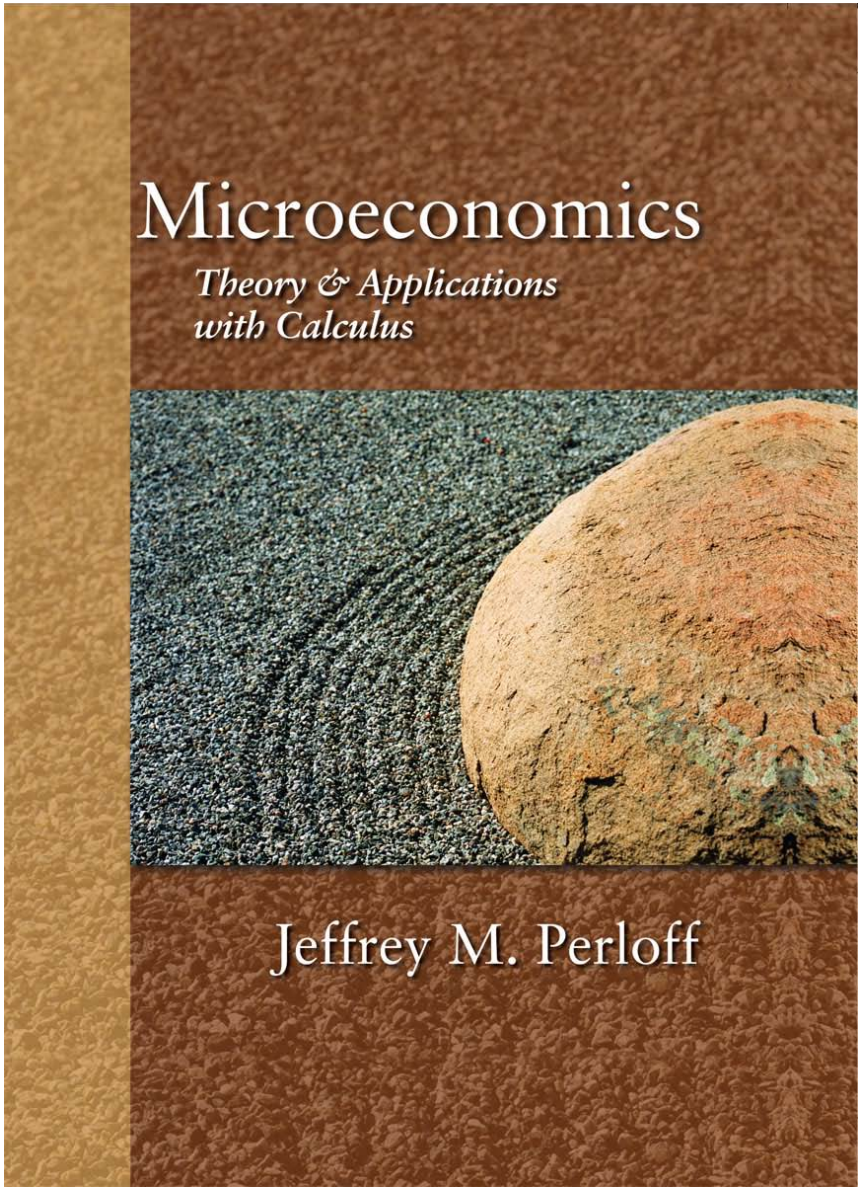
Chapter Two

Supply and Demand



PEARSON Addison Wesley

央行打擊台北房價，房價恐跌15%

- 2010-09-17 經濟日報

中央銀行控管房市效應顯現，永豐金控首席經濟學家黃蔭基16日表示，大台北地區房屋成交量已經萎縮，預估第四季到明年第一季房價將下跌15%。黃蔭基昨天是在銀行公會與台灣金融研訓院舉辦的「全額存保機制退場之因應措施與展望」研討會上，做出以上表示。黃蔭基以自己居住的台北市文山區為例，表示8月文山區的房屋買賣成交量減少四成，量縮之後就是價跌，央行選擇性信用管制的效力預期將持續到明年第一季；但房價跌到15%後，應該就已經到谷底，接下來可能逐漸反彈。

黃蔭基認為台灣不會出現二次衰退。據永豐金內部估計的明年經濟展望，大陸經濟成長率達9.6%，台灣經濟成長率則約4.6%，美國經濟成長率估計為2.7%。

永豐金預估，明年台灣第一季到第四季經濟成長率是2.2%、3.0%、5.5%、7.4%，顯示明年景氣會愈來愈好。黃蔭基提醒，現在亞洲各國都在打擊房市投機客，預期這些熱錢會尋找投資標的，目前最熱門的是跟氣候變遷相關的投資標的，例如小麥、玉米、棉花等農作物，以及鉛、鋅等基礎金屬。

Supply and Demand

- **In this chapter, we examine eight main topics.**
  - Demand
  - Supply
  - Market Equilibrium
  - Shocking the Equilibrium: Comparative Statics
  - Elasticities
  - Effects of a Sales Tax
  - Quantity Supplied Need Not Equal Quantity Demanded
  - When to Use the Supply-and-Demand model

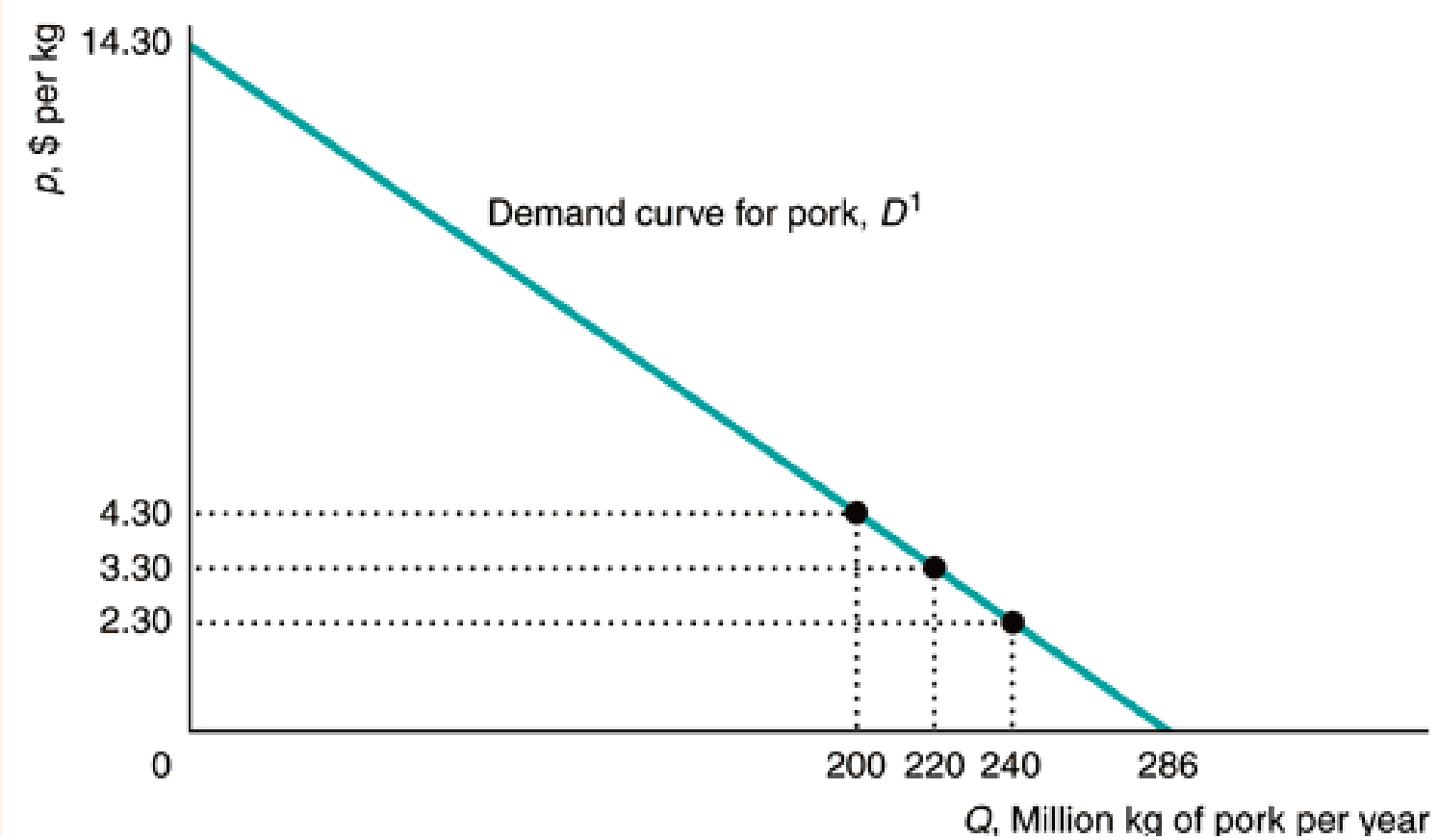
Demand

- Potential **consumers** decide how much of a good or service to **buy** on the basis of its *price* and many other factors, including their own *tastes*, *information*, *prices of other goods*, *incomes*, and *government actions*.

The Demand Curve

- **Quantity demanded**
  - The amount of a good that consumers are willing to buy at a given price, holding constant the other factors that influence purchases
- **Demand curve**
  - The *quantity demanded* at each possible price, holding constant the other factors that influence purchases

Figure 2.1
A Demand Curve



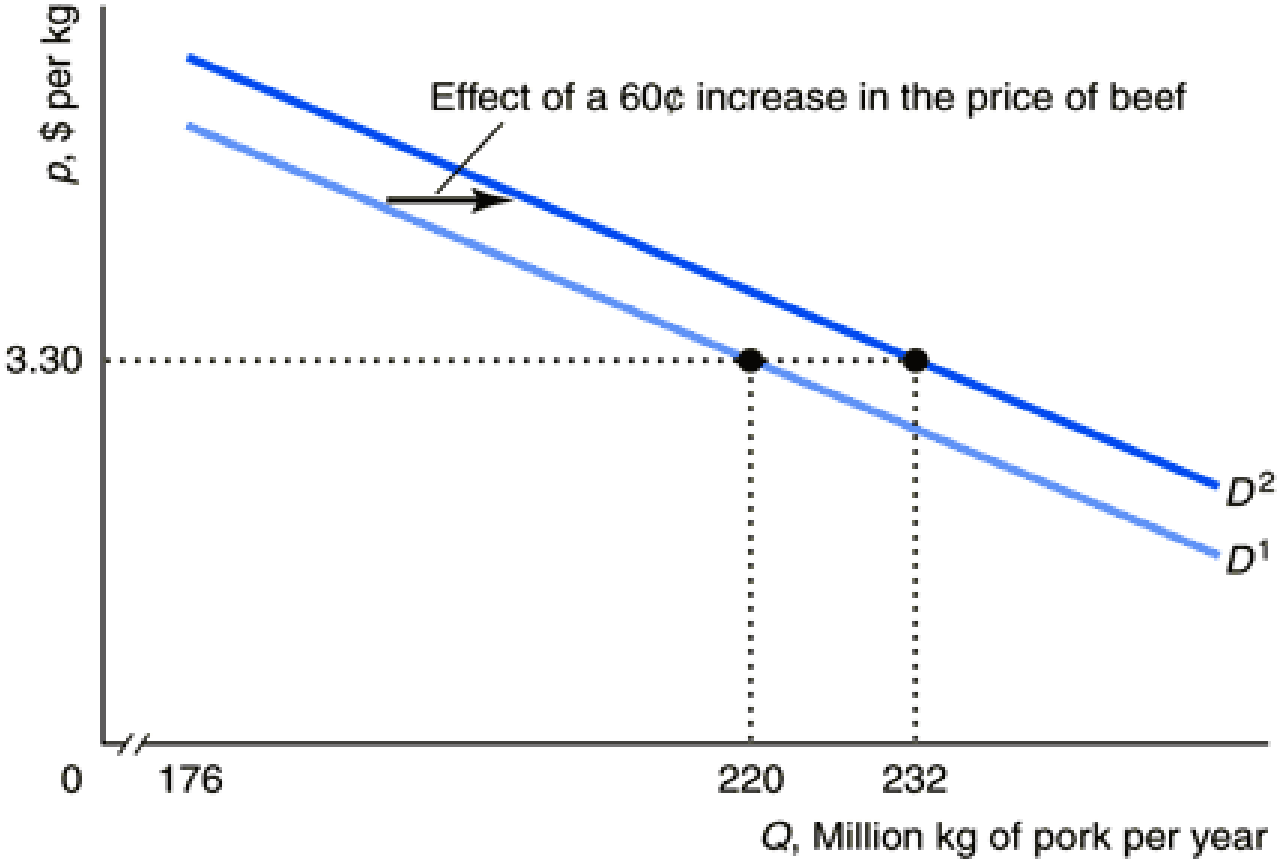
Effect of Prices on the Quantity Demanded

- Many economists claim that the most important *empirical* finding in economics is **the Law of Demand**: Consumers demand more of a good the lower its price, holding constant tastes, the prices of other goods, and other factors that influence the amount they consume.
- According to the Law of Demand, ***demand curves slope downward***, as in Figure 2.1.

Effect of Other Factors on Demand

- Economists use a simpler approach to show the effect on demand of a change in a factor that affects demand other than the price of the good.
- A change in any factor other than price of the good itself causes **a *shift* of the demand curve** rather than **a *movement* along the demand curve.**

Figure 2.2
A Shift of A Demand Curve



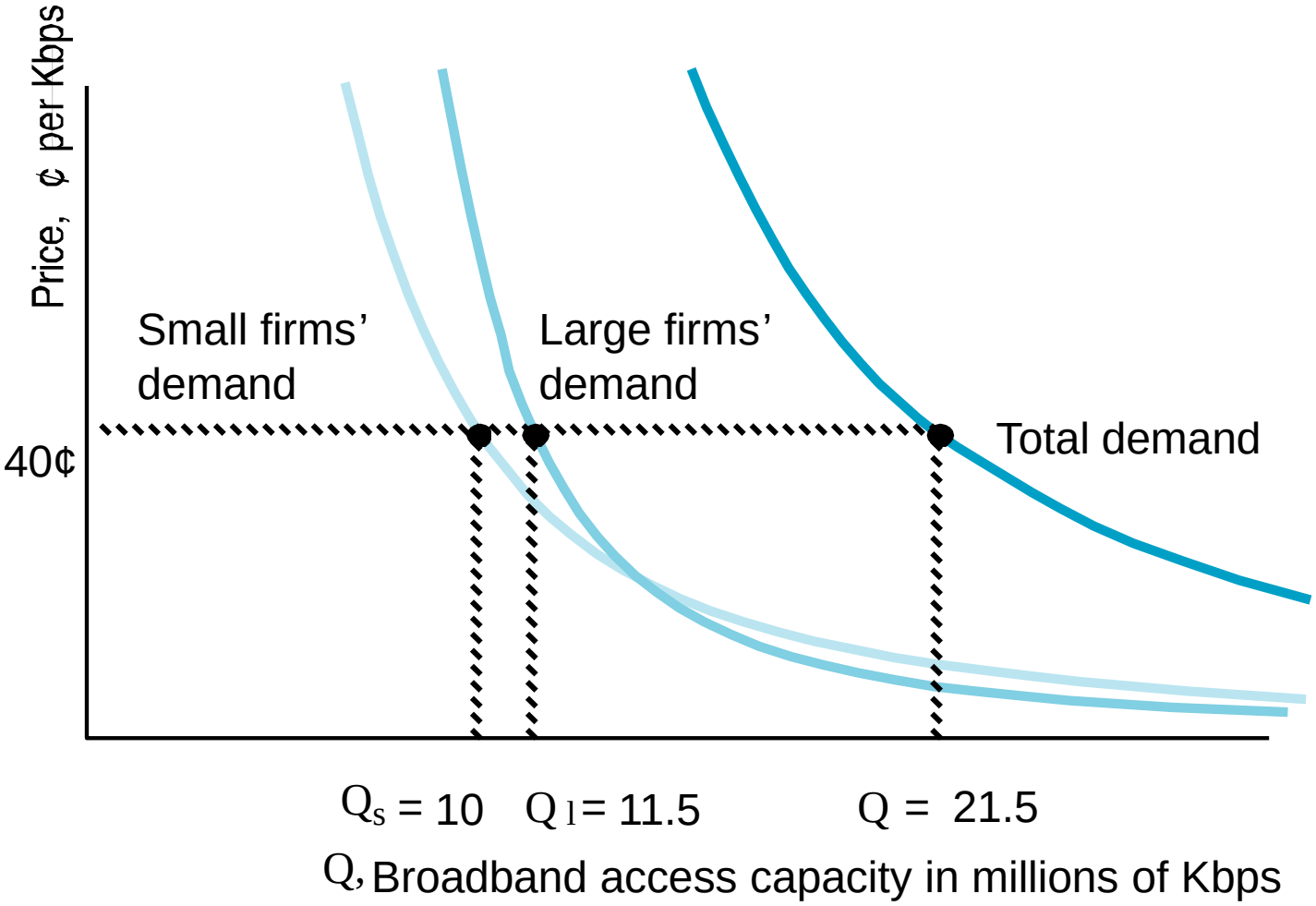
The Demand Function

- In addition to drawing the demand curve, you can write it as a mathematical relationship called the ***demand function***.
- The processed pork demand function is

$$Q = D(p, p_b, p_c, Y), \qquad (2.1)$$

where **Q** is the quantity of pork demanded, ***p*** is the price of pork, p_b is the price of beef, p_c is the price of chicken, and Y is the income of consumers.

Application: Aggregating the Demand for Broadband Service



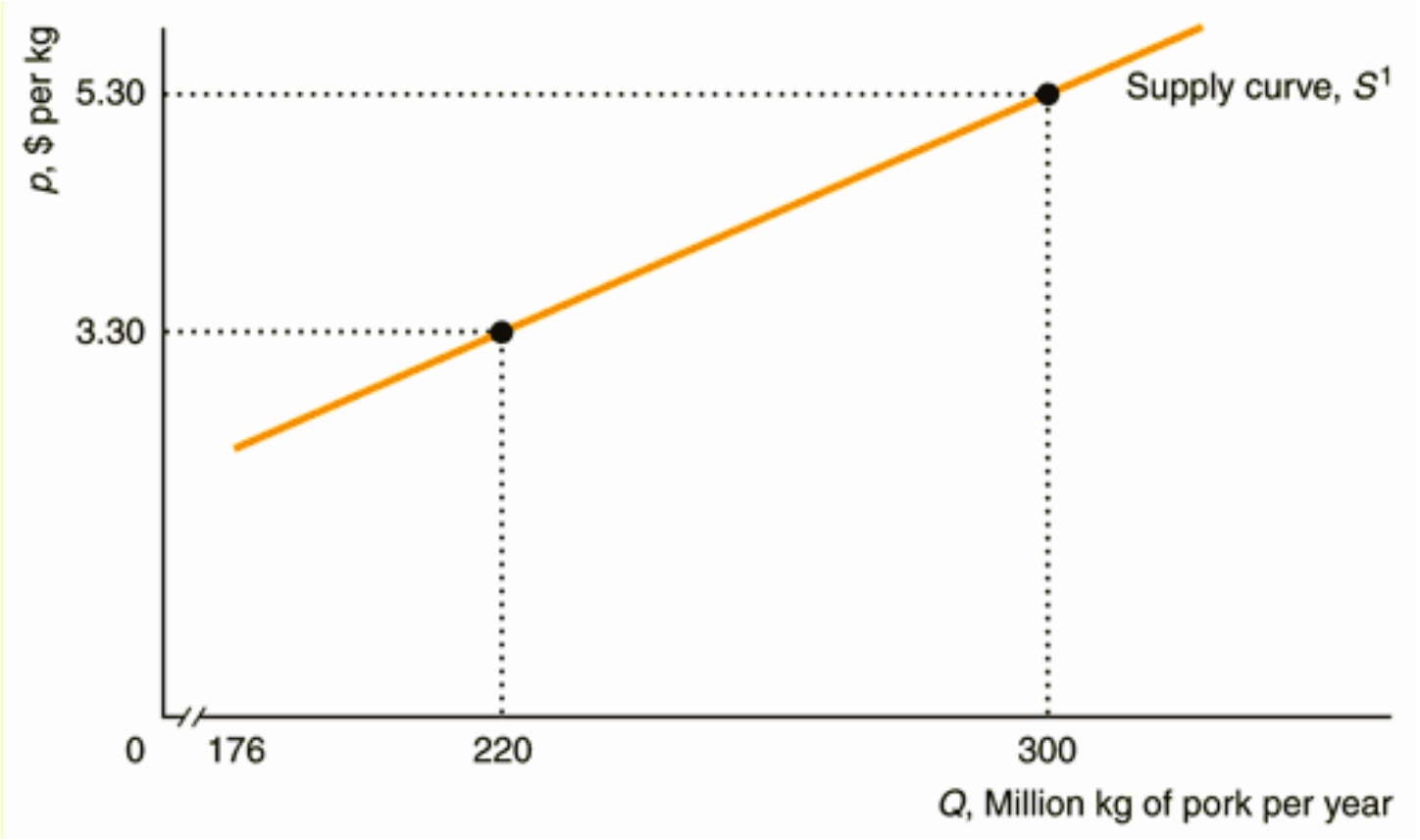
Supply

- **Firms** determine how much of a good to **supply** on the basis of the *price of that good* and other factors, including the *costs of production* and *government rules and regulations*. Usually, we expect firms to supply more at a higher price.

The Supply Curve

- **Quantity supplied**
  - The amount of a good that firms want to sell at a given price, holding constant other factors that influence firms' supply decisions, such as costs and government actions
- **Supply curve**
  - The *quantity supplied* at each possible price, holding constant the other factors that influence firms' supply decisions

Figure 2.3
A Supply Curve



Effect of Price on Supply

- The supply curve for pork is **upward sloping**. As the price of pork increases, firms supply more.

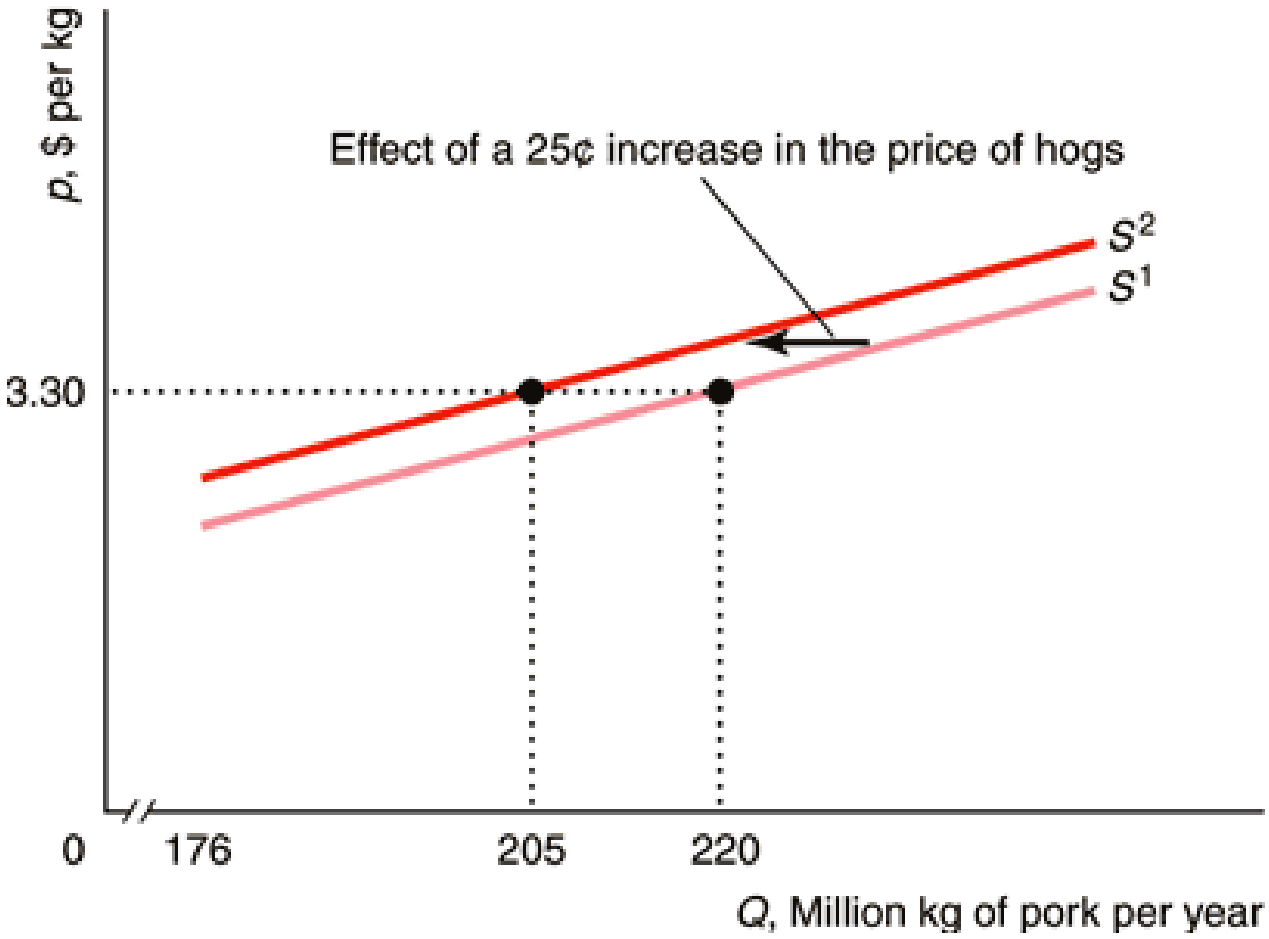
- An increase in the price of pork causes ***a movement along the supply curve***, resulting in more pork being supplied.

Effect of Other Variable on Supply

- A change in a variable other than the price of pork causes the ***entire supply curve to shift***.

- It is important to distinguish between a **movement along a supply curve** and a **shift of the supply curve**.

Figure 2.4
A Shift of a Supply Curve



The Supply Function

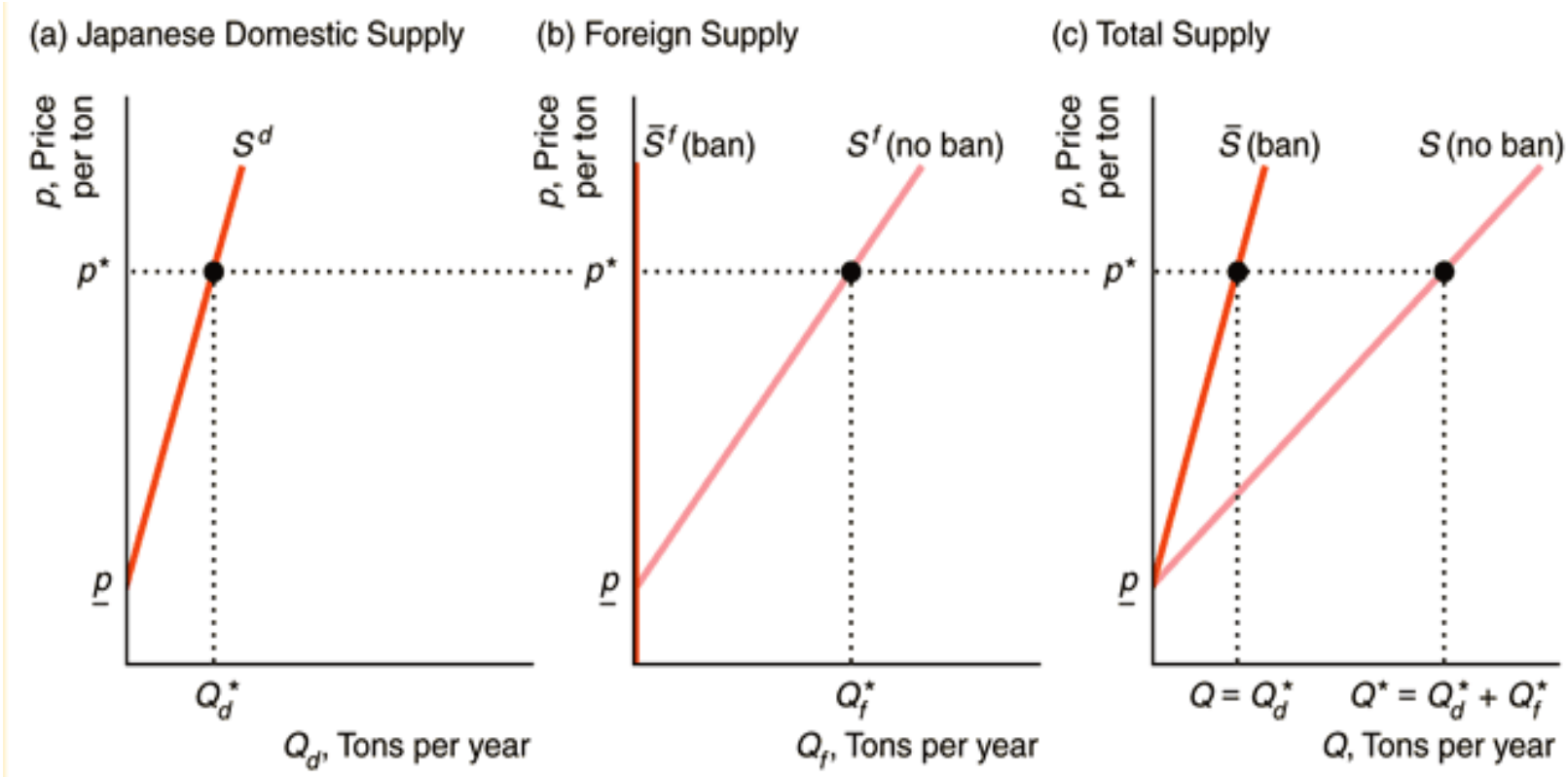
- We can write the relationship between the quantity supplied and price and other factors as a mathematical relationship called the **supply function**.

- Written generally, the processed pork supply function is

$$Q = S(p, p_h) \qquad (2.5)$$

where **Q** is the quantity of processed pork supplied, ***p*** is the price of processed pork, and p_h is the price of a hog.

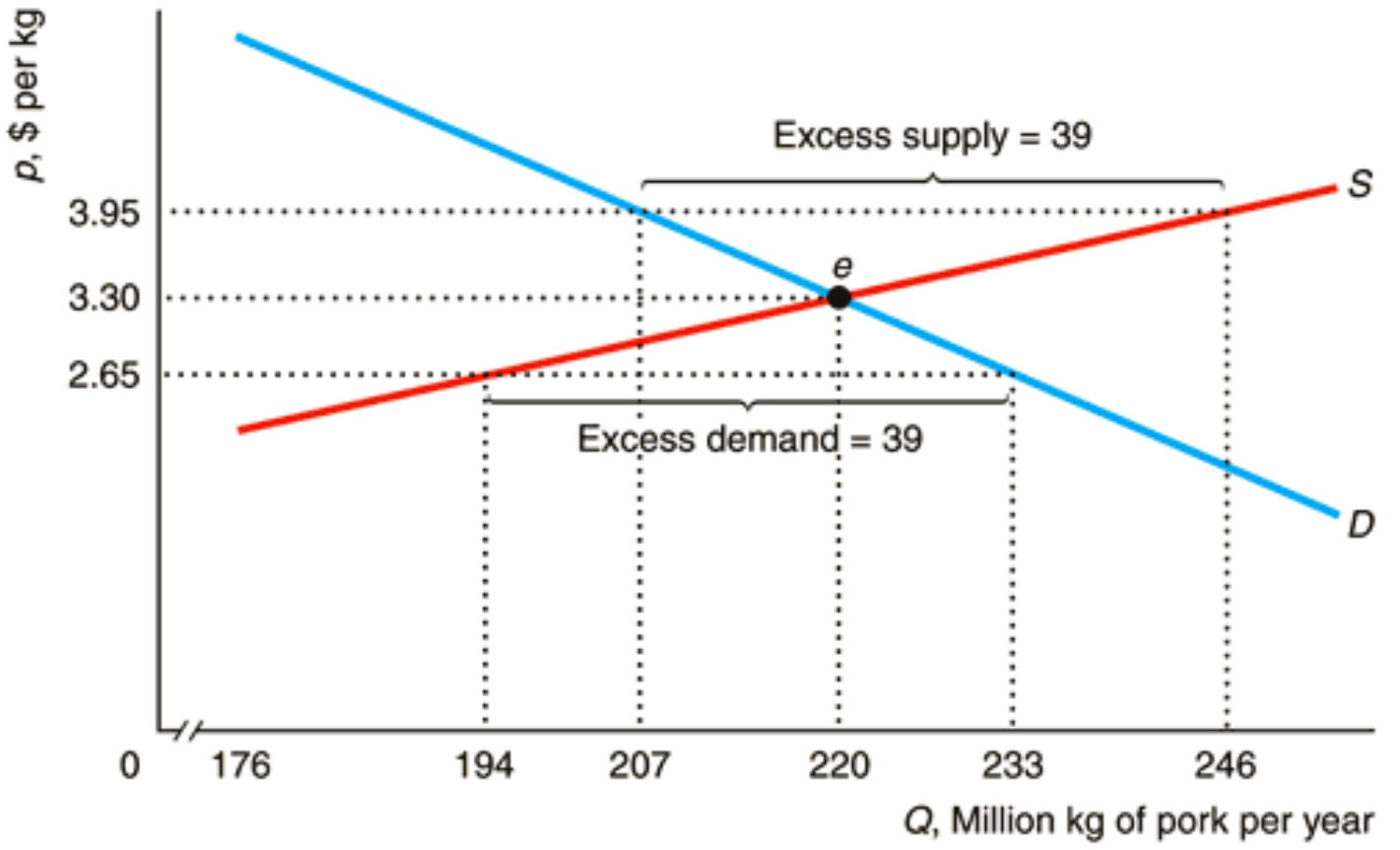
Figure 2.5
Total Supply: The Sum of Domestic and Foreign Supply



Market Equilibrium

- When all traders are able to buy or sell as much as they want, we say that the **market is in equilibrium**: a situation in which no participant wants to change its behavior.
- A price at which consumers can buy as much as they want and sellers can sell as much as they want is called an ***equilibrium price***.
- The quantity that is bought and sold at the equilibrium price is called ***equilibrium quantity***.

Figure 2.6 Market Equilibrium



Using Math to Determine the Equilibrium

- We use the supply and demand functions to solve for the equilibrium price at which **the quantity demanded equals supplied** (the equilibrium quantity).
- The **demand function** shows the relationship between the quantity demanded, Q_d, and the price:

$$Q_d = 286 - 20p$$

- The **supply function** tells us the relationship between the quantity supplied, Qs, and the price:

$$Q_s = 88 + 40p$$

- We want to find the p at which Qd = Qs = Q, the equilibrium quantity.

Forces That Drive the Market to Equilibrium

- **Excess demand**
  - The amount by which the *quantity demanded* exceeds the *quantity supplied* at a specified price
- **Excess supply**
  - The amount by which the *quantity supplied* is greater than the *quantity demanded* at a specified price

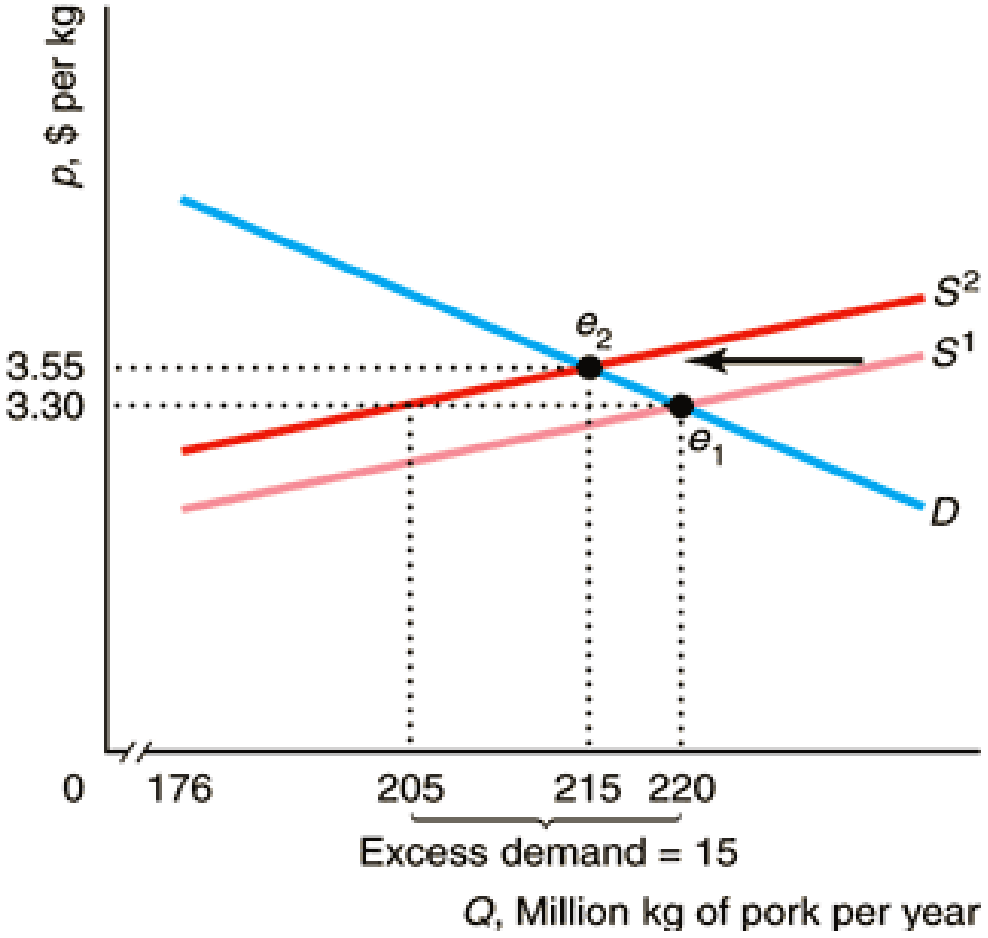
Forces That Drive the Market to Equilibrium

- At any price **other than the equilibrium price**, either consumers or suppliers are **unable to trade** as much as they want. These disappointed people act to change the price, driving the price to the equilibrium level.

Shocking the Equilibrium: Comparative Statics

- The equilibrium changes only if a shock occurs that shifts the demand curve or the supply curve.
- These curves shift if one of the variables we were holding constant changes.

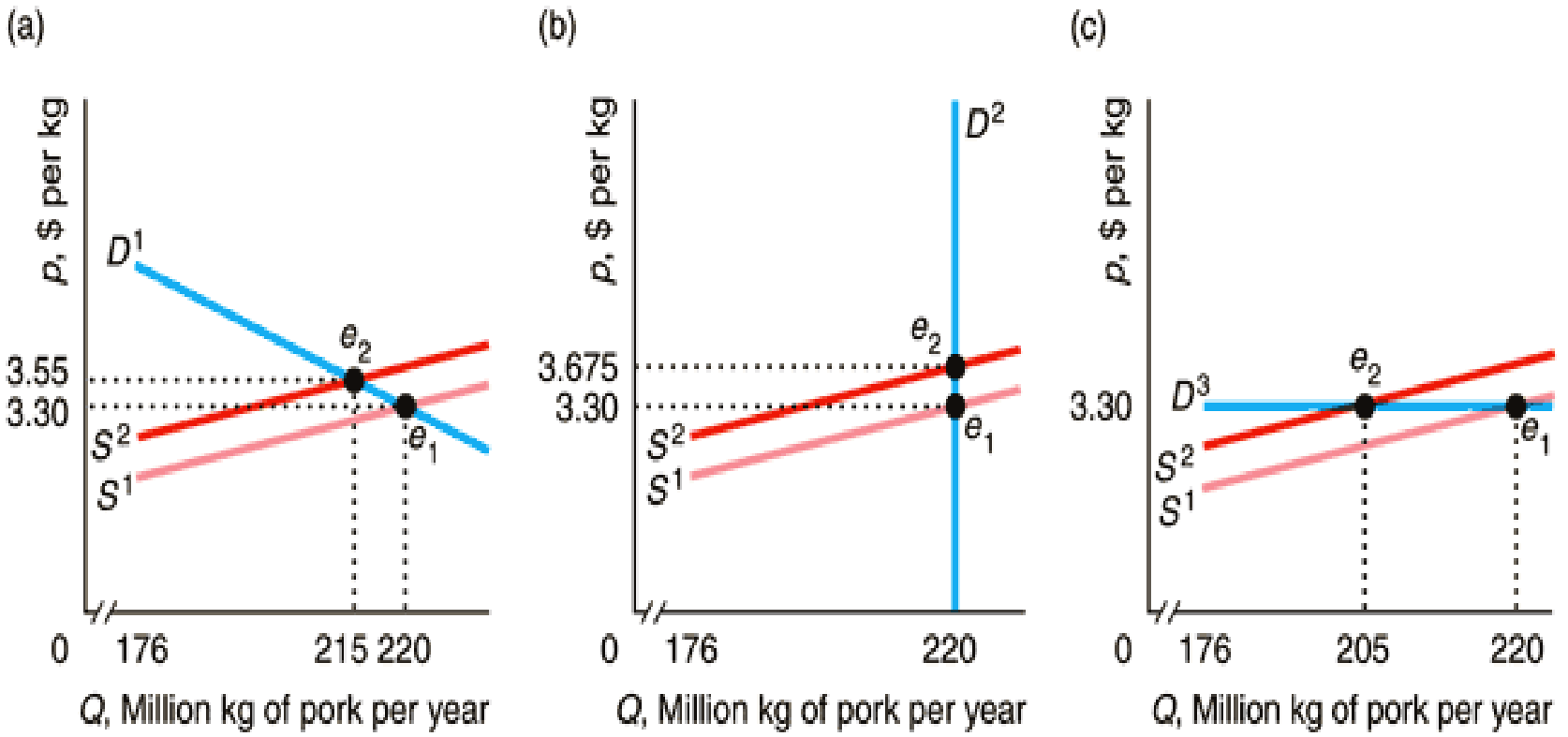
Figure 2.7
The Equilibrium Effect of a Shift of the Supply Curve



How Shapes of Demand and Supply Curves Matter

- The shapes of the demand and supply curves determine by how much a shock affects the equilibrium price and quantity.
- A supply shock would have different effects if the demand curve had a different shape.(see Figure 2.8)

Figure 2.8 How the Effect of a Supply Shock Depends on the Shape of the Demand Curve



Elasticity

- **Elasticity**
  - the percentage change in a variable in response to a given percentage change in another variable

Demand Elasticity

- The **price elasticity of demand** (or simply ***elasticity of demand***) is the percentage change in the quantity demanded, Q, in response to a given percentage change in the price, p , at a particular point on the demand curve.
- The **price elasticity of demand** (represented by **ε**, the Greek letter epsilon) is

$$\varepsilon = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\Delta Q/Q}{\Delta p/p} = \frac{\partial Q}{\partial p}\frac{p}{Q}$$

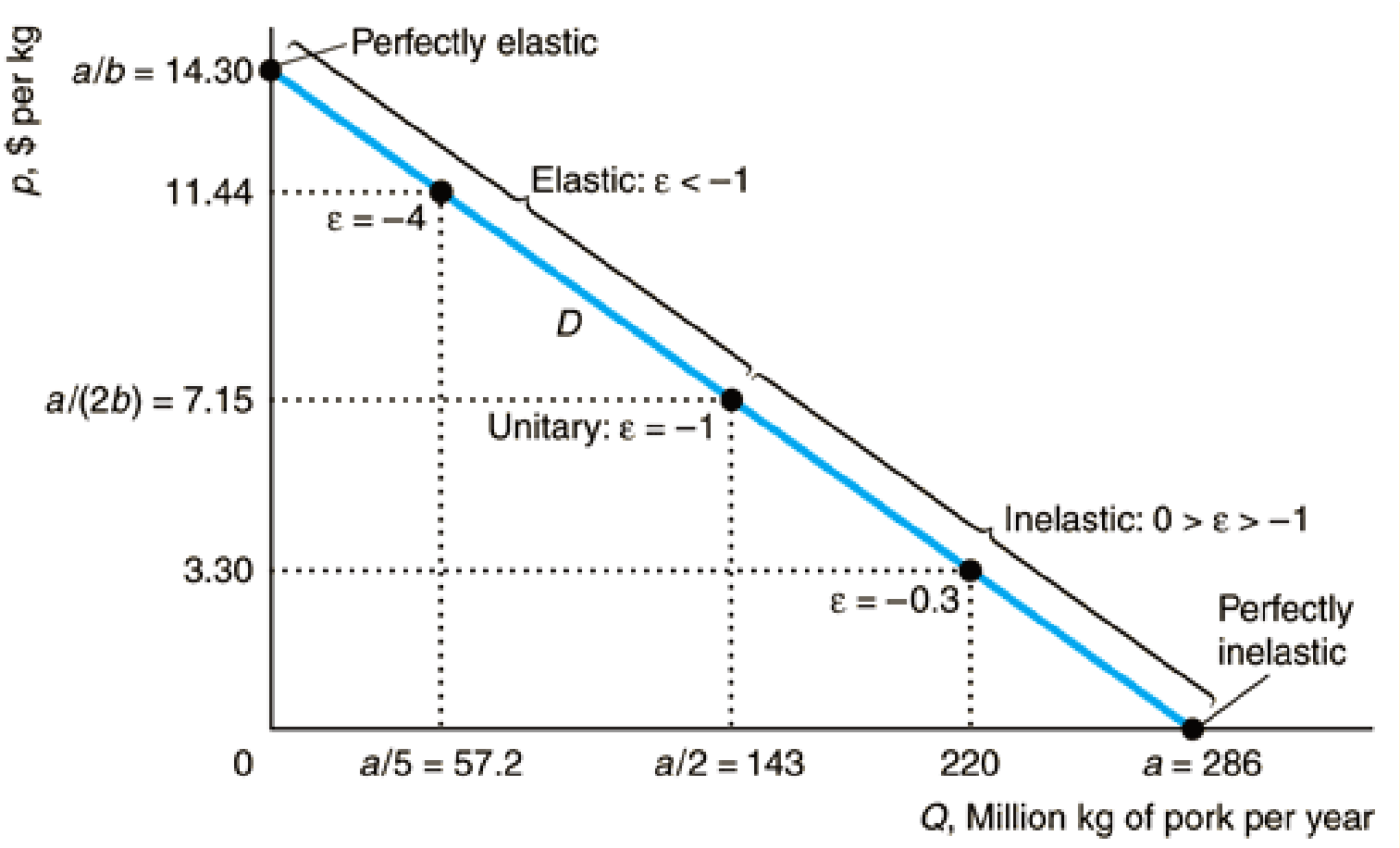
where the symbol Δ (the Greek letter delta) indicates a change.

Demand Elasticity

- **For a linear demand curve, $Q = a - bp$, the elasticity of demand is**

$$\varepsilon = \frac{dQ}{dp}\frac{p}{Q} = -b\frac{p}{Q}$$

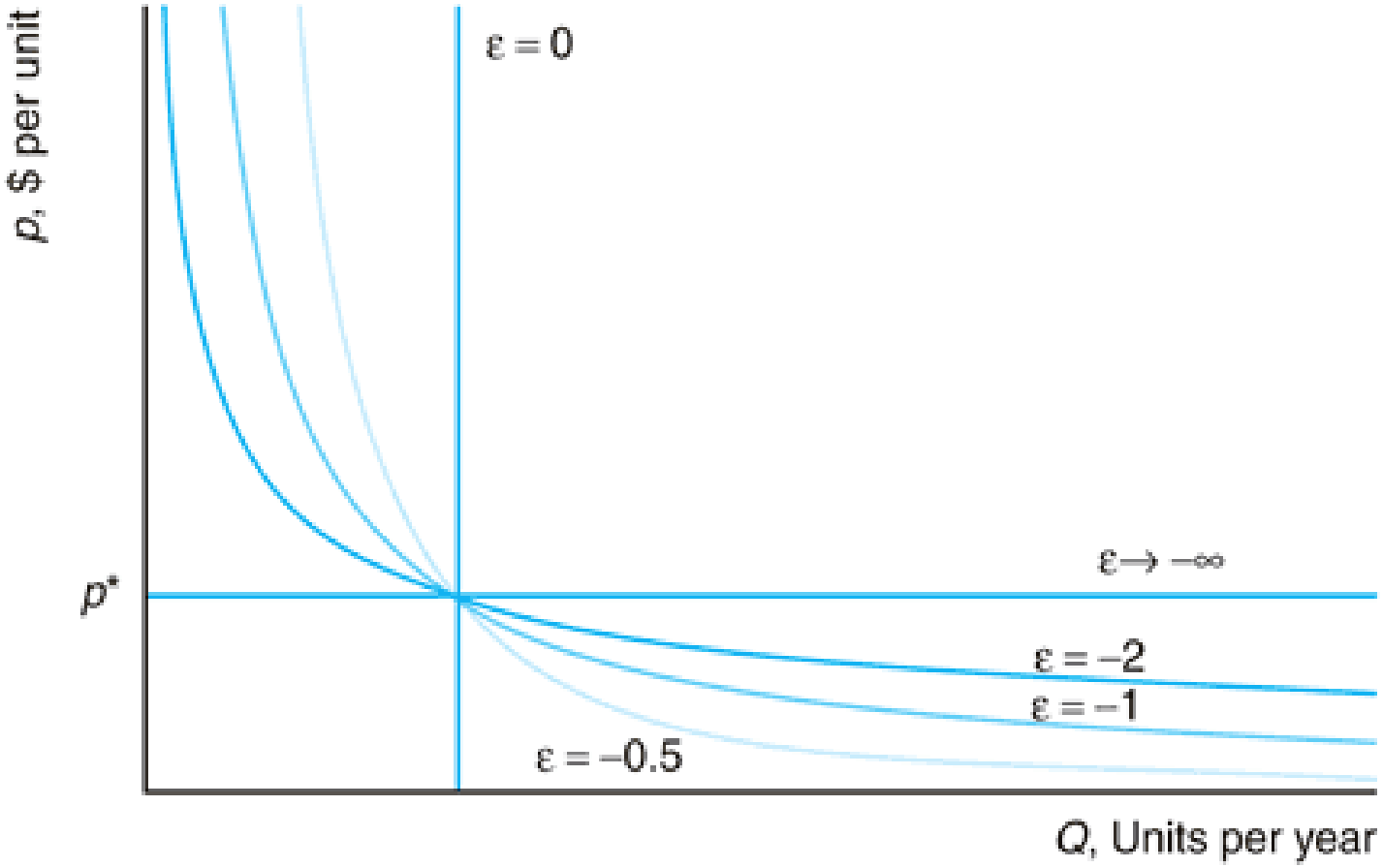
Figure 2.9 Elasticity Along the Pork Demand Curve



Elasticity along the Demand Curve

- **Horizontal Demand Curve**
  - A small increase in price causes an infinite drop in quantity, so the demand curve is **perfectly elastic**.
- **Vertical Demand Curve**
  - The **elasticity of demand is zero**.
  - A demand curve is vertical for *essential goods* — goods that people feel they must have and will pay anything to get.

Figure 2.10
Constant Elasticity Demand Curves



Other Demand Elasticities

- **Income elasticity of demand (or *income elasticity*)**
  - the percentage change in the *quantity demanded* in response to a given percentage change in income

$$\zeta = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}} = \frac{\Delta Q / Q}{\Delta Y / Y} = \frac{\Delta Q}{\Delta Y}\frac{Y}{Q}$$

Other Demand Elasticities

- **cross-price elasticity of demand**
  - the percentage change in the *quantity demanded* in response to a given percentage change in price of another good

$$\frac{\text{percentage change in quantity demanded}}{\text{percentage change in price of another good}} = \frac{\Delta Q / Q}{\Delta p_0 / p_0} = \frac{\Delta Q}{\Delta p_0}\frac{p_0}{Q}$$

Supply Elasticity

- **price elasticity of supply (or *elasticity of supply*, η)**
  - the percentage change in the *quantity supplied* in response to a given percentage change in the price

$$\eta = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}} = \frac{\Delta Q/Q}{\Delta p/p} = \frac{\partial Q}{\partial p}\frac{p}{Q}$$

Elasticity along the Supply Curve

- Two extreme examples of both constant elasticity of supply curves and linear supply curves are the vertical and horizontal supply curves.
- Constant elasticity of supply curves are one of the form $Q = Bp^{\eta}$, where *B* is a constant and η is the constant elasticity of supply at every point along the curve.

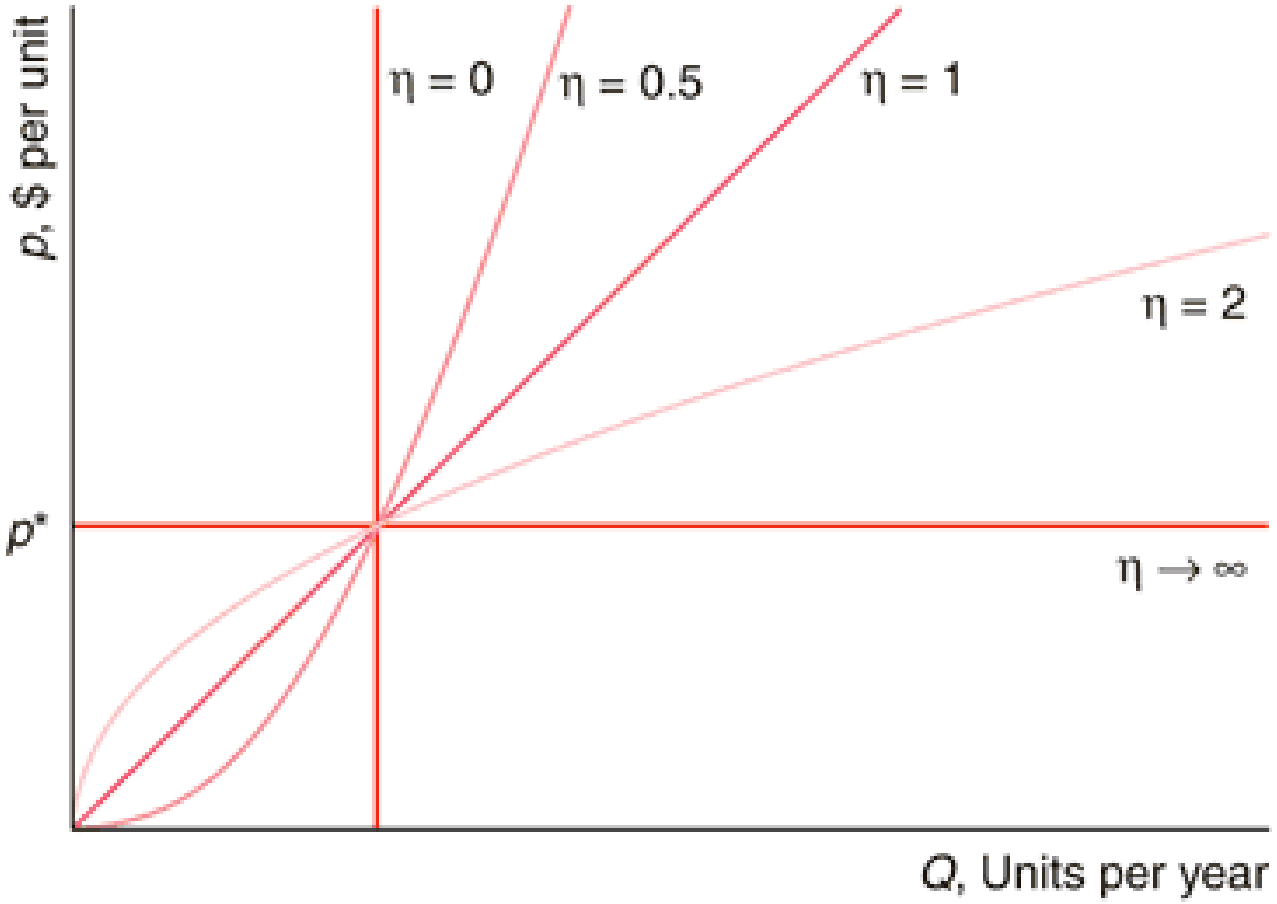
Derivation of Constant Elasticity of Supply

An exponential supply function : $Q = Bp^{\eta}$

$$\text{elasticity of supply} = \frac{\Delta Q / Q}{\Delta P / P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= \frac{\partial Q}{\partial P} \times \frac{P}{Q} = (\eta B p^{n-1}) \frac{P}{BP^{n}} = \eta$$

Figure 2.11
Constant Elasticity Supply Curves



Long Run Versus Short Run

- The shapes of demand and supply curves depend on the relevant time period. Short-run elasticities may differ substantially from long-run elasticities.

- **Demand elasticities over time**
  - Two factors that determine whether short-run demand elasticities are larger or smaller than long-run elasticities are ease of substitution and storage opportunities.

Long Run Versus Short Run

- **Supply elasticities over time**
  - In the short run, how much a manufacturing firm can expand its output is limited by the fixed size of its manufacturing plant and the number of machines it has.
  - In the long run, however, the firm can build another plant and buy or build more equipment.

Effects of Government Interventions

- A government can affect a market equilibrium in many ways.
- Sometimes government actions cause a **shift** in the supply curve, the demand curve, or both curves, which causes the equilibrium to change.
- Some government interventions, however, cause the quantity demanded to differ from the quantity supplied.

米酒稅調降首日，紅標料理米酒狂賣150萬瓶

- 2010-09-17 工商時報

行政院昨天宣布，國內紅標米酒比照料理米酒課徵較低菸酒稅從16日起生效。台灣菸酒公司的紅標料理米酒昨天出貨量12.5萬打（150萬瓶），比平常1天出貨量2萬打，多出5倍之多。但到底會增賣多少量，多受歡迎，需要數天的觀察，才能知道結果。

財政部國庫署表示，昨天到下午4點為止，共出貨12.5萬打（150萬瓶）。台酒公司昨天表示，消費者昨天可以在台酒的營業處與零售店今買到紅標料理米酒；同時也都批貨給超商和大賣場，但要看地理距離的遠近，及物流配送的速度，最近會陸續上架。

從昨日起到11月15日止，台酒會接受消費者拿舊酒換新酒，原來舊米酒每瓶賣50元（已含2元押瓶費），新的米酒27元（含2元押瓶費），所以舊酒1瓶換2瓶，再補4元，等未來退還2個瓶子時，可領回4元。

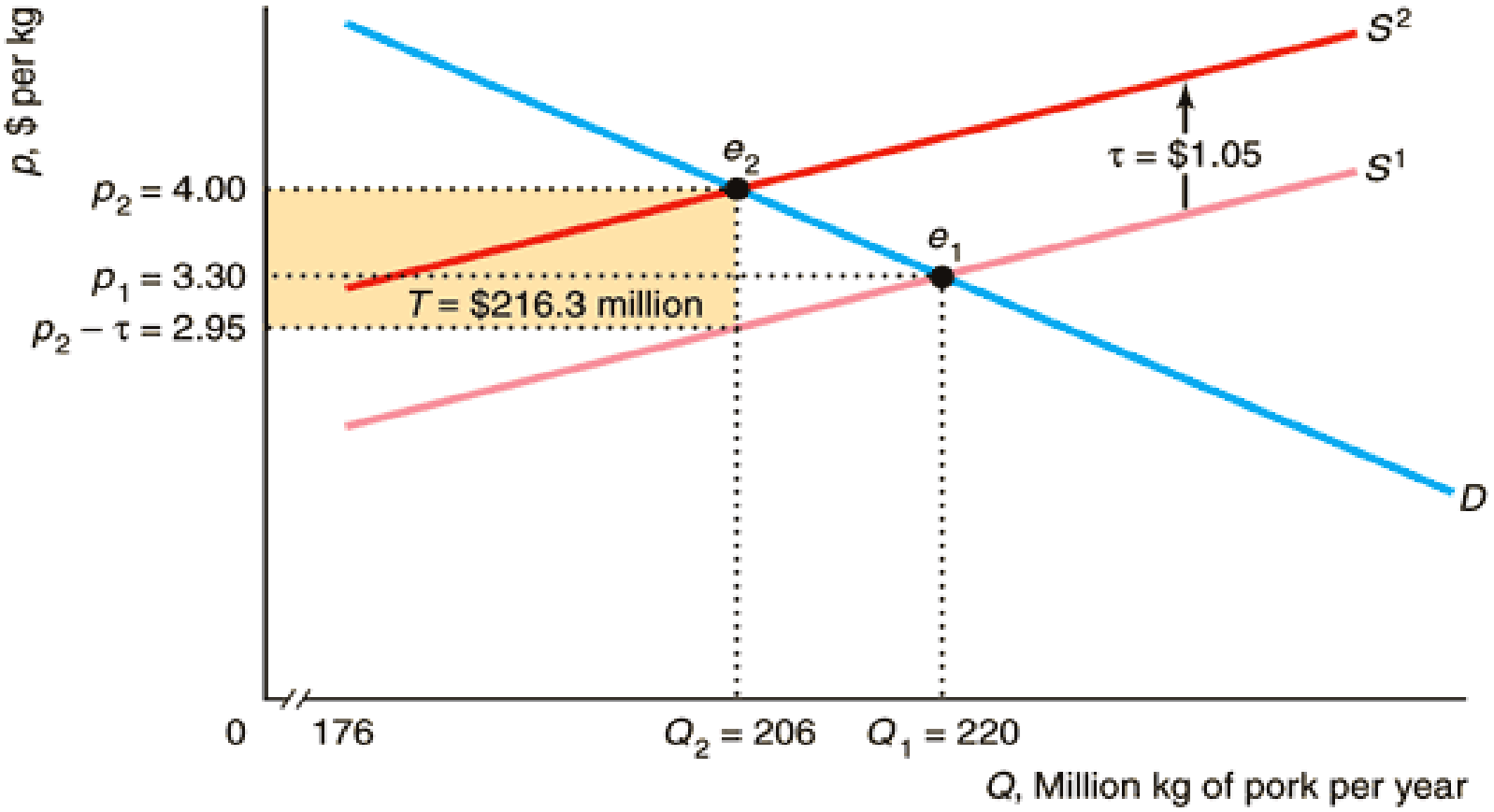
Effects of a Sales Tax

- What effect does a sales tax have on equilibrium prices and quantity?
- Is it true, as many people claim, that taxes assessed on producers are passed along to consumers? That is , do consumers pay for the entire tax?
- Do the equilibrium price and quantity depend on whether the tax is assessed on consumers or on producers?

Two Types of Sales Taxes

- The most common sales tax is called an ***ad valorem* tax (従価税)** by economists and *the* sales tax by real people. For every dollar the consumers spends, the government keeps a fraction, α, which is the *ad valorem* tax rate.
- The other type of sales tax is a ***specific* or *unit* tax (従量税)**, where a specified dollar amount, τ, is collected per unit of output.

Figure 2.12 Effect of a $1.05 Specific Tax on the Pork Market Collected from Producers



How Specific Tax Effects Depend on Elasticities

- The **effects of the specific tax** on the equilibrium prices and quantity **depend on the elasticities of supply and demand**.
- In response to this change in the tax, the price consumers pay increases by

$$\Delta p = \left(\frac{\eta}{\eta - \varepsilon} \right) \Delta \tau$$

- where ε is the demand elasticity and η is the supply elasticity at the equilibrium.

How Specific Tax Effects Depend on Elasticities

- New equilibrium is determined by:

$$D(p) - S(p - \tau) = 0$$

- The effect of tax on price
- differentiating $\frac{dD}{dp}\frac{dp}{d\tau} = \frac{dS}{dp}\frac{d(p(\tau)-\tau)}{d\tau} = \frac{dS}{dp}\left(\frac{dp}{d\tau} - 1\right)$
- rearranging

$$\frac{dp}{d\tau} = \frac{\frac{dS}{dp}}{\frac{dS}{dp} - \frac{dD}{dp}} = \frac{\frac{dS}{dp}\frac{P}{Q}}{\frac{dS}{dp}\frac{P}{Q} - \frac{dD}{dp}\frac{P}{Q}} = \frac{\eta}{\eta - \varepsilon}$$

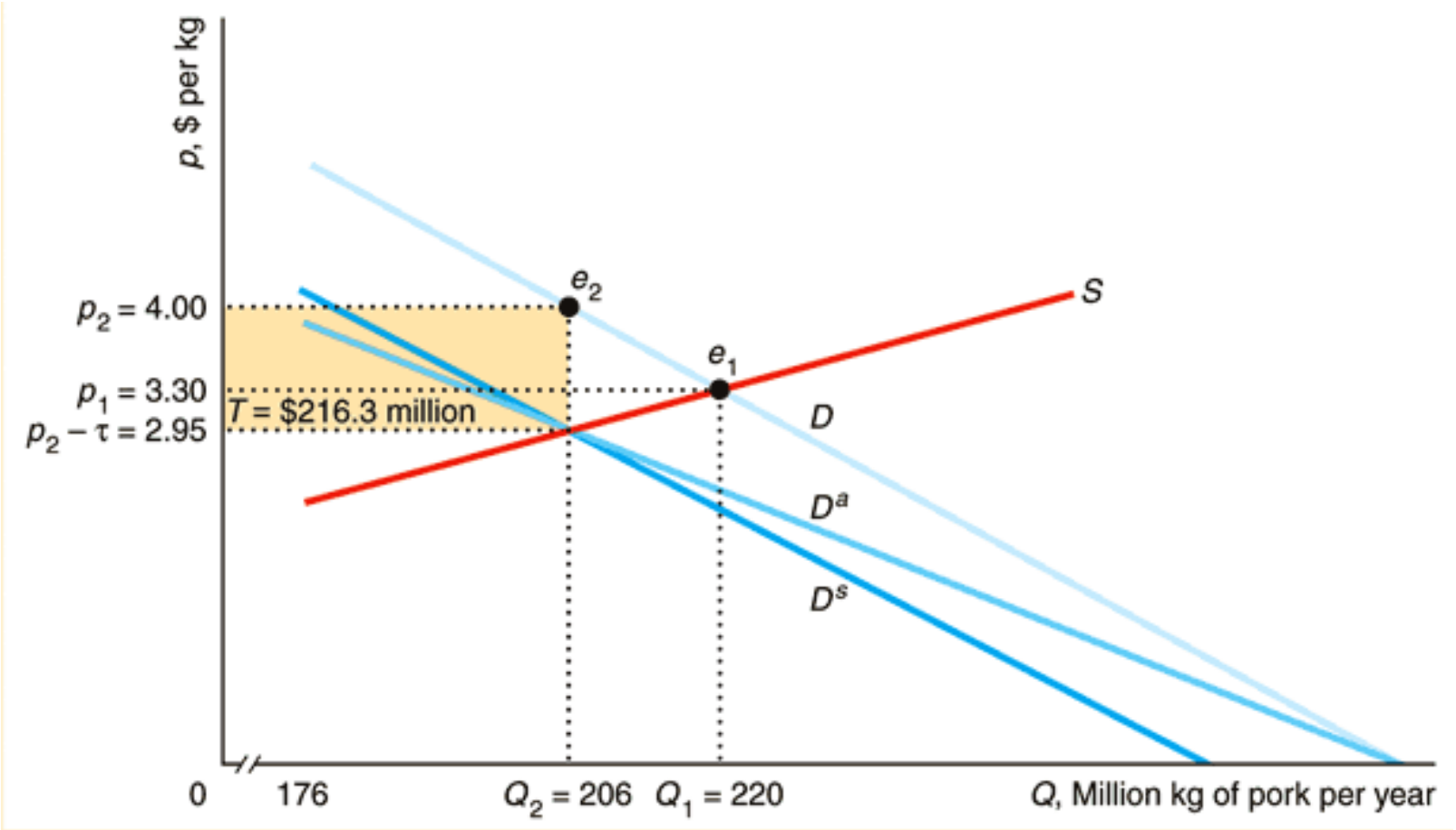
Tax Incidence of a Specific Tax

- The incidence of a tax on consumers is the share of the tax that falls on consumers. The incidence of the tax that falls on consumers is：

$$\frac{\mathrm{d}p}{\mathrm{d}\tau} = \frac{\eta}{\eta - \varepsilon}$$

which is the amount by which the price to consumers rises as a fraction of the amount the tax increases.

Figure 2.13 Comparison of an *Ad Valorem* and a Specific Tax on Pork



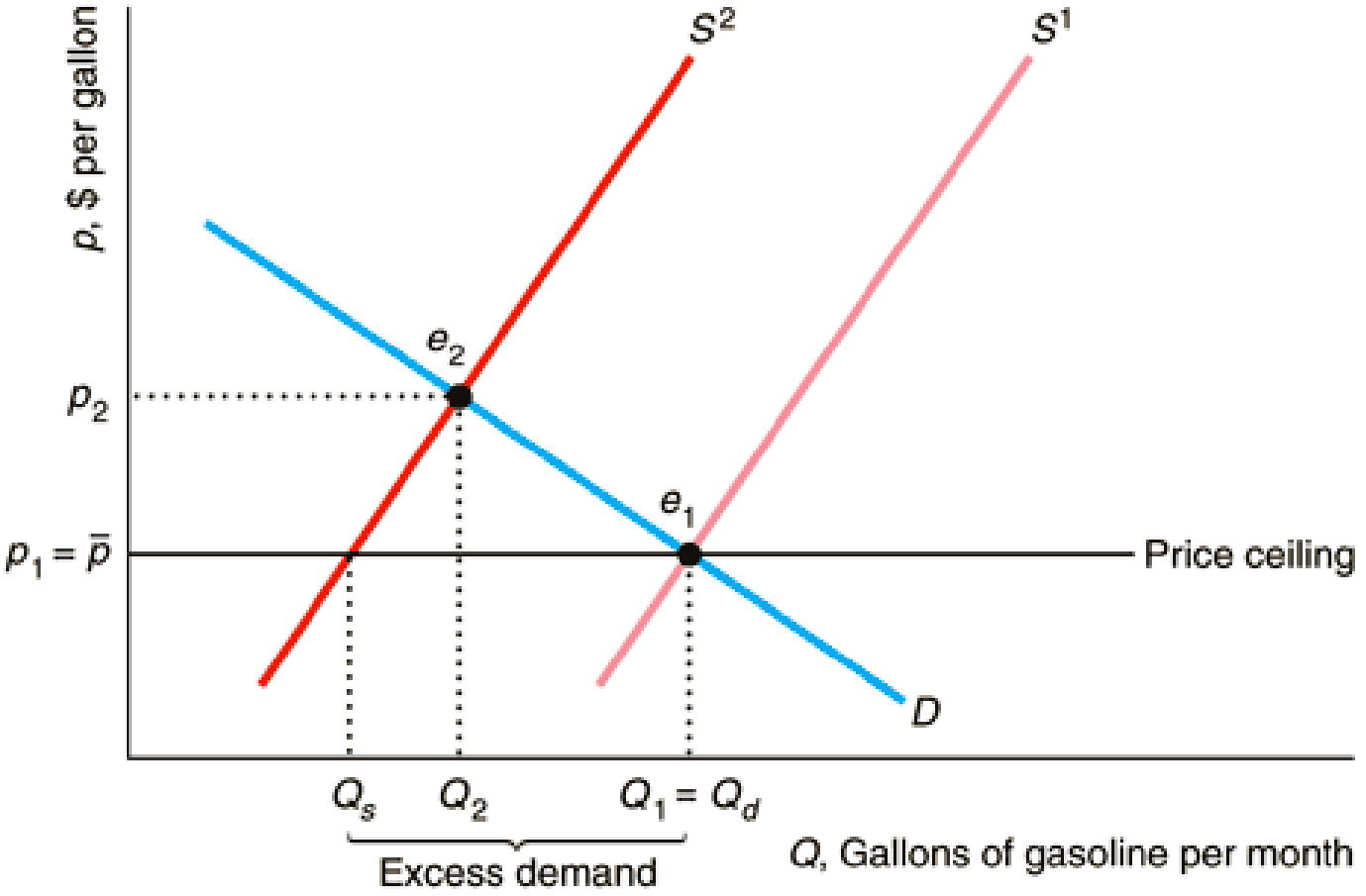
Policies That Cause Demand to Differ From Supply

- Some government policies do more than merely shift the supply or demand curve.
- For example, governments may control prices directly, a policy that leads to either **excess supply** or **excess demand** if the price the government sets differs from the equilibrium price.

Price Ceilings

- Price ceilings have **no effect** if they are **set above the equilibrium price** that would be observed in the absence of the price controls.
- However, if the equilibrium price, p, would be above the price ceiling $\overline{p}$, the price that is actually observed in the market is the price ceiling.
- As a result, an **enforced price ceiling** causes a shortage: **a persistent excess demand**.

Figure 2.14 Price Ceiling on Gasoline



Price Floors

- Governments also commonly use **price floors**. One of the most important examples of a price floor is the **minimum wage** in labor markets. The minimum wage law forbids employers from paying less than the minimum wage, *w*.
- If the minimum wage binds — **exceeds the equilibrium wage, *w**** — the minimum wage creates ***unemployment***, which is a **persistent excess supply** of labor.

基本工資確定調漲

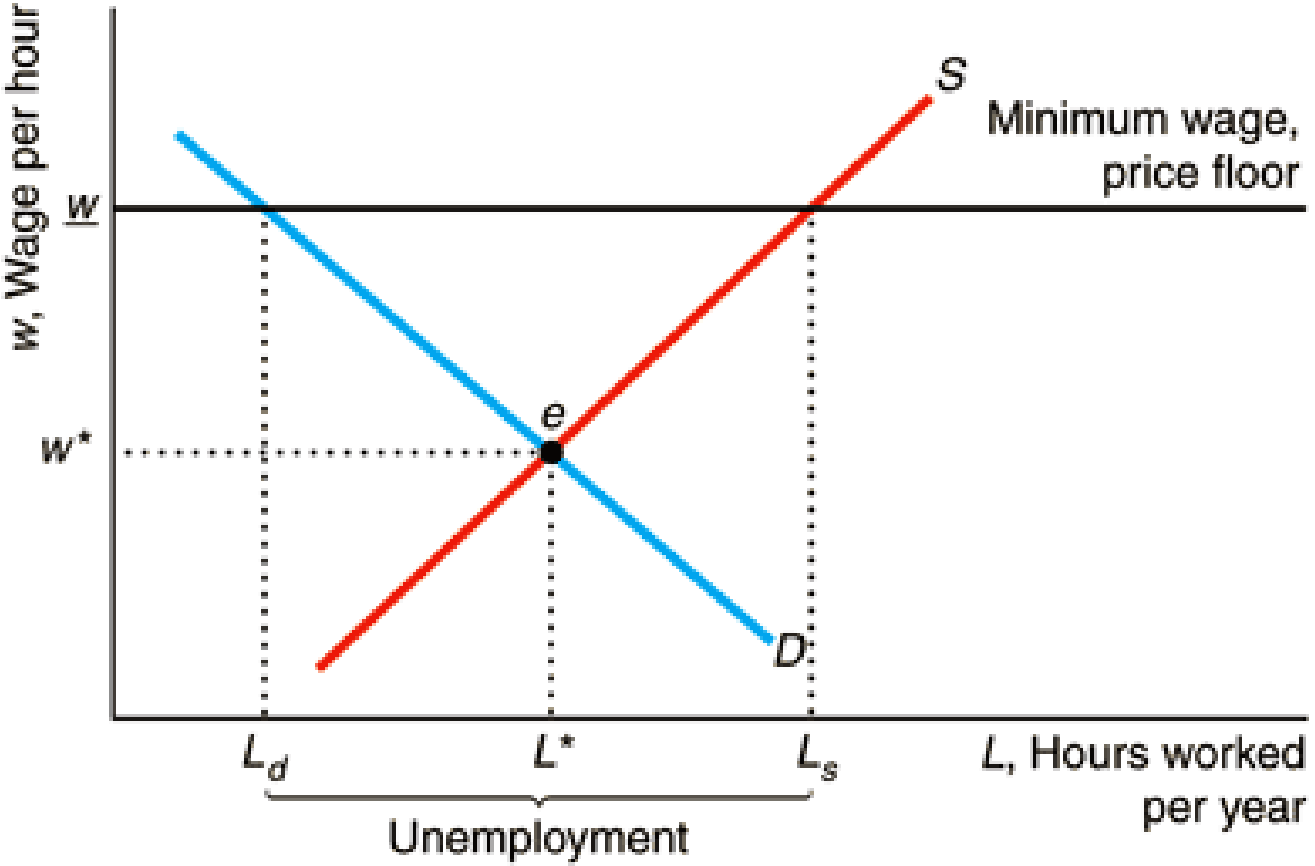
- **調幅3.47%，漲600元，基本工資微調17,880元定案**

2010-09-14 中國時報

勞資雙方歷經三個多小時的激辯，基本工資終於確定調漲！月薪由17,280元調高600元，成為17,800元；時薪則由95元調高3元，成為98元，調幅為3.47%。結果經行政院核定後，將於明年一月一日起實施，粗估至少有154萬名勞工受惠。

全文來源：
http://news.chinatimes.com/focus/0,5243,50106571x112010091400101,00.html

Figure 2.15 Minimum Wage



When to Use the Supply-and-Demand Model

- Supply-and-demand theory can help us to understand and predict real-word events in many markets.
- In this semester, we discuss competitive markets in which the supply-and-demand model is a powerful tool for predicting what will happen to market equilibrium if underlying conditions — tastes, incomes, and prices of inputs — change.

When to Use the Supply-and-Demand Model

- **This model is applicable in markets in which:**
  - Everyone is a price taker
  - Firms sell identical products
  - Everyone has full information about the price and quality of goods
  - Costs of trading are low

Markets with these properties are called *perfectly competitive markets*.