# Lecture 4

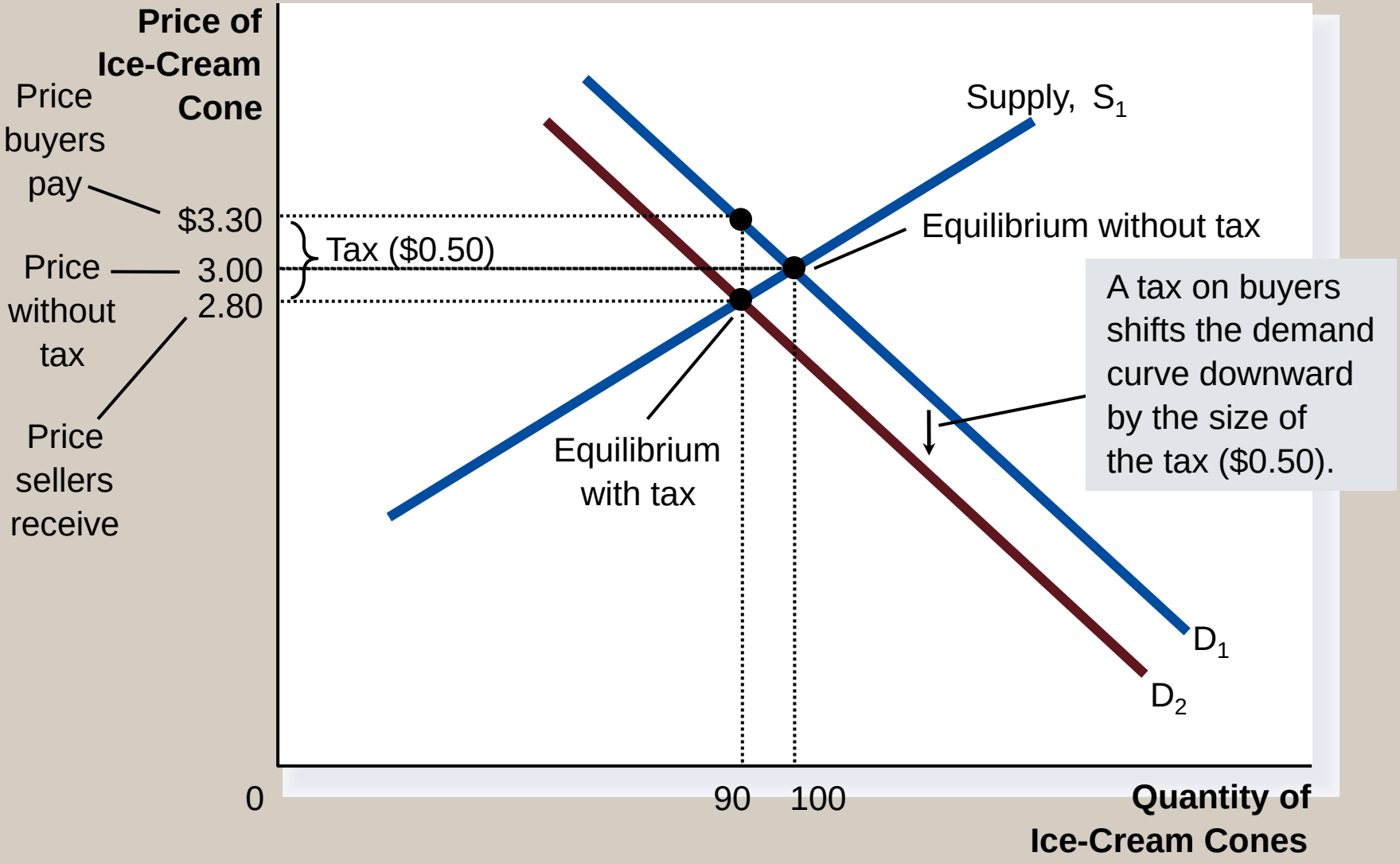
Impact of tax policy on equilibrium price and quantiy

# Content

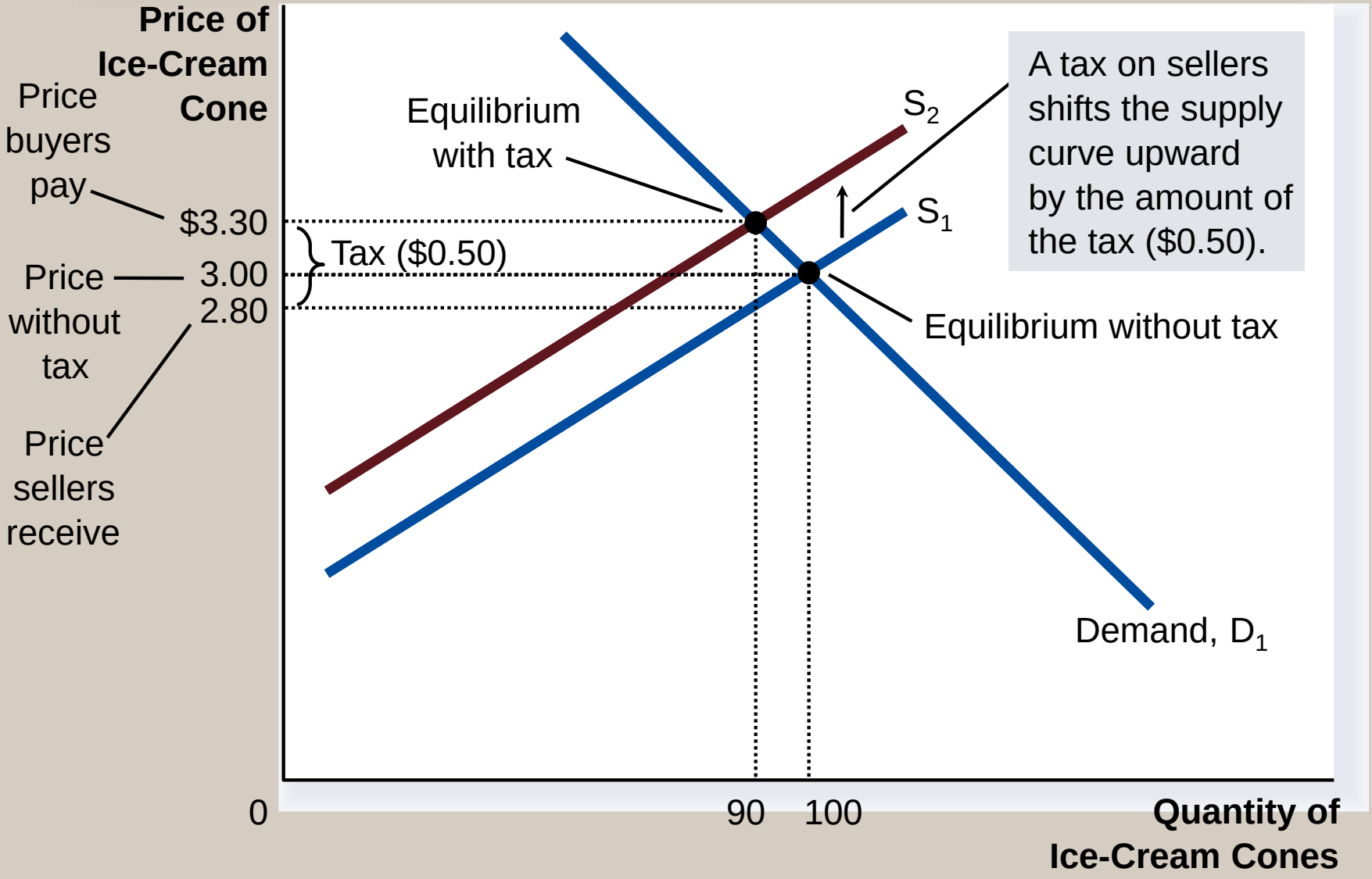
- Tax incidence
- Elasticity and Tax incidence
- The costs of Taxation

- *Tax incidence* is the manner in which the burden of a tax is shared among participants in a market.
- Tax incidence is the study of who bears the burden of a tax.
- Taxes result in a change in market equilibrium.
- Buyers pay more and sellers receive less, regardless of whom the tax is levied on.

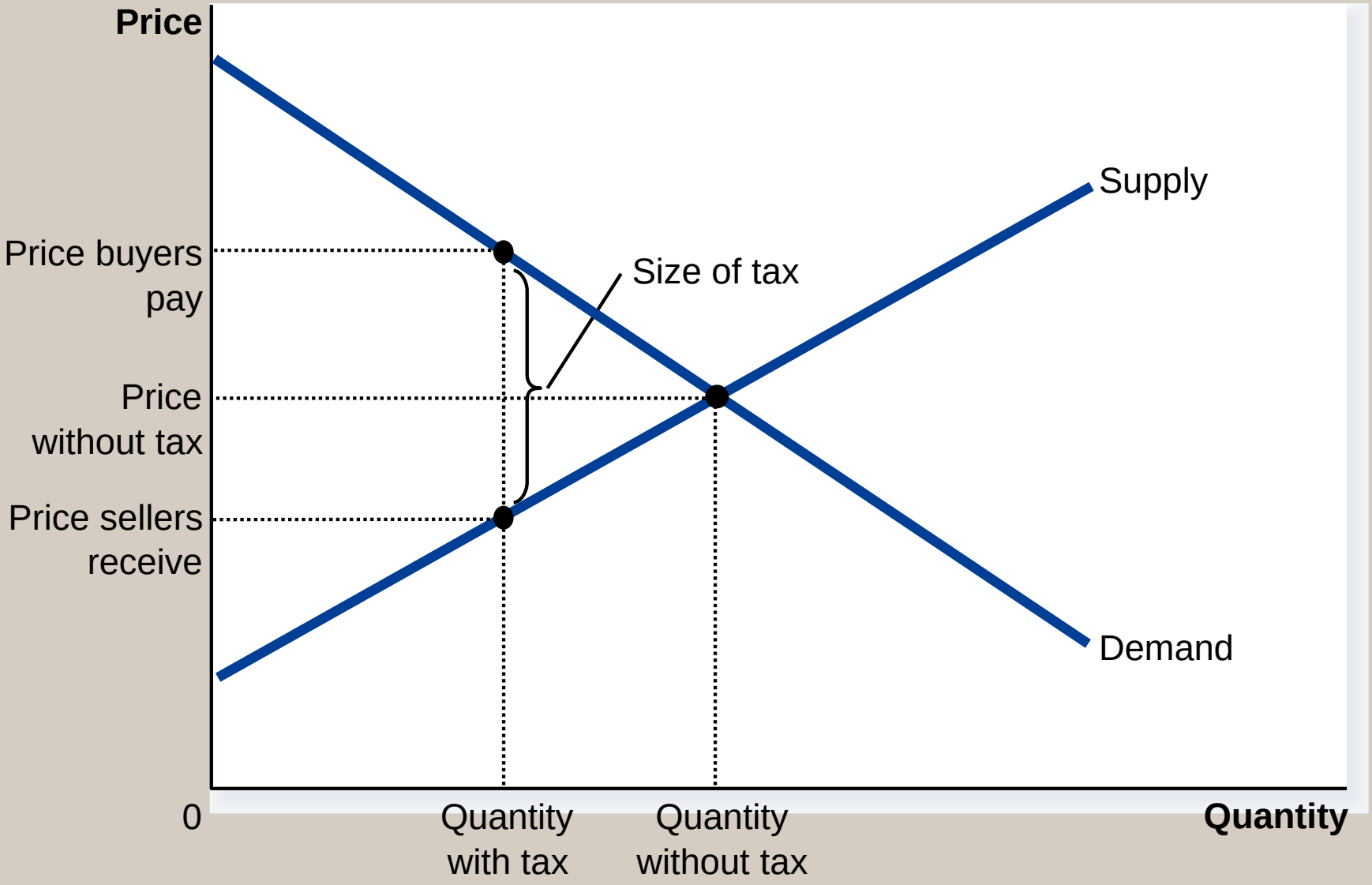
# Figure A Tax on Buyers



# Figure A Tax on Sellers



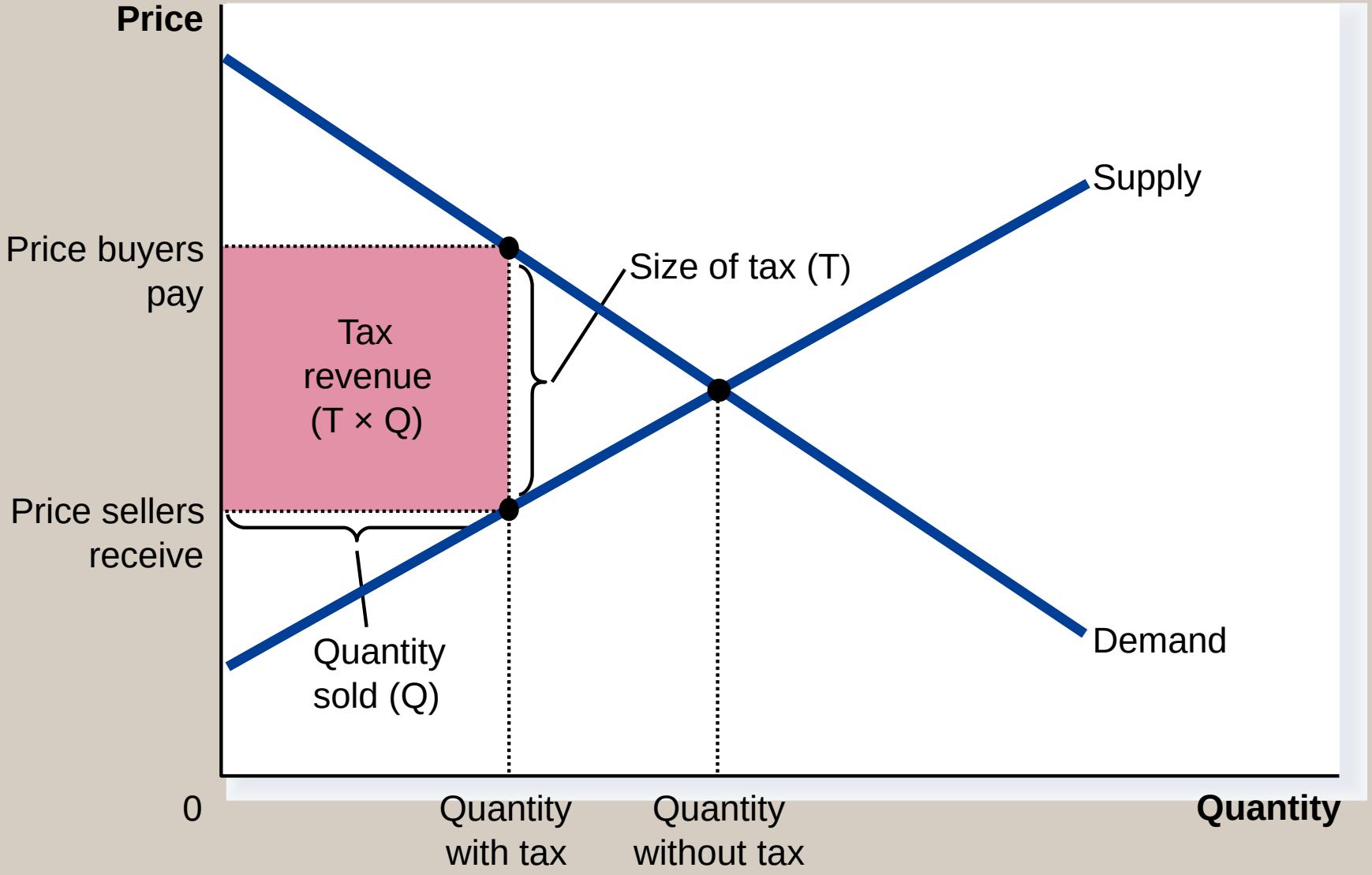
# Figure Size of tax



- A tax places a *wedge* between the price buyers pay and the price sellers receive.
- Because of this tax wedge, the quantity sold falls below the level that would be sold without a tax.
- The size of the market for that good shrinks.

- Tax Revenue
  - $T$ = the size of the tax
  - $Q$ = the quantity of the good sold
  - $T \times Q$ = the government's tax revenue

# Figure Tax Revenue



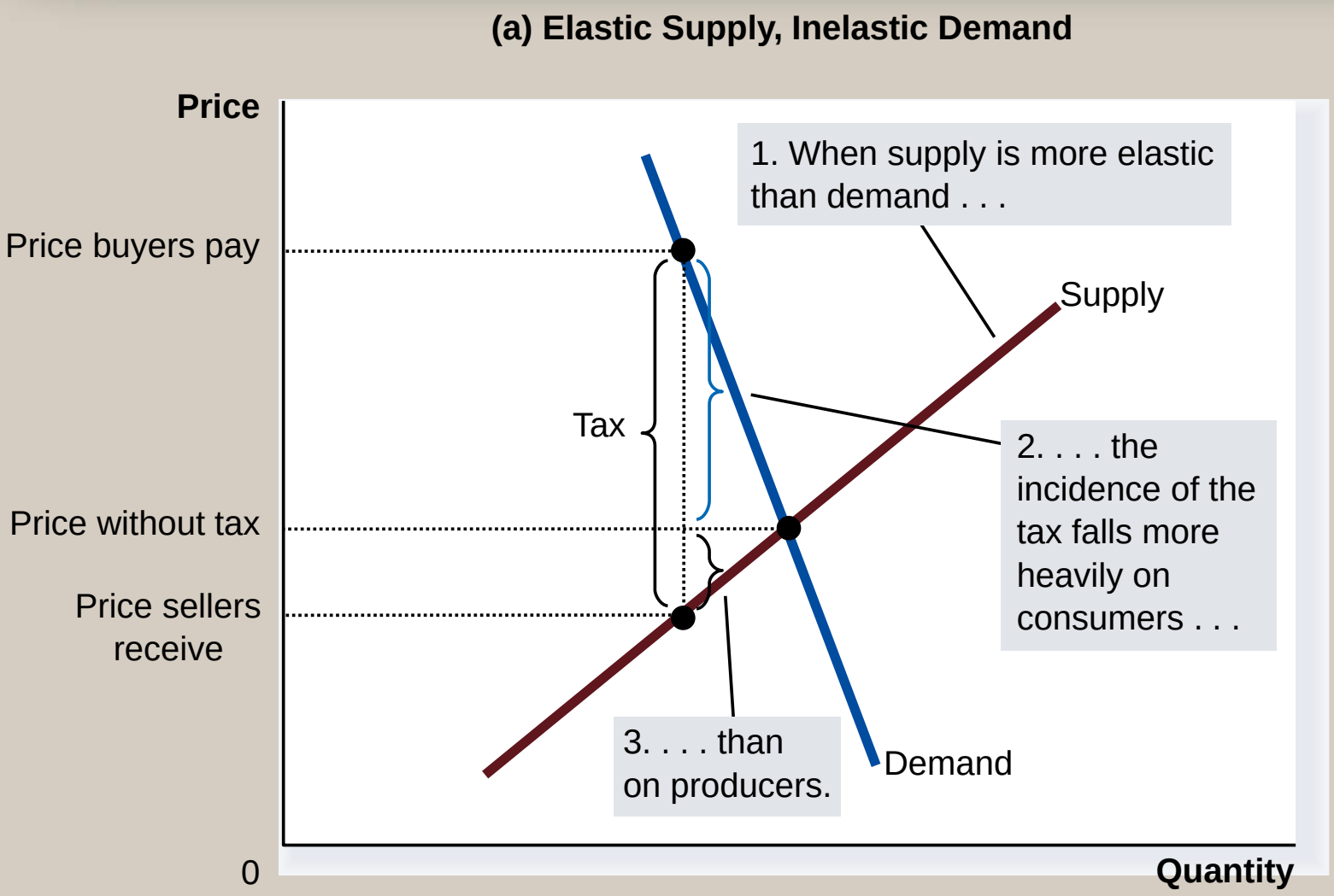
# Tax incdence

- What was the impact of tax?
  - Taxes discourage market activity.
  - When a good is taxed, the quantity sold is smaller.
  - Buyers and sellers  share the tax burden.

# Elasticity and Tax incidence

- In what proportions is the burden of the tax divided?
- How do the effects of taxes on sellers compare to those levied on buyers?
- The answers to these questions depend on the elasticity of demand and the elasticity of supply.

# Figure How the Burden of a Tax Is Divided



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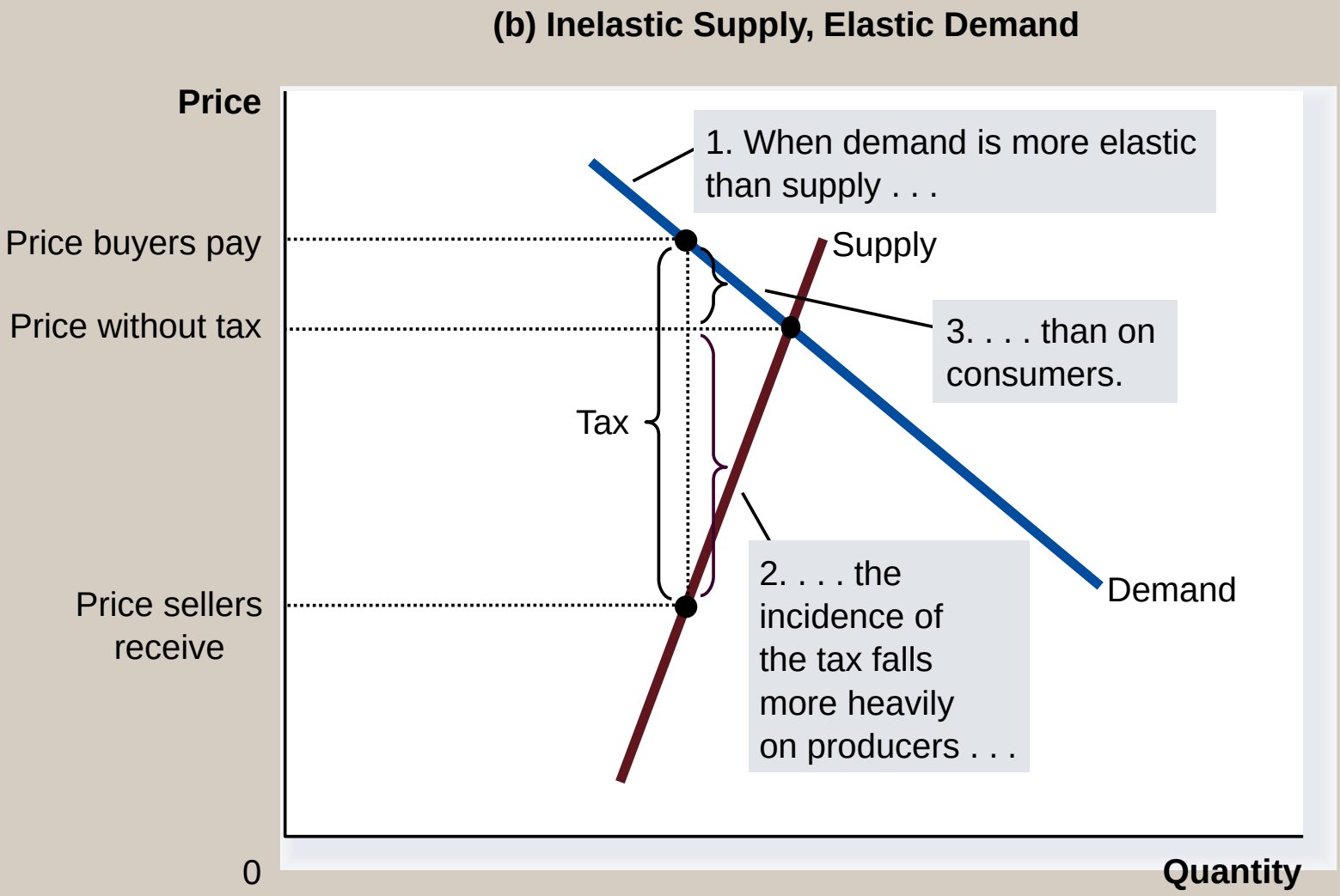


# Elasticity and Tax incidence

- The burden of a tax falls more heavily on the side of the market that is less elastic.

# The Costs of Taxation

- Welfare economics is the study of how the allocation of resources affects economic well-being.
  - Buyers and sellers receive benefits from taking part in the market.
  - The equilibrium in a market maximizes the total welfare of buyers and sellers.

# The Costs of Taxation

- How do taxes affect the economic well-being of market participants?
- It does not matter whether a tax on a good is levied on buyers or sellers of the good . . . the price paid by buyers rises, and the price received by sellers falls.

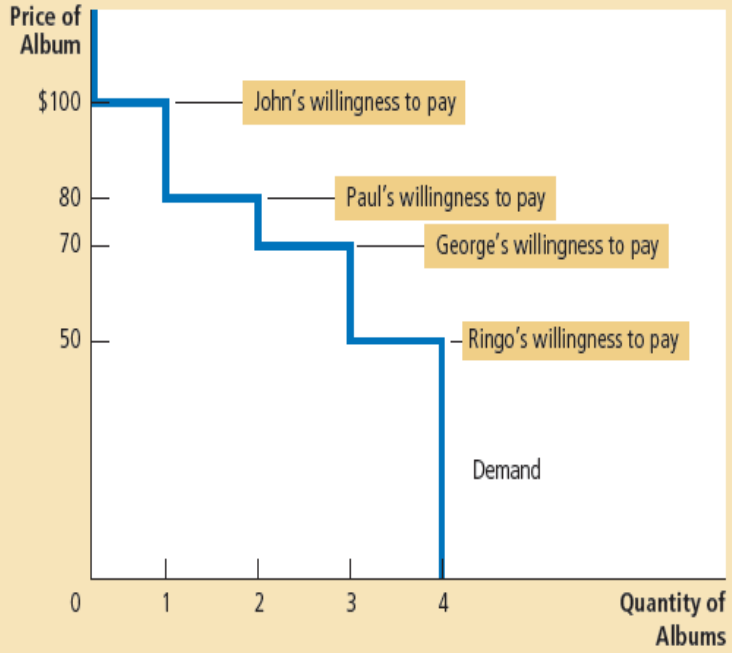
# Consumer surplus

Figure 1

The table shows the demand schedule for the buyers in Table 1. The graph shows the corresponding demand curve. Note that the height of the demand curve reflects buyers' willingness to pay.

**The Demand Schedule and the Demand Curve**

| Price | Buyers | Quantity Demanded |
|---|---|---|
| More than $100 | None | 0 |
| $80 to $100 | John | 1 |
| $70 to $80 | John, Paul | 2 |
| $50 to $70 | John, Paul, George | 3 |
| $50 or less | John, Paul, George, Ringo | 4 |

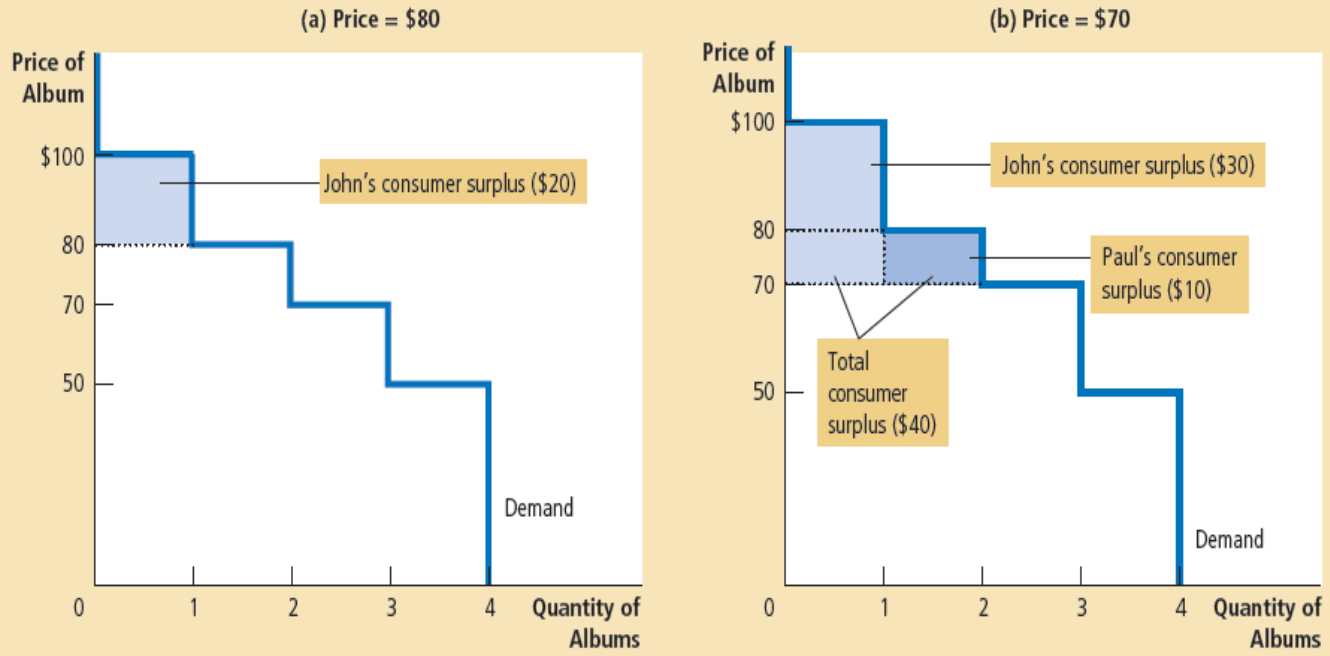


# Consumer surplus

In panel (a), the price of the good is $80, and the consumer surplus is $20. In panel (b), the price of the good is $70, and the consumer surplus is $40.

Figure 2

**Measuring Consumer Surplus with the Demand Curve**

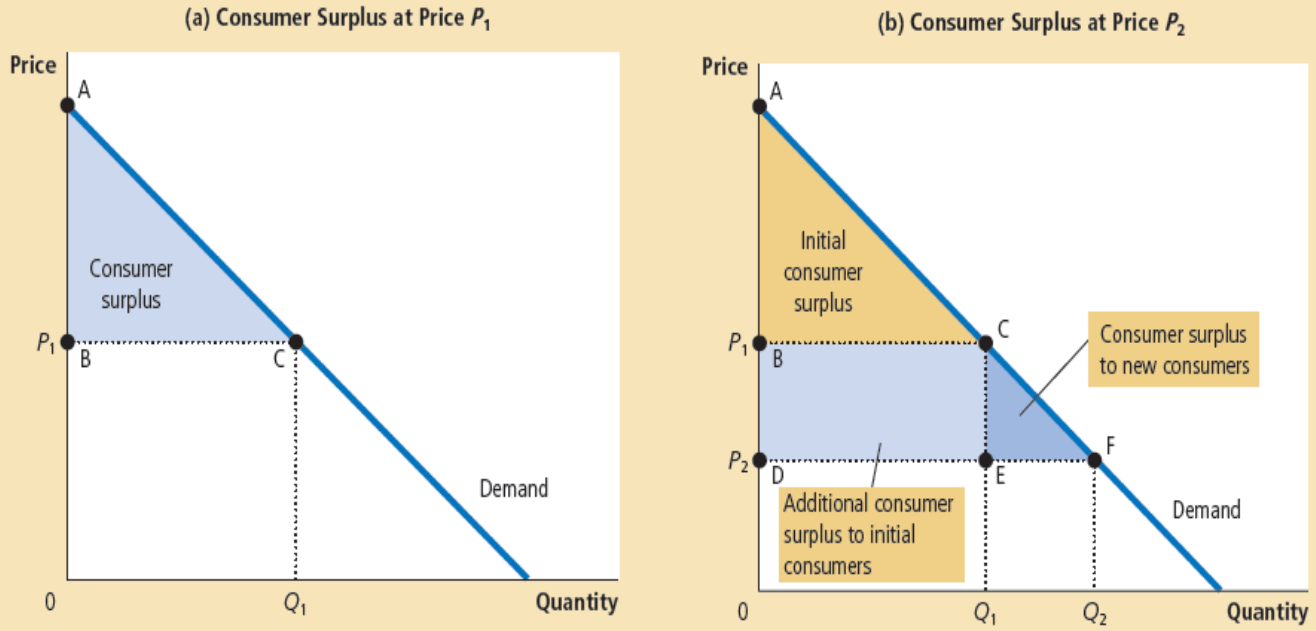


# Consumer surplus

Figure 3

**How the Price Affects Consumer Surplus**

In panel (a), the price is $P_1$, the quantity demanded is $Q_1$, and consumer surplus equals the area of the triangle ABC. When the price falls from $P_1$ to $P_2$, as in panel (b), the quantity demanded rises from $Q_1$ to $Q_2$, and the consumer surplus rises to the area of the triangle ADF. The increase in consumer surplus (area BCFD) occurs in part because existing consumers now pay less (area BCED) and in part because new consumers enter the market at the lower price (area CEF).



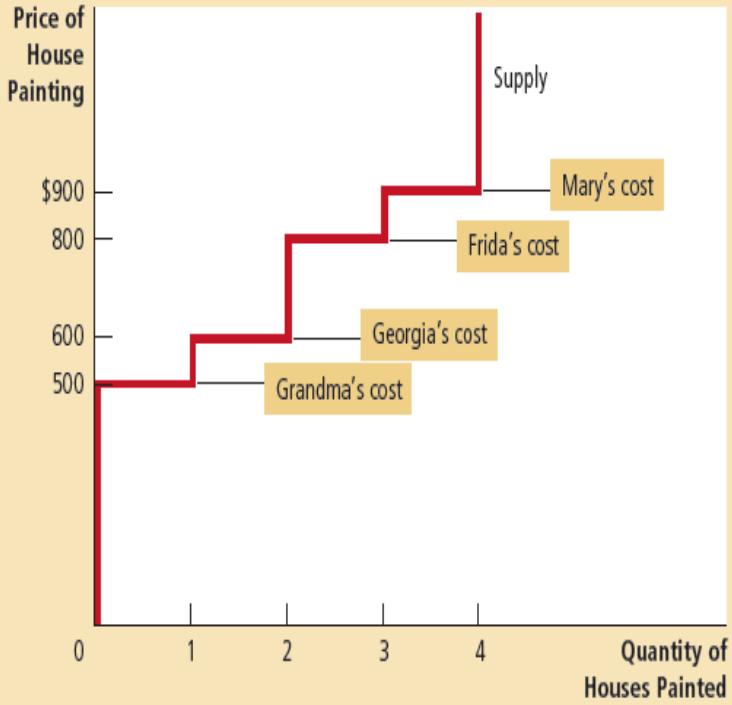
# Producer surplus

Figure 4

The table shows the supply schedule for the sellers in Table 2. The graph shows the corresponding supply curve. Note that the height of the supply curve reflects sellers' costs.

**The Supply Schedule and the Supply Curve**

| Price | Sellers | Quantity Supplied |
|---|---|---|
| $900 or more | Mary, Frida, Georgia, Grandma | 4 |
| $800 to $900 | Frida, Georgia, Grandma | 3 |
| $600 to $800 | Georgia, Grandma | 2 |
| $500 to $600 | Grandma | 1 |
| Less than $500 | None | 0 |

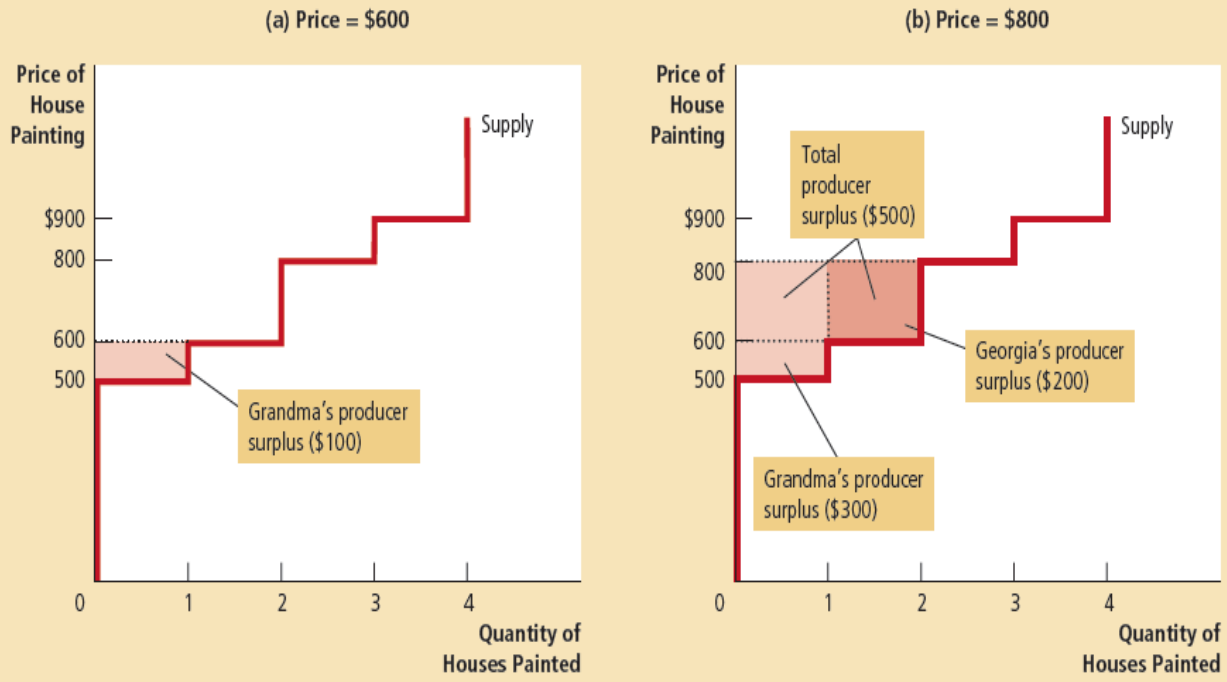


# Producer surplus

In panel (a), the price of the good is $600, and the producer surplus is $100. In panel (b), the price of the good is $800, and the producer surplus is $500.

Figure 5

**Measuring Producer Surplus with the Supply Curve**

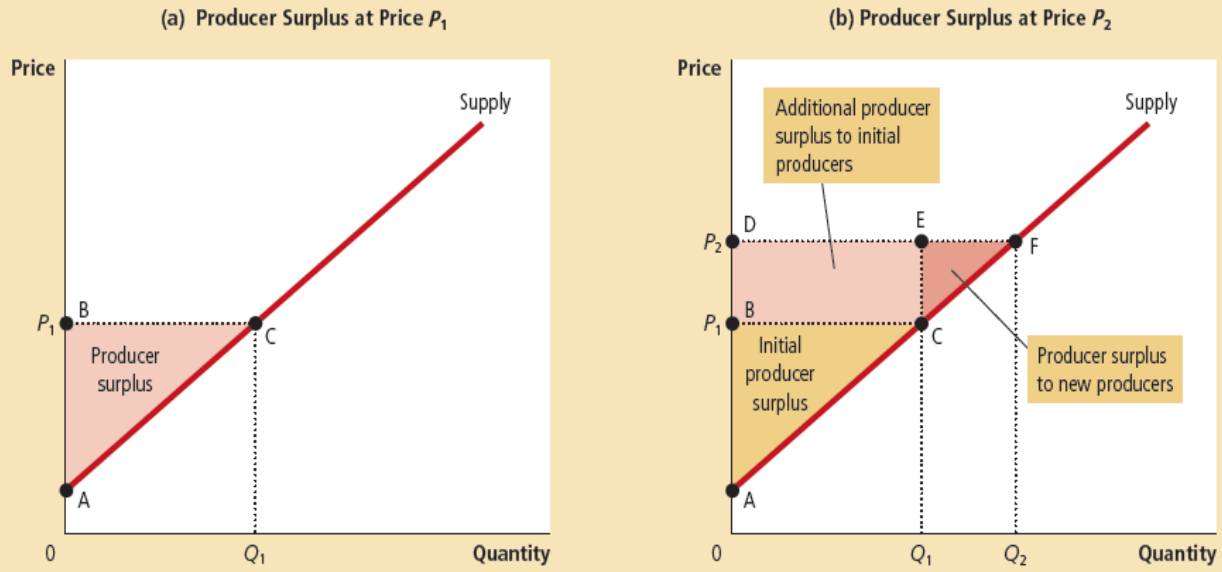


# Producer surplus

Figure 6

**How the Price Affects Producer Surplus**

In panel (a), the price is $P_1$, the quantity demanded is $Q_1$, and producer surplus equals the area of the triangle ABC. When the price rises from $P_1$ to $P_2$, as in panel (b), the quantity supplied rises from $Q_1$ to $Q_2$, and the producer surplus rises to the area of the triangle ADF. The increase in producer surplus (area BCFD) occurs in part because existing producers now receive more (area BCED) and in part because new producers enter the market at the higher price (area CEF).

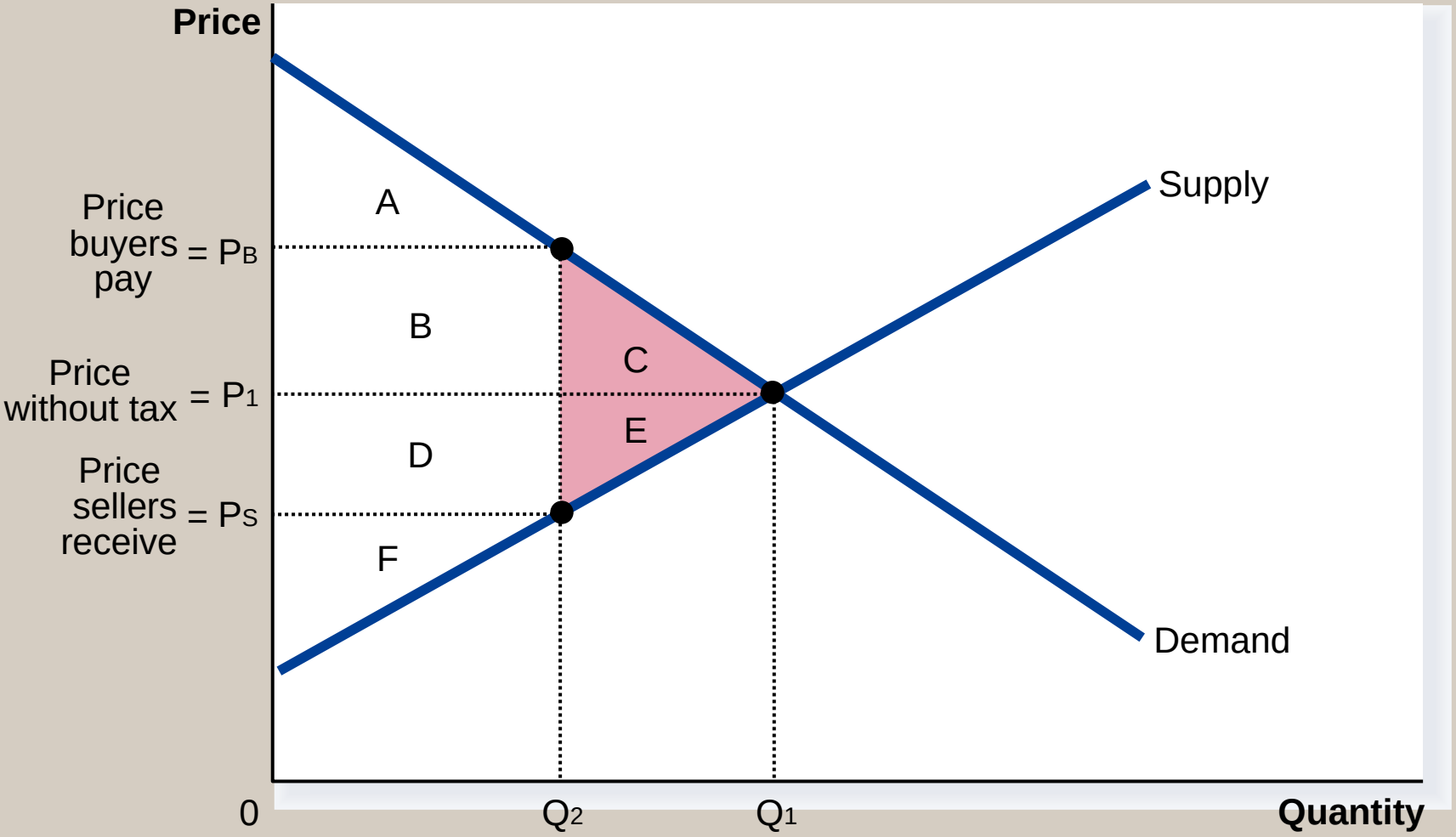


# How a Tax Affects Welfare

- A *deadweight loss* is the fall in total surplus that results from a market distortion, such as a tax.

- The change in total welfare includes:
  - The change in consumer surplus,
  - The change in producer surplus, and
  - The change in tax revenue.
  - The losses to buyers and sellers exceed the revenue raised by the government.
  - This fall in total surplus is called the *deadweight loss*.

# Figure How a Tax Effects Welfare



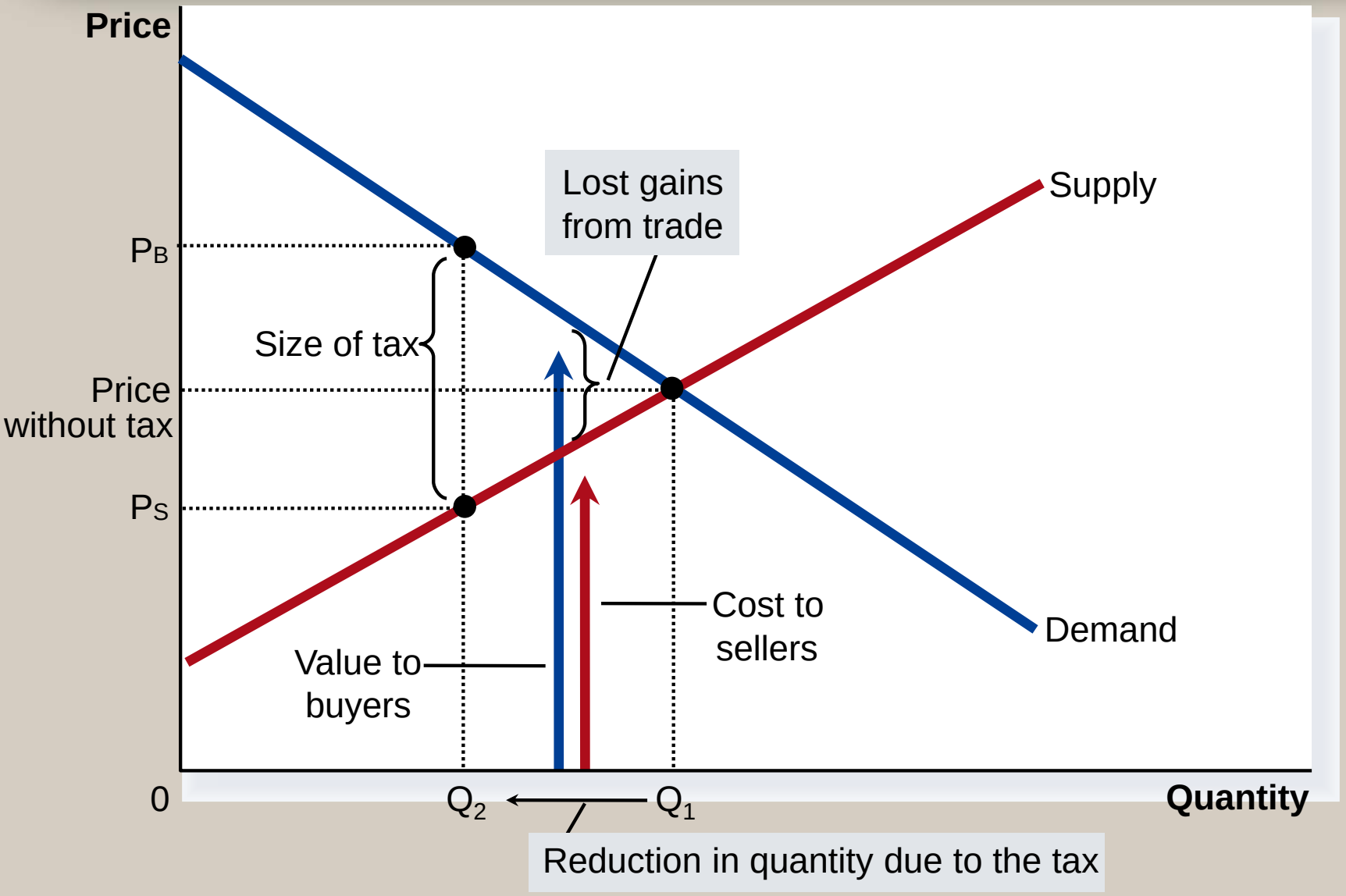
# How a Tax Affects Welfare

| | Without Tax | With Tax | Change |
|---|---|---|---|
| **Consumer Surplus** | A + B + C | A | −(B + C) |
| **Producer Surplus** | D + E + F | F | −(D + E) |
| **Tax Revenue** | None | B + D | +(B + D) |
| **Total Surplus** | A + B + C + D + E + F | A + B + D + F | −(C + E) |

The area C + E shows the fall in total surplus and is the deadweight loss of the tax.

- Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade.

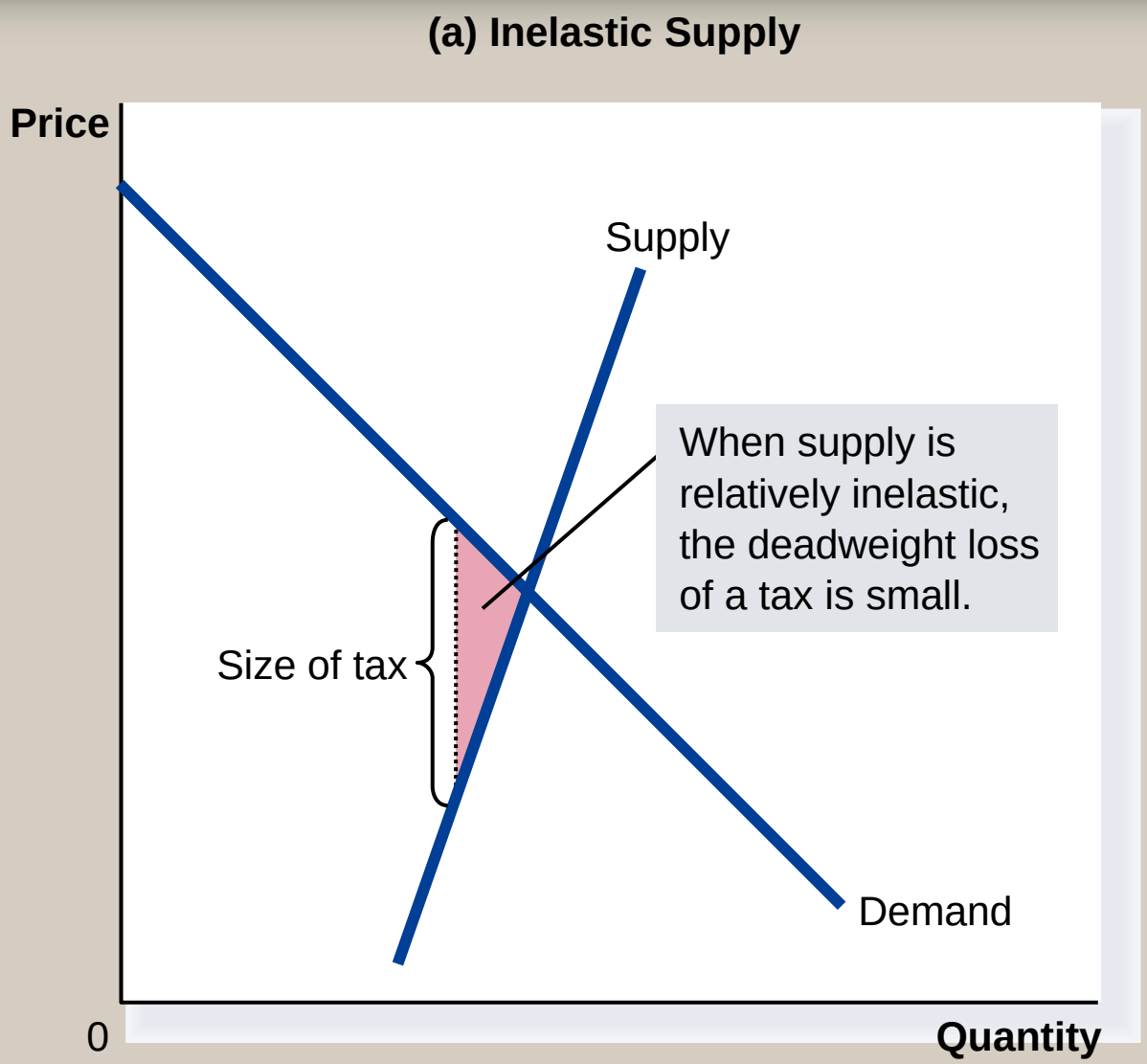
# Figure The Deadweight Loss



# DETERMINANTS OF THE DEADWEIGHT LOSS

- What determines whether the deadweight loss from a tax is large or small?
  - The magnitude of the deadweight loss depends on how much the quantity supplied and quantity demanded respond to changes in the price.
  - That, in turn, depends on the price elasticities of supply and demand.

# Figure Tax Distortions and Elasticities



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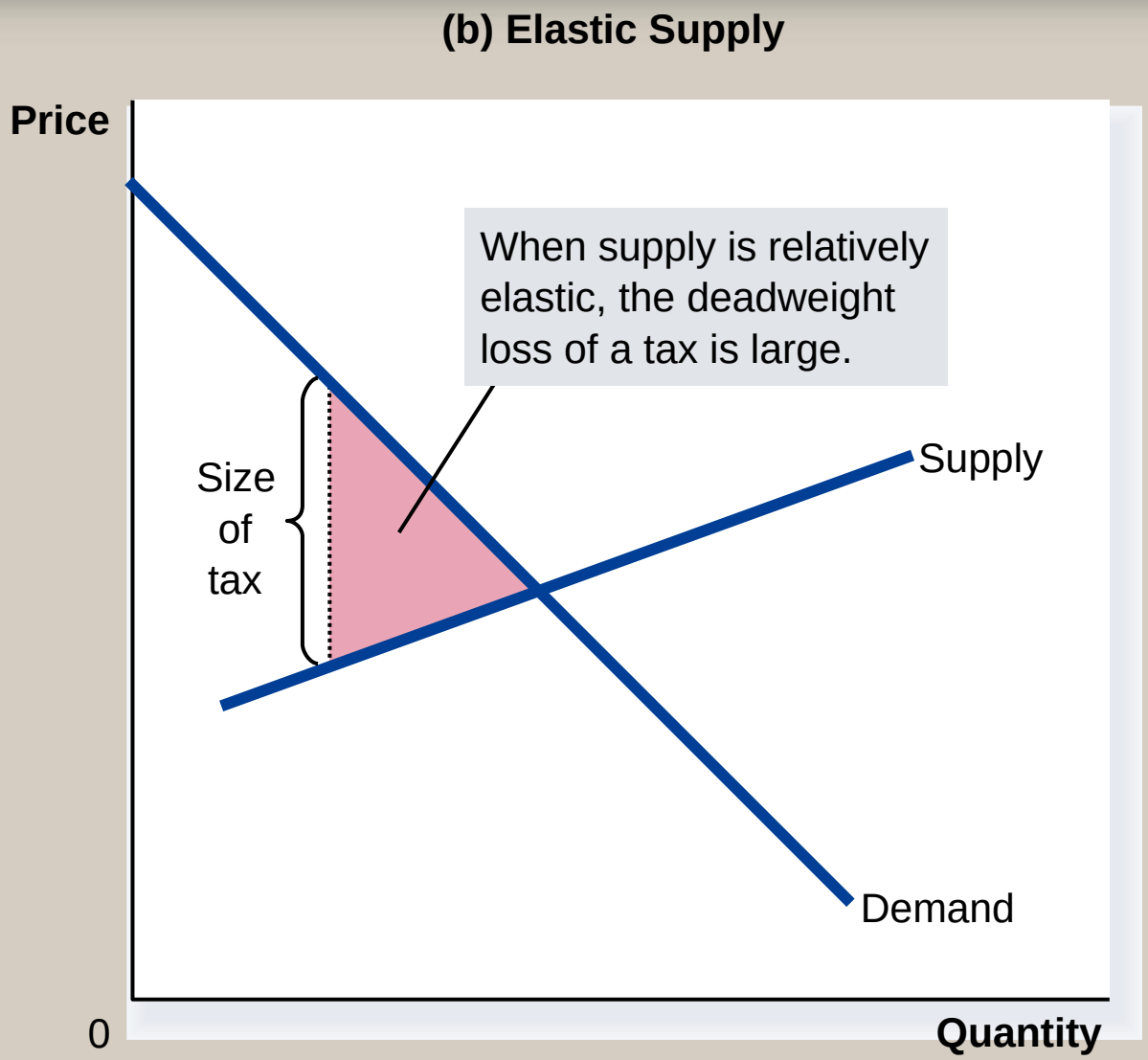

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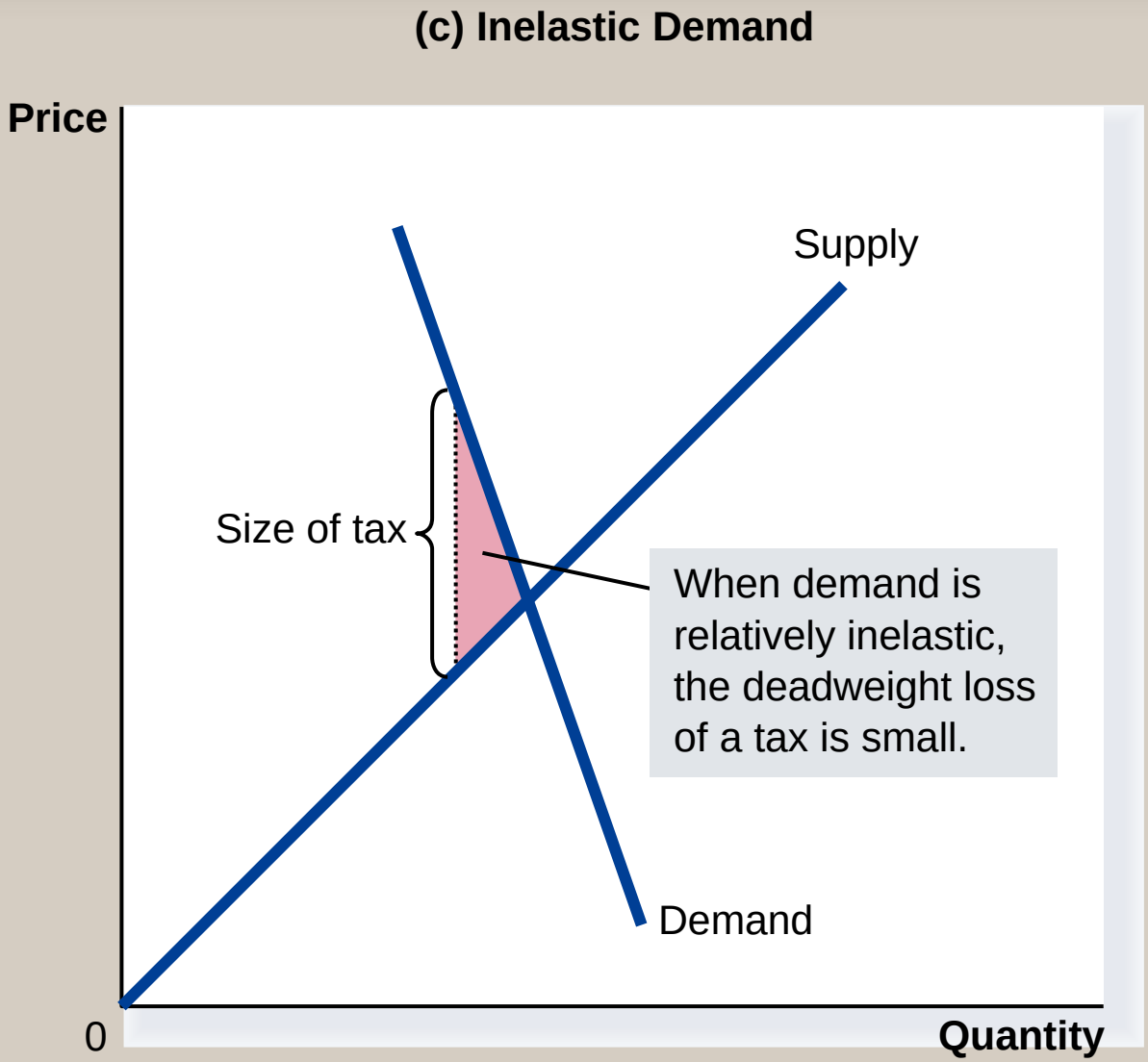
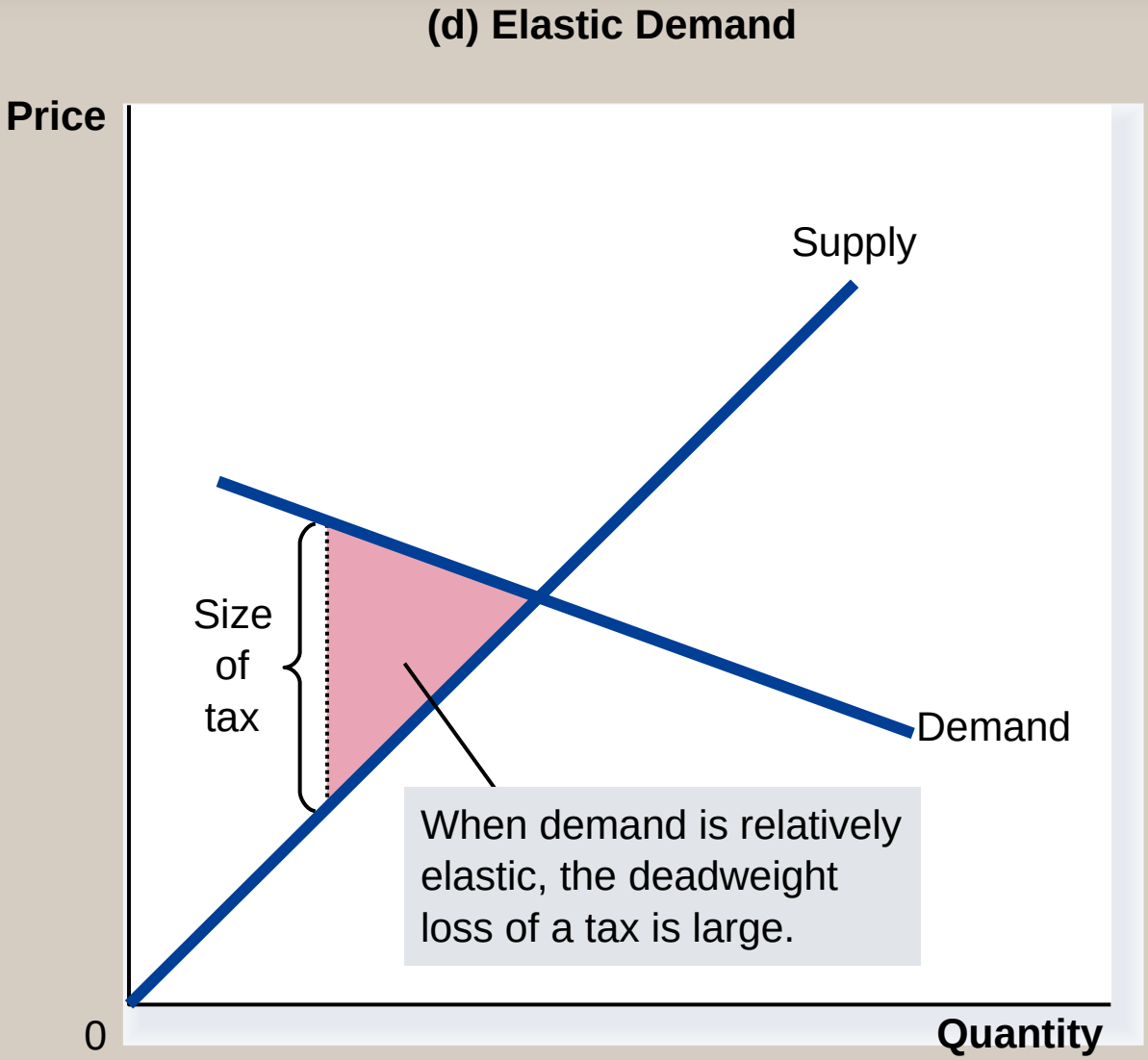


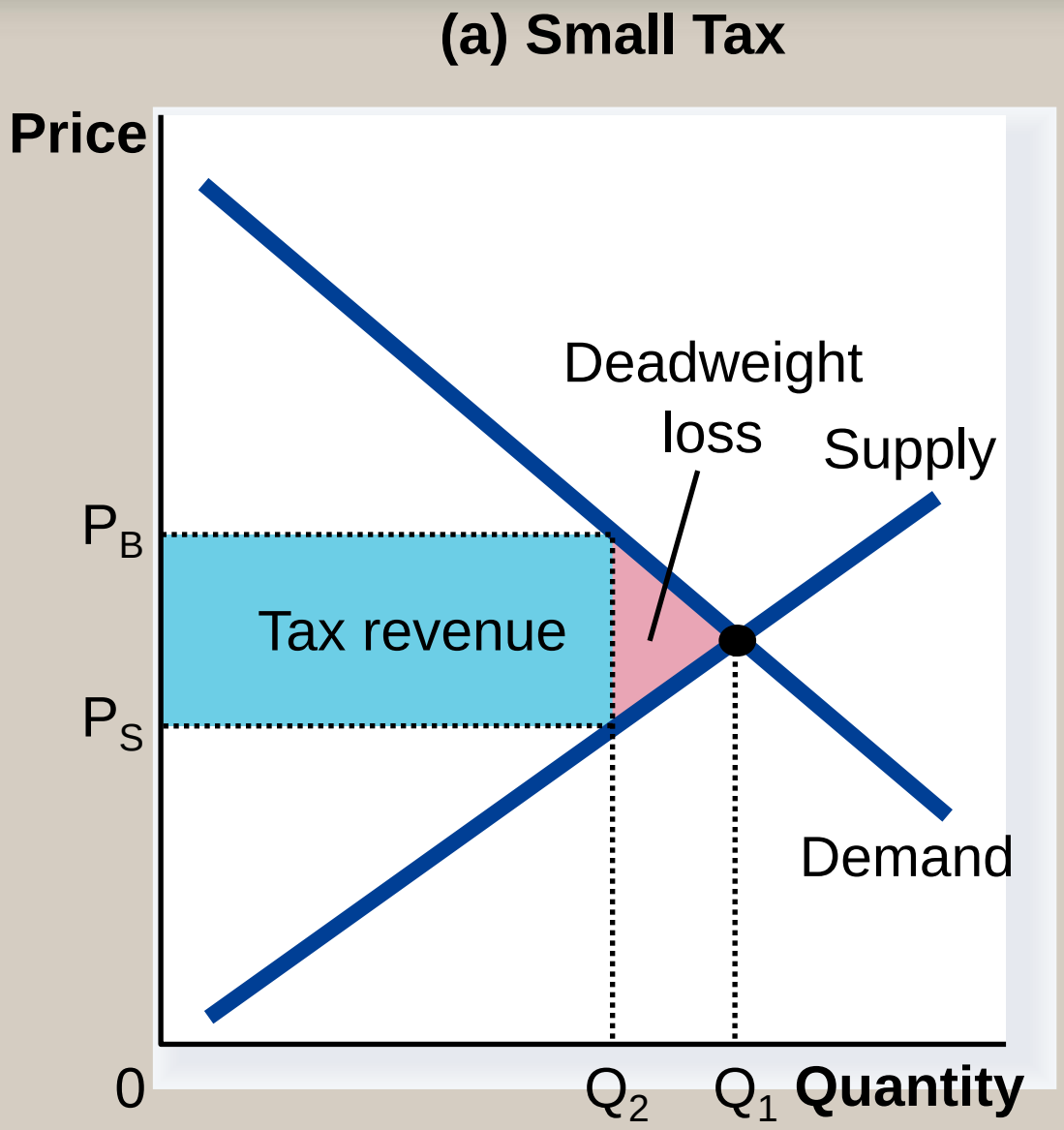
# Figure 5 Tax Distortions and Elasticities



# DETERMINANTS OF THE DEADWEIGHT LOSS

- The greater the elasticities of demand and supply:
  - the larger will be the decline in equilibrium quantity and,
  - the greater the deadweight loss of a tax.

# Figure 6 Deadweight Loss and Tax Revenue from Three Taxes of Different Sizes



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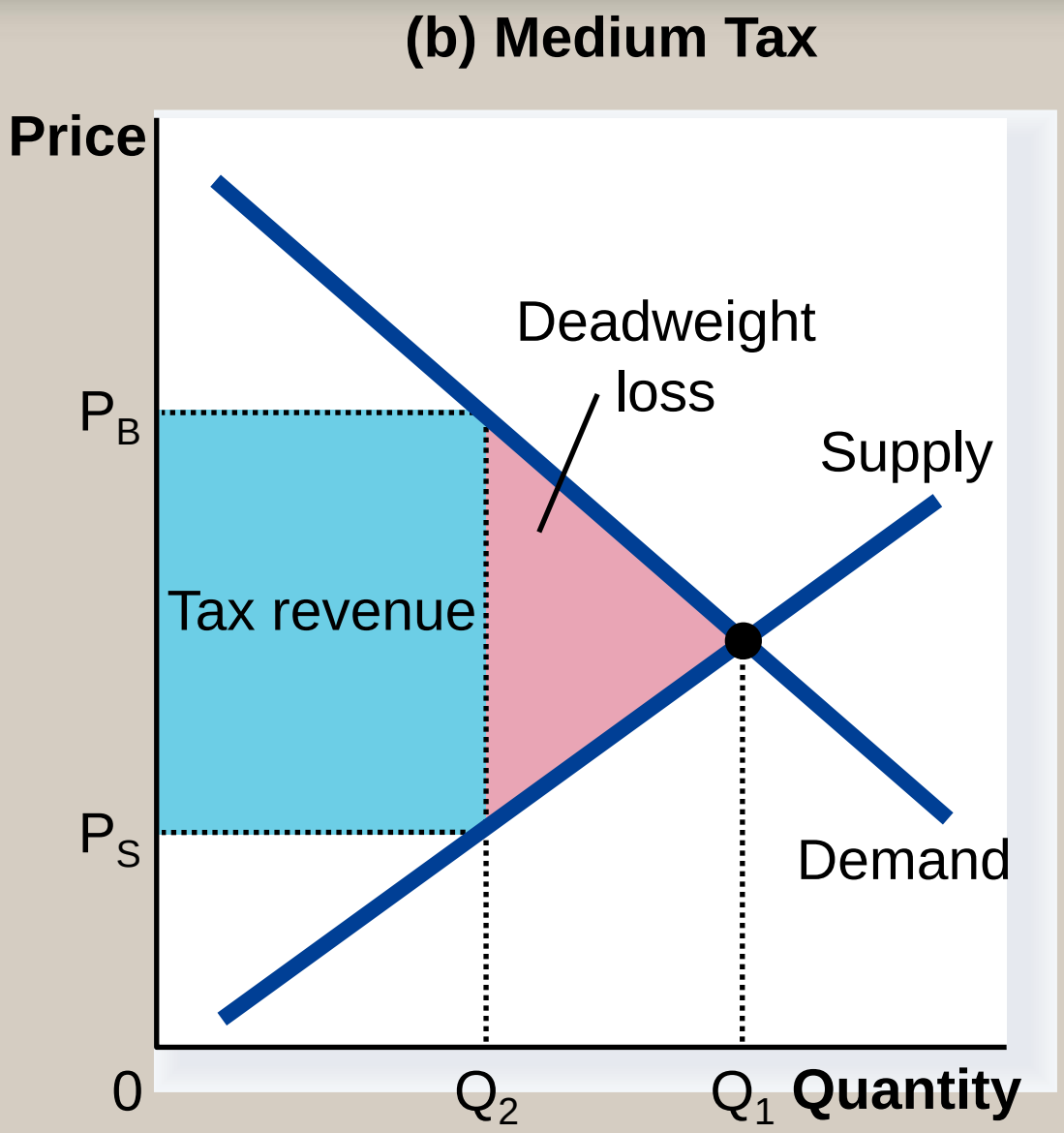

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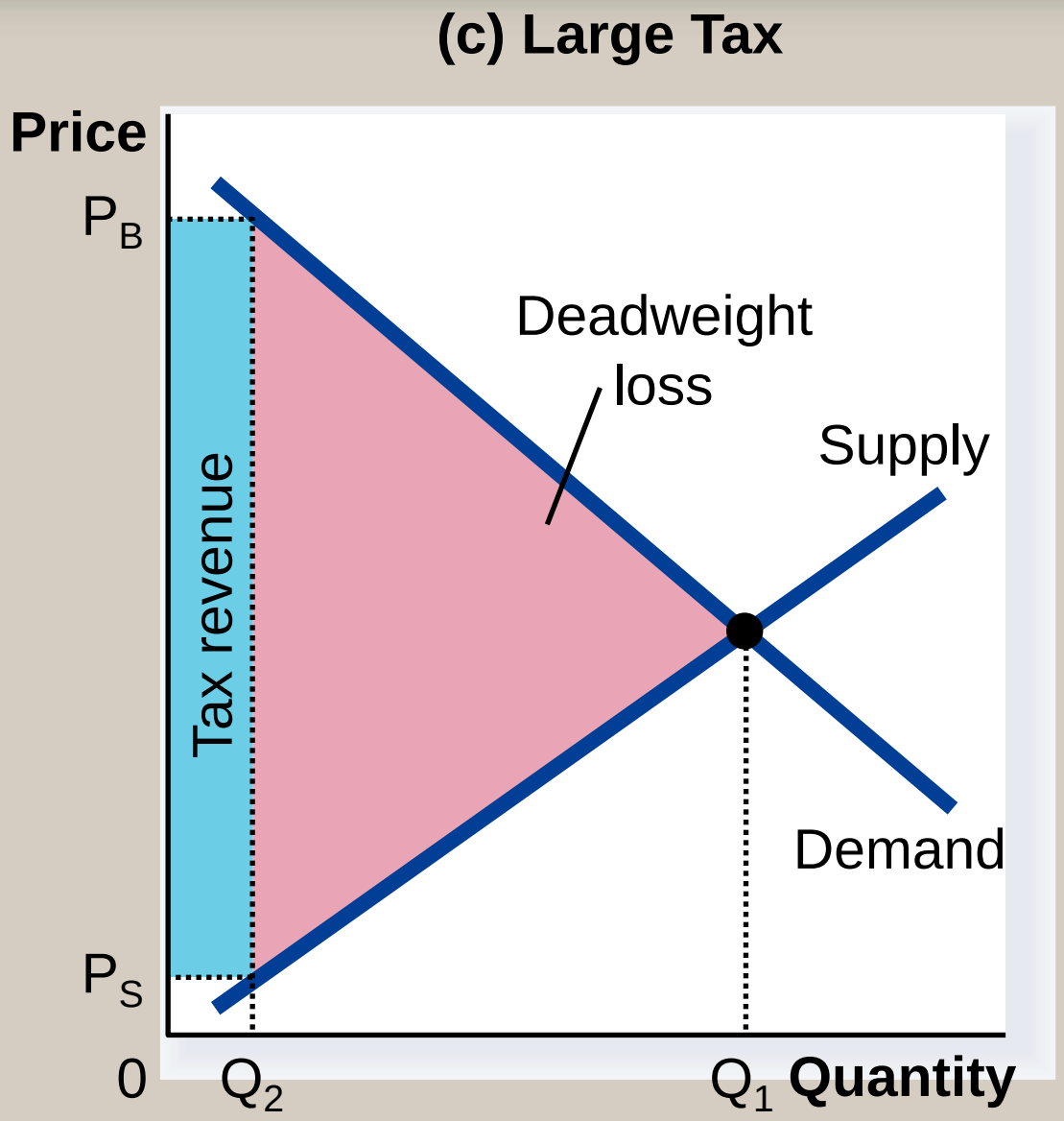
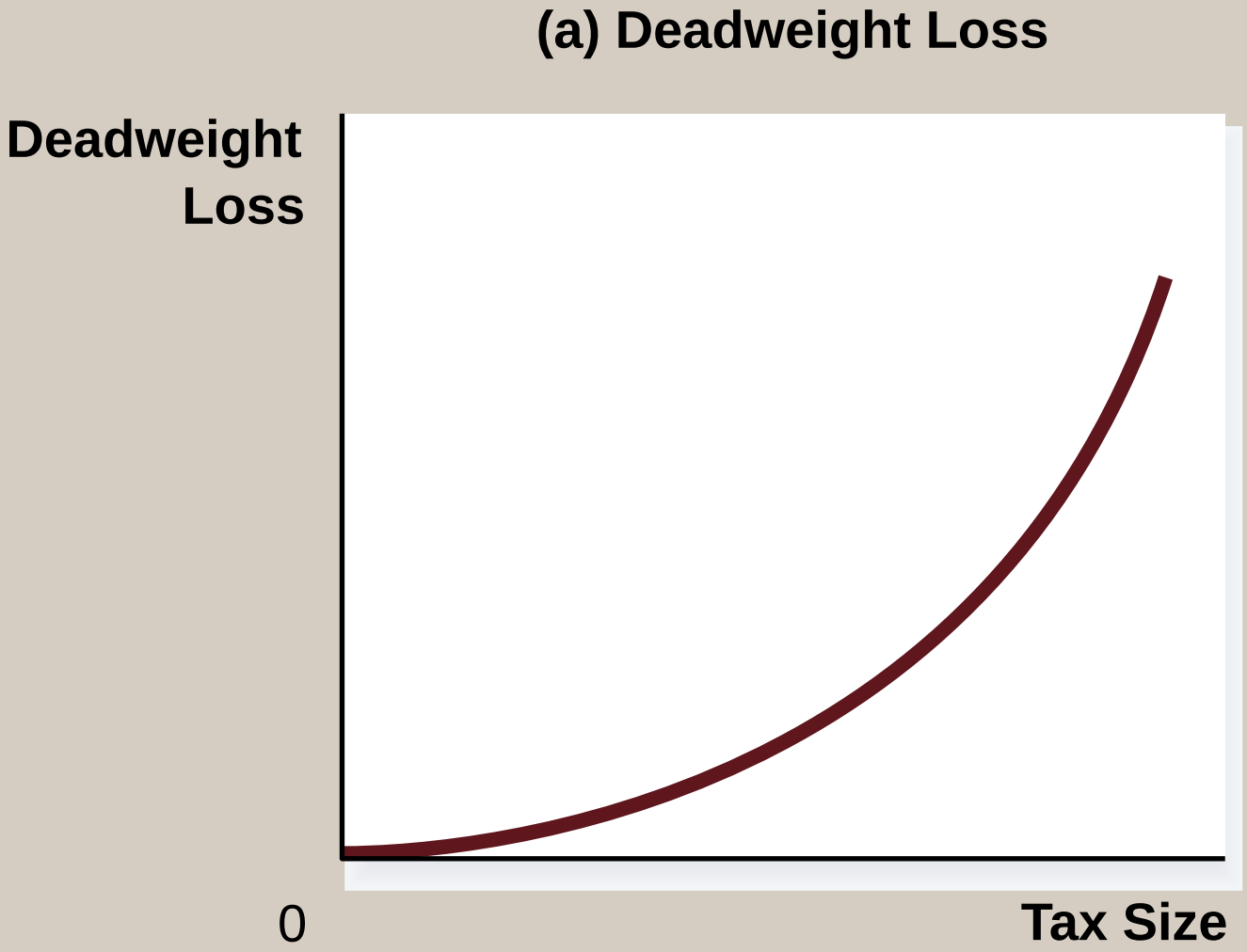


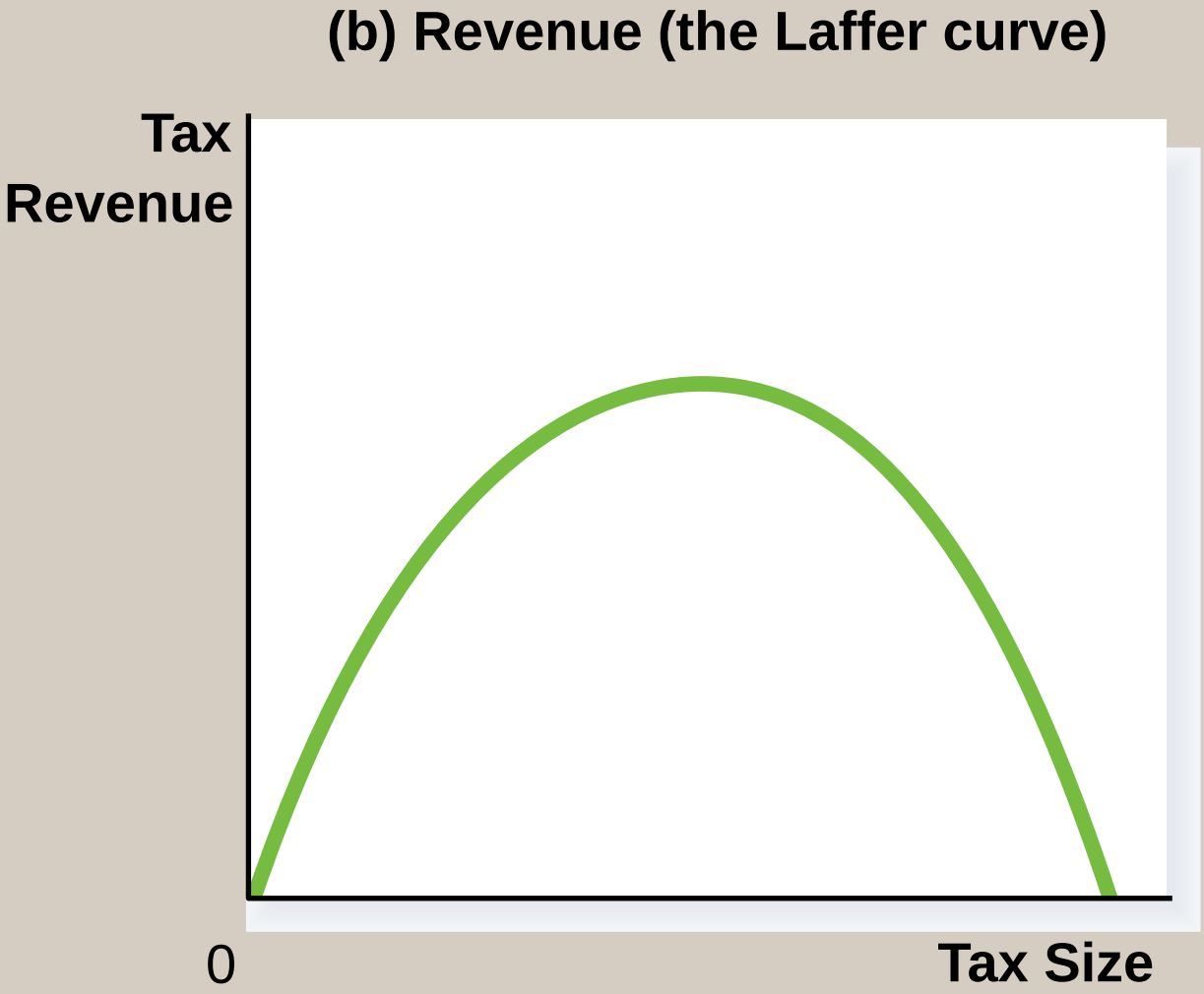
# DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

- For the small tax, tax revenue is small.
- As the size of the tax rises, tax revenue grows.
- But as the size of the tax continues to rise, tax revenue falls because the higher tax reduces the size of the market.

# Figure 7 How Deadweight Loss and Tax Revenue Vary with the Size of a Tax



# Figure 7 How Deadweight Loss and Tax Revenue Vary with the Size of a Tax



# DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

- As the size of a tax increases, its deadweight loss quickly gets larger.
- By contrast, tax revenue first rises with the size of a tax, but then, as the tax gets larger, the market shrinks so much that tax revenue starts to fall.

# The Laffer Curve and Supply-side Economics

- The *Laffer curve* depicts the relationship between tax rates and tax revenue.
- *Supply-side economics* refers to the views of Reagan and Laffer who proposed that a tax cut would induce more people to work and thereby have the potential to increase tax revenues.

# Summary

- Taxes are used to raise revenue for public purposes.
- When the government levies a tax on a good, the equilibrium quantity of the good falls.
- A tax on a good places a wedge between the price paid by buyers and the price received by sellers.

# Summary

- The incidence of a tax refers to who bears the burden of a tax.
- The incidence of a tax does not depend on whether the tax is levied on buyers or sellers.
- The incidence of the tax depends on the price elasticities of supply and demand.
- The burden tends to fall on the side of the market that is less elastic.