

Controversy sometimes surrounds the prices and quantities established by demand and supply, especially for products that are considered necessities. In some cases, discontent over prices turns into public pressure on politicians, who may then pass legislation to prevent a certain price from climbing “too high” or falling “too low.”

The demand and supply model shows how people and firms will react to the incentives that these laws provide to control prices, in ways that will often lead to undesirable consequences. Alternative policy tools can often achieve the desired goals of price control laws, while avoiding at least some of their costs and tradeoffs.

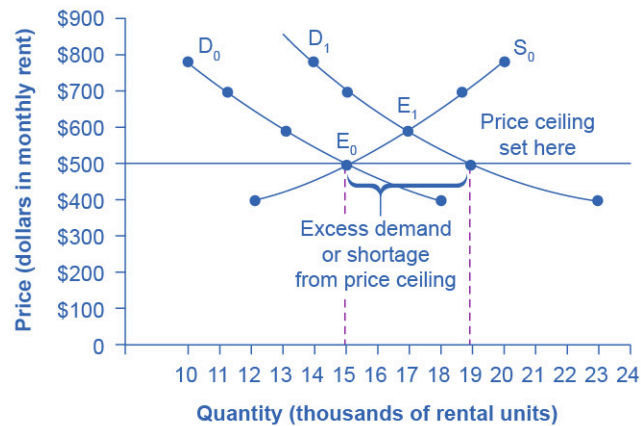
### Price Ceilings

Laws that governments enact to regulate prices are called **price controls**. Price controls come in two flavors. A **price ceiling** keeps a price from rising above a certain level (the “ceiling”), while a **price floor** keeps a price from falling below a given level (the “floor”). This section uses the demand and supply framework to analyze price ceilings. The next section discusses price floors.

A price ceiling is a legal maximum price that one pays for some good or service. A government imposes price ceilings in order to keep the price of some necessary good or service affordable. For example, in 2005 during Hurricane Katrina, the price of bottled water increased above \$5 per gallon. As a result, many people called for price controls on bottled water to prevent the price from rising so high. In this particular case, the government did not impose a price ceiling, but there are other examples of where price ceilings did occur.

In many markets for goods and services, demanders outnumber suppliers. Consumers, who are also potential voters, sometimes unite behind a political proposal to hold down a certain price. In some cities, such as Albany, renters have pressed political leaders to pass rent control laws, a price ceiling that usually works by stating that landlords can raise rents by only a certain maximum percentage each year. Some of the best examples of rent control occur in urban areas such as New York, Washington D.C., or San Francisco.

Rent control becomes a politically hot topic when rents begin to rise rapidly. Everyone needs an affordable place to live. Perhaps a change in tastes makes a certain suburb or town a more popular place to live. Perhaps locally-based businesses expand, bringing higher incomes and more people into the area. Such changes can cause a change in the demand for rental housing, as [Figure 3.21](#) illustrates. The original equilibrium ( $E_0$ ) lies at the intersection of supply curve  $S_0$  and demand curve  $D_0$ , corresponding to an equilibrium price of \$500 and an equilibrium quantity of 15,000 units of rental housing. The effect of greater income or a change in tastes is to shift the demand curve for rental housing to the right, as the data in [Table 3.7](#) shows and the shift from  $D_0$  to  $D_1$  on the graph. In this market, at the new equilibrium  $E_1$ , the price of a rental unit would rise to \$600 and the equilibrium quantity would increase to 17,000 units.



**FIGURE 3.21** A Price Ceiling Example—Rent Control The original intersection of demand and supply occurs at  $E_0$ . If demand shifts from  $D_0$  to  $D_1$ , the new equilibrium would be at  $E_1$ —unless a price ceiling prevents the price from rising. If the price is not permitted to rise, the quantity supplied remains at 15,000. However, after the change in demand, the quantity demanded rises to 19,000, resulting in a shortage.

Price	Original Quantity Supplied	Original Quantity Demanded	New Quantity Demanded
\$400	12,000	18,000	23,000
\$500	15,000	15,000	19,000
\$600	17,000	13,000	17,000
\$700	19,000	11,000	15,000
\$800	20,000	10,000	14,000

**TABLE 3.7** Rent Control

Suppose that a city government passes a rent control law to keep the price at the original equilibrium of \$500 for a typical apartment. In [Figure 3.21](#), the horizontal line at the price of \$500 shows the legally fixed maximum price set by the rent control law. However, the underlying forces that shifted the demand curve to the right are still there. At that price (\$500), the quantity supplied remains at the same 15,000 rental units, but the quantity demanded is 19,000 rental units. In other words, the quantity demanded exceeds the quantity supplied, so there is a shortage of rental housing. One of the ironies of price ceilings is that while the price ceiling was intended to help renters, there are actually fewer apartments rented out under the price ceiling (15,000 rental units) than would be the case at the market rent of \$600 (17,000 rental units).

Price ceilings do not simply benefit renters at the expense of landlords. Rather, some renters (or potential renters) lose their housing as landlords convert apartments to co-ops and condos. Even when the housing remains in the rental market, landlords tend to spend less on maintenance and on essentials like heating, cooling, hot water, and lighting. The first rule of economics is you do not get something for nothing—everything has an opportunity cost. Thus, if renters obtain “cheaper” housing than the market requires, they tend to also end up with lower quality housing.

Price ceilings are enacted in an attempt to keep prices low for those who need the product. However, when the market price is not allowed to rise to the equilibrium level, quantity demanded exceeds quantity supplied, and thus a shortage occurs. Those who manage to purchase the product at the lower price given by the price ceiling will benefit, but sellers of the product will suffer, along with those who are not able to purchase the product at all. Quality is also likely to deteriorate.

## Price Floors

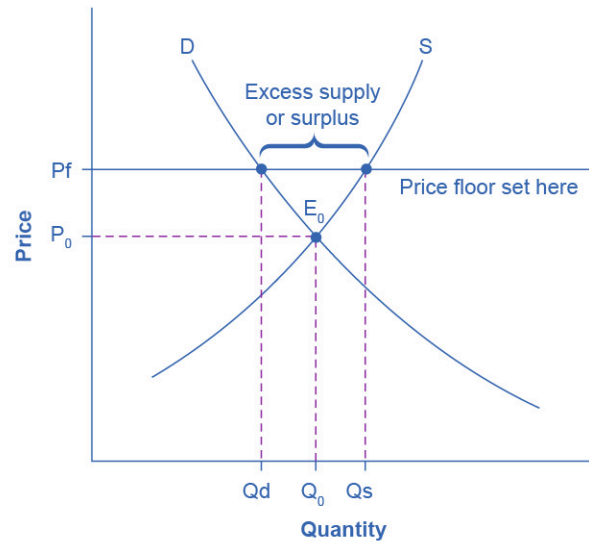
A price floor is the lowest price that one can legally pay for some good or service. Perhaps the best-known example of a price floor is the minimum wage, which is based on the view that someone working full time should be able to afford a basic standard of living. The federal minimum wage in 2022 was \$7.25 per hour, although some states and localities have a higher minimum wage. The federal minimum wage yields an annual income for a single person of \$15,080, which is slightly higher than the Federal poverty line of \$11,880. Congress periodically raises the federal minimum wage as the cost of living rises. As of March 2022, the most recent adjustment occurred in 2009, when the federal minimum wage was raised from \$6.55 to \$7.25.

Price floors are sometimes called “price supports,” because they support a price by preventing it from falling below a certain level. Around the world, many countries have passed laws to create agricultural price supports. Farm prices and thus farm incomes fluctuate, sometimes widely. Even if, on average, farm incomes are adequate, some years they can be quite low. The purpose of price supports is to prevent these swings.

The most common way price supports work is that the government enters the market and buys up the product, adding to demand to keep prices higher than they otherwise would be. According to the Common Agricultural Policy reform effective in 2019, the European Union (EU) will spend about 58 billion euros per year, or 65.5 billion dollars per year (with the December 2021 exchange rate), or roughly 36% of the EU budget, on price supports for Europe’s farmers.

[Figure 3.22](#) illustrates the effects of a government program that assures a price above the equilibrium by focusing on the market for wheat in Europe. In the absence of government intervention, the price would adjust so that the quantity supplied would equal the quantity demanded at the equilibrium point  $E_0$ , with price  $P_0$  and quantity  $Q_0$ . However, policies to keep prices high for farmers keep the price above what would have been the market equilibrium level—the price  $P_f$  shown by the dashed horizontal line in the diagram. The result is a quantity supplied in excess of the quantity demanded ( $Q_d$ ). When quantity supplied exceeds quantity demanded, a surplus exists.

Economists estimate that the high-income areas of the world, including the United States, Europe, and Japan, spend roughly \$1 billion per day in supporting their farmers. If the government is willing to purchase the excess supply (or to provide payments for others to purchase it), then farmers will benefit from the price floor, but taxpayers and consumers of food will pay the costs. Agricultural economists and policy makers have offered numerous proposals for reducing farm subsidies. In many countries, however, political support for subsidies for farmers remains strong. This is either because the population views this as supporting the traditional rural way of life or because of industry’s lobbying power of the agro-business.



**FIGURE 3.22** European Wheat Prices: A Price Floor Example The intersection of demand (D) and supply (S) would be at the equilibrium point  $E_0$ . However, a price floor set at  $P_f$  holds the price above  $E_0$  and prevents it from falling. The result of the price floor is that the quantity supplied  $Q_s$  exceeds the quantity demanded  $Q_d$ . There is excess supply, also called a surplus.

### 3.5 Demand, Supply, and Efficiency

#### LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Contrast consumer surplus, producer surplus, and social surplus
- Explain why price floors and price ceilings can be inefficient
- Analyze demand and supply as a social adjustment mechanism

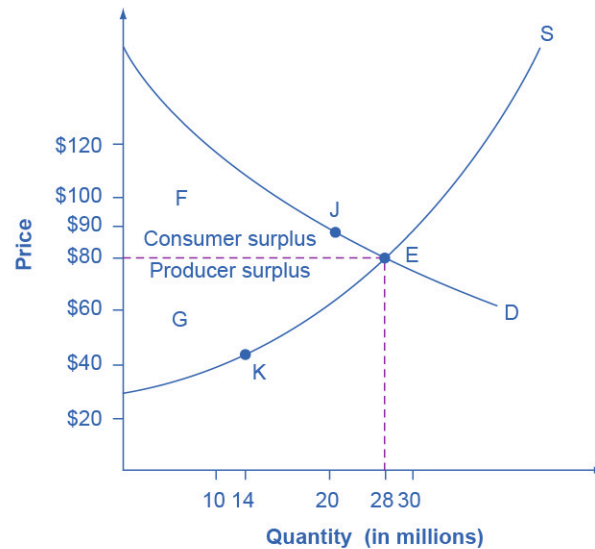
The familiar demand and supply diagram holds within it the concept of economic efficiency. One typical way that economists define efficiency is when it is impossible to improve the situation of one party without imposing a cost on another. Conversely, if a situation is inefficient, it becomes possible to benefit at least one party without imposing costs on others.

Efficiency in the demand and supply model has the same basic meaning: The economy is getting as much benefit as possible from its scarce resources and all the possible gains from trade have been achieved. In other words, the optimal amount of each good and service is produced and consumed.

#### Consumer Surplus, Producer Surplus, Social Surplus

Consider a market for tablet computers, as [Figure 3.23](#) shows. The equilibrium price is \$80 and the equilibrium quantity is 28 million. To see the benefits to consumers, look at the segment of the demand curve above the equilibrium point and to the left. This portion of the demand curve shows that at least some demanders would have been willing to pay more than \$80 for a tablet.

For example, point J shows that if the price were \$90, 20 million tablets would be sold. Those consumers who would have been willing to pay \$90 for a tablet based on the utility they expect to receive from it, but who were able to pay the equilibrium price of \$80, clearly received a benefit beyond what they had to pay. Remember, the demand curve traces consumers' willingness to pay for different quantities. The amount that individuals would have been willing to pay, minus the amount that they actually paid, is called **consumer surplus**. Consumer surplus is the area labeled F—that is, the area above the market price and below the demand curve.



**FIGURE 3.23** Consumer and Producer Surplus The somewhat triangular area labeled by F shows the area of consumer surplus, which shows that the equilibrium price in the market was less than what many of the consumers were willing to pay. Point J on the demand curve shows that, even at the price of \$90, consumers would have been willing to purchase a quantity of 20 million. The somewhat triangular area labeled by G shows the area of producer surplus, which shows that the equilibrium price received in the market was more than what many of the producers were willing to accept for their products. For example, point K on the supply curve shows that at a price of \$45, firms would have been willing to supply a quantity of 14 million.

The supply curve shows the quantity that firms are willing to supply at each price. For example, point K in [Figure 3.23](#) illustrates that, at \$45, firms would still have been willing to supply a quantity of 14 million. Those producers who would have been willing to supply the tablets at \$45, but who were instead able to charge the equilibrium price of \$80, clearly received an extra benefit beyond what they required to supply the product. The extra benefit producers receive from selling a good or service, measured by the price the producer actually received minus the price the producer would have been willing to accept is called **producer surplus**. In [Figure 3.23](#), producer surplus is the area labeled G—that is, the area between the market price and the segment of the supply curve below the equilibrium.

The sum of consumer surplus and producer surplus is **social surplus**, also referred to as **economic surplus** or **total surplus**. In [Figure 3.23](#) we show social surplus as the area F + G. Social surplus is larger at equilibrium quantity and price than it would be at any other quantity. This demonstrates the economic efficiency of the market equilibrium. In addition, at the efficient level of output, it is impossible to produce greater consumer surplus without reducing producer surplus, and it is impossible to produce greater producer surplus without reducing consumer surplus.

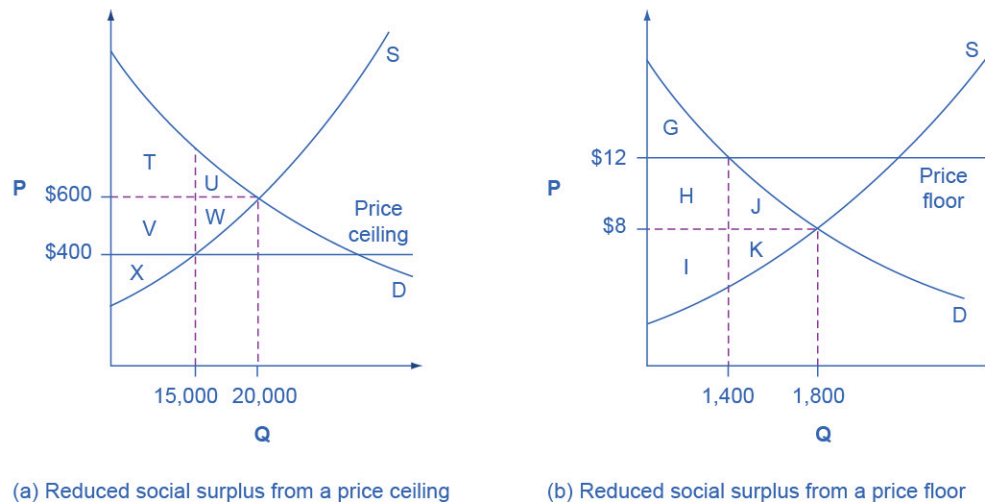
### Inefficiency of Price Floors and Price Ceilings

The imposition of a price floor or a price ceiling will prevent a market from adjusting to its equilibrium price and quantity, and thus will create an inefficient outcome. However, there is an additional twist here. Along with creating inefficiency, price floors and ceilings will also transfer some consumer surplus to producers, or some producer surplus to consumers.

Imagine that several firms develop a promising but expensive new drug for treating back pain. If this therapy is left to the market, the equilibrium price will be \$600 per month and 20,000 people will use the drug, as shown in [Figure 3.24](#) (a). The original level of consumer surplus is T + U and producer surplus is V + W + X. However, the government decides to impose a price ceiling of \$400 to make the drug more affordable. At this price ceiling, firms in the market now produce only 15,000.

As a result, two changes occur. First, an inefficient outcome occurs and the total surplus of society is reduced. The loss in social surplus that occurs when the economy produces at an inefficient quantity is called **deadweight loss**. In a very real sense, it is like money thrown away that benefits no one. In [Figure 3.24](#) (a), the deadweight loss is the area  $U + W$ . When deadweight loss exists, it is possible for both consumer and producer surplus to be higher, in this case because the price control is blocking some suppliers and demanders from transactions they would both be willing to make.

A second change from the price ceiling is that some of the producer surplus is transferred to consumers. After the price ceiling is imposed, the new consumer surplus is  $T + V$ , while the new producer surplus is  $X$ . In other words, the price ceiling transfers the area of surplus ( $V$ ) from producers to consumers. Note that the gain to consumers is less than the loss to producers, which is just another way of seeing the deadweight loss.



**FIGURE 3.24** Efficiency and Price Floors and Ceilings (a) The original equilibrium price is \$600 with a quantity of 20,000. Consumer surplus is  $T + U$ , and producer surplus is  $V + W + X$ . A price ceiling is imposed at \$400, so firms in the market now produce only a quantity of 15,000. As a result, the new consumer surplus is  $T + V$ , while the new producer surplus is  $X$ . (b) The original equilibrium is \$8 at a quantity of 1,800. Consumer surplus is  $G + H + J$ , and producer surplus is  $I + K$ . A price floor is imposed at \$12, which means that quantity demanded falls to 1,400. As a result, the new consumer surplus is  $G$ , and the new producer surplus is  $H + I$ .

[Figure 3.24](#) (b) shows a price floor example using a string of struggling movie theaters, all in the same city. The current equilibrium is \$8 per movie ticket, with 1,800 people attending movies. The original consumer surplus is  $G + H + J$ , and producer surplus is  $I + K$ . The city government is worried that movie theaters will go out of business, reducing the entertainment options available to citizens, so it decides to impose a price floor of \$12 per ticket. As a result, the quantity demanded of movie tickets falls to 1,400. The new consumer surplus is  $G$ , and the new producer surplus is  $H + I$ . In effect, the price floor causes the area  $H$  to be transferred from consumer to producer surplus, but also causes a deadweight loss of  $J + K$ .

This analysis shows that a price ceiling, like a law establishing rent controls, will transfer some producer surplus to consumers—which helps to explain why consumers often favor them. Conversely, a price floor like a guarantee that farmers will receive a certain price for their crops will transfer some consumer surplus to producers, which explains why producers often favor them. However, both price floors and price ceilings block some transactions that buyers and sellers would have been willing to make, and creates deadweight loss. Removing such barriers, so that prices and quantities can adjust to their equilibrium level, will increase the economy's social surplus.

### Demand and Supply as a Social Adjustment Mechanism

The demand and supply model emphasizes that prices are not set only by demand or only by supply, but by the

interaction between the two. In 1890, the famous economist Alfred Marshall wrote that asking whether supply or demand determined a price was like arguing “whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper.” The answer is that both blades of the demand and supply scissors are always involved.

The adjustments of equilibrium price and quantity in a market-oriented economy often occur without much government direction or oversight. If the coffee crop in Brazil suffers a terrible frost, then the supply curve of coffee shifts to the left and the price of coffee rises. Some people continue to drink coffee and pay the higher price. Others switch to tea or soft drinks. No government commission is needed to figure out how to adjust coffee prices, which companies will be allowed to process the remaining supply, which supermarkets in which cities will get how much coffee to sell, or which consumers will ultimately be allowed to drink the brew. Such adjustments in response to price changes happen all the time in a market economy, often so smoothly and rapidly that we barely notice them.

Think for a moment of all the seasonal foods that are available and inexpensive at certain times of the year, like fresh corn in midsummer, but more expensive at other times of the year. People alter their diets and restaurants alter their menus in response to these fluctuations in prices without fuss or fanfare. For both the U.S. economy and the world economy as a whole, markets—that is, demand and supply—are the primary social mechanism for answering the basic questions about what is produced, how it is produced, and for whom it is produced.



## BRING IT HOME

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### Why Can We Not Get Enough of Organic Food?

Organic food is grown without synthetic pesticides, chemical fertilizers or genetically modified seeds. In recent decades, the demand for organic products has increased dramatically. The Organic Trade Association reported sales increased from \$1 billion in 1990 to nearly \$62 billion in 2020, more than 90% of which were sales of food products.

Why, then, are organic foods more expensive than their conventional counterparts? The answer is a clear application of the theories of supply and demand. As people have learned more about the harmful effects of chemical fertilizers, growth hormones, pesticides and the like from large-scale factory farming, our tastes and preferences for safer, organic foods have increased. This change in tastes has been reinforced by increases in income, which allow people to purchase pricier products, and has made organic foods more mainstream. This shift, in addition to population growth, has led to an increased demand for organic foods. Graphically, the demand curve has shifted right, and we have moved up the supply curve as producers have responded to the higher prices by supplying a greater quantity.

In addition to the movement along the supply curve, we have also had an increase in the number of farmers converting to organic farming over time. This is represented by a shift to the right of the supply curve. Since both demand and supply have shifted to the right, the resulting equilibrium quantity of organic foods is definitely higher, but the price will only fall when the increase in supply is larger than the increase in demand. We may need more time before we see lower prices in organic foods. Since the production costs of these foods may remain higher than conventional farming, because organic fertilizers and pest management techniques are more expensive, they may never fully catch up with the lower prices of non-organic foods.

As a final, specific example: The Environmental Working Group’s “Dirty Dozen” list of fruits and vegetables, which test high for pesticide residue even after washing, was released in April 2013. The inclusion of strawberries on the list led to an increase in demand for organic strawberries, resulting in both a higher equilibrium price and quantity of sales.

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