

## ***Effects of a Shift in the Supply and Demand Curves***

Some events cause both the supply curve and the demand curve to shift. If both shift, then the qualitative effect on the equilibrium price and quantity may be difficult to predict, even if we know the direction in which each curve shifts. Changes in the equilibrium price and quantity depend on exactly how the curves shift: see the following application and solved problem and the related questions at the end of the chapter.

### **Application Mad Cow: Shifting Supply and Demand Curves**

Government announcements that the fatal disease known as mad cow (bovine spongiform encephalopathy, or BSE) has been found in a country's cattle affect both supply and demand curves. Humans who consume beef products made from diseased animal parts can develop new variant Creutzfeldt-Jakob disease, a deadly affliction that slowly eats holes in sufferers' brains. Mad cow disease can take years to develop in cattle, and symptoms in its human version may not appear for decades. Consequently, identifying the presence of the disease has been difficult.

In 1986, the British government disclosed a case of mad cow disease, but initially asserted that humans were not at risk from eating infected beef. Since then, 180,000 cases of mad cow have been reported in the United Kingdom. Not until 1996 did the British Government announce that people were falling victim to a degenerative new brain disease linked to BSE. Following this announcement and similar announcements for France, Italy, and Germany, many British and other European consumers stopped buying beef causing the beef demand curves in European countries to shift to the left. Over time, many cattle were removed from the food chain and European beef producers reduced their herds, so that the supply curves also shifted to the left. Consequently, beef consumption plummeted in Europe in the 1990s.

Japan found its first case in 2001. Two-thirds of beef sold in Japan in 2001 was imported: 49% from Australia and 46% from the United States. Immediately following the domestic mad cow discovery, beef consumption in Japan fell by 60% (including a 30% drop in imports, which were not implicated). A survey of Japanese consumers found that 86% said that they had reduced their consumption since the announcement. To protect and reassure consumers, Japan started testing all 1.2 million cattle that are slaughtered for BSE. By mid-2002, Japan's beef consumption recovered to within 10-15% of its pre-announcement levels.

Canada announced its first indigenous case in May 2003 (Canada reported a case in 1993 for a cow imported from Europe). The first U.S. case, in a cow imported from Canada, was reported in December 2003 (and the second in 2005). These announcements affected supply curves and demand curves throughout the world. As soon as the United States revealed the discovery of the single mad cow, more than 40 countries slapped an embargo on U.S. beef, causing beef supply curves to shift to the left in those importing countries. The loss of U.S. producers' largest export market, Japan, cost them \$1 billion worth of sales; and Canadian exporters lost about \$55 million worth of sales to Japan. U.S. exports fell from 1,143 (thousand metric tons) in 2003 to 209 in 2004. At least initially, a few people in the United States and Canada stopped consuming beef, causing demand curves in these countries to move slightly to the left. Strangely, the National Cattlemen's Beef Association reported that 89% of U.S. consumers expressed confidence in the safety of U.S. beef after the mad cow announcement compared to 88% in September 2003. Over a longer period, the U.S. demand curve may have shifted further to the left as consumers learned more about the disease.

The immediate supply effects in the United States and Canada were larger. The United States was exporting about 10% of its total production (about \$3.8 billion in sales), while the Canadians were exporting 40% on their domestic production. When they were unable to ship the beef abroad, U.S. and Canadian producers had to sell their beef in only their domestic markets, causing domestic supply curves to shift to the right. Thereafter, U.S. and Canadian producers reduced their herds, so that the supply curves shifted to the left in the longer run.

To reopen their export markets, the United States and Canada will have to convince countries that have imposed bans that their testing is adequate to catch future cases. The United States tested only 20,000 cattle out of 23 million slaughtered in 2003. Unless the United States and Canada started testing all slaughtered animals, Japan said that it would not allow additional imports.

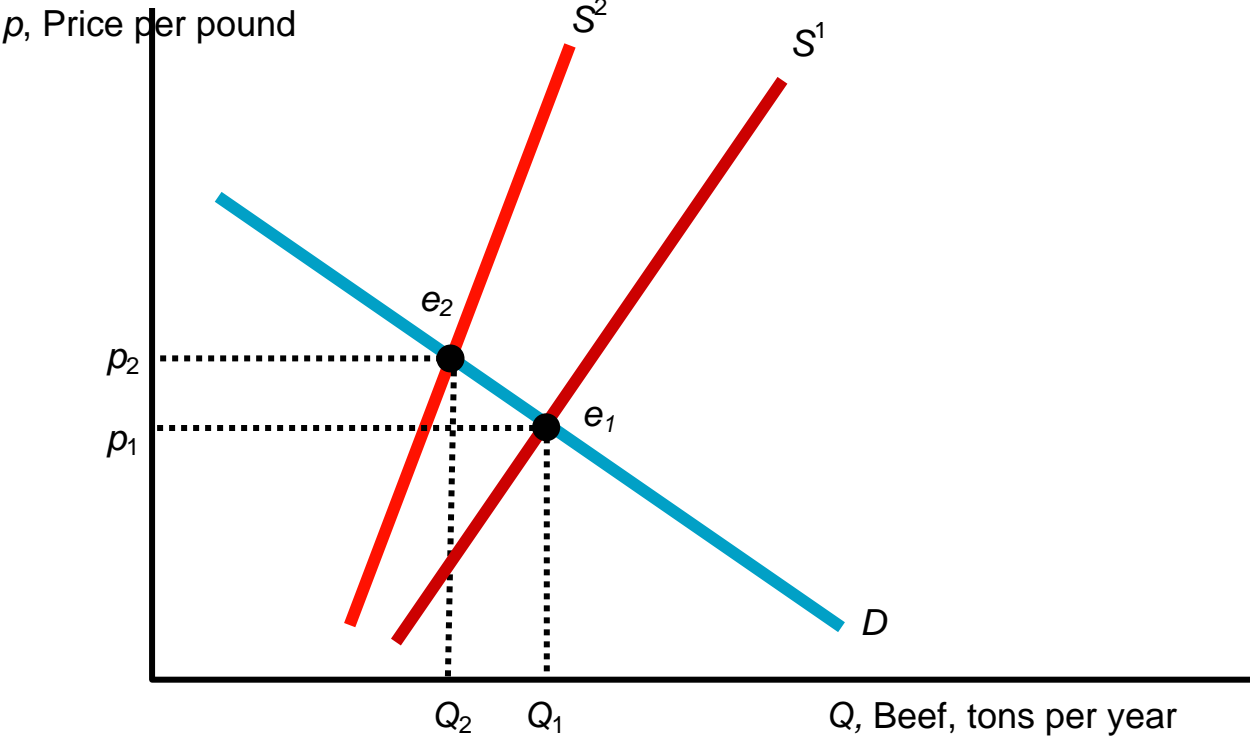
In the first few weeks after the U.S. ban, the quantity of beef sold in Japan fell substantially, and the price rose. In contrast, three weeks after the first discovery, the U.S. price in January 2004 fell by about 15% and the quantity sold increased by 43% over the last week in October 2003. Use supply and demand diagrams to explain why these events occurred.

## **Answer**

1. *Show how a shift of the Japanese supply curve affects the Japanese equilibrium:* When Japan banned U.S. imports, the supply curve of beef in Japan shifted to the left from  $S^1$  to  $S^2$  in panel a of the figure. (The figure shows a parallel shift for simplicity.) Presumably, the Japanese demand curve,  $D$ , was unaffected as Japanese consumers had no increased risk of consuming tainted meat. Thus, the shift of the supply curve caused the equilibrium to move along the demand curve from  $e_1$  to  $e_2$ . The equilibrium price rose from  $p_1$  to  $p_2$  and the equilibrium quantity fell from  $q_1$  to  $q_2$ .
2. *Show how shifts of both the U.S. supply and demand curves affect the U.S. equilibrium:* U.S. beef consumers' fear of mad cow disease caused their demand curve in panel b of the figure to shift slightly to the left from  $D^1$  to  $D^2$ . In the short run, total U.S. production was essentially unchanged. Because of the ban on exports, beef that would have been sold in Japan and elsewhere was sold in the United States, causing the U.S. supply curve to shift right from  $S^1$  to  $S^2$ . As a result, the U.S. equilibrium changed from  $e_1$  (where  $S^1$  intersects  $D^1$ ) to  $e^2$  (where  $S^2$  intersects  $D^2$ ). The U.S. price fell 15% from  $p_1$  to  $p_2 = 0.85p_1$ , while the quantity rose 43% from  $Q_1$  to  $Q_2 = 1.43Q_1$ .

*Comment:* Depending on exactly how the U.S. supply and demand curves had shifted, it would have been possible for the U.S. price and quantity to have both fallen. For example, if  $D^2$  had shifted far enough left, it could have intersected  $S^2$  to the left of  $Q_1$ , so that the equilibrium quantity would have fallen.

(a) Japanese Beef Market



(b) U.S. Beef Market

$p$ , Price per pound

