Basics of Economics of taxation

Any book of Microeconomics can be useful:

- Microeconomics and Behavior, R. H. Frank
- Microeconomic Analysis (H. Varian)

Basics of the economics of taxation

- Taxation in competitive market
- Commodity taxation
- Income taxation
- Welfare economics and taxation

Key points

- taxes reduce consumer and producer surplus.
- the meaning and causes of the deadweight loss from a tax.
- some taxes have larger deadweight losses than others.
- tax revenue and deadweight loss vary with the size of a tax.

THE DEADWEIGHT LOSS OF TAXATION

- How do taxes affect the economic well-being of market participants?

<u>Tax on quantity</u>: is paid on each unit sold or bought. Ex. fuel

Gross price: tax included, the price effectively payed by the buyer

Net price: after (not included) the tax, price effectively received by the sellers

When a tax is applied the price effectively paid by the buyer is no more equal to price effectively received by the seller;

the tax is given by the difference between these two values.

Example

- Tax on quantity: in the US is 12 cents per liter consumer pays 1-liter gasoline P_G=1.50 $, supplier receives P_N=1.50$-0.12=1.38$

Assuming *t* is the amount of tax for each sold/acquired unit, the gross price is

$$P_G = P_N + t$$

$$\boxed{\text{Tax on sellers (on sold quantity)}}$$

i.e. Fuel (consumers already paid at the pump the gross price)

The seller receives:

$$P_N + t = P_G$$

At Equilibrium:

$$P_G(q) = P_N(q) + t$$

New supply

Supply-price increases because it includes also the tax that is transferred from the seller to the buyer

Tax on buyers (on acquired quantity)

Consumers pay at the pump the net price

$$P_G - t = P_N$$

At Equilibrium

$$P_G(q) - t = P_N(q)$$

New demand →

Equilibrium price and quantity do not change according to who pays the tax

Tax on buyers: $$P_G(q) - t = P_N(q)$$
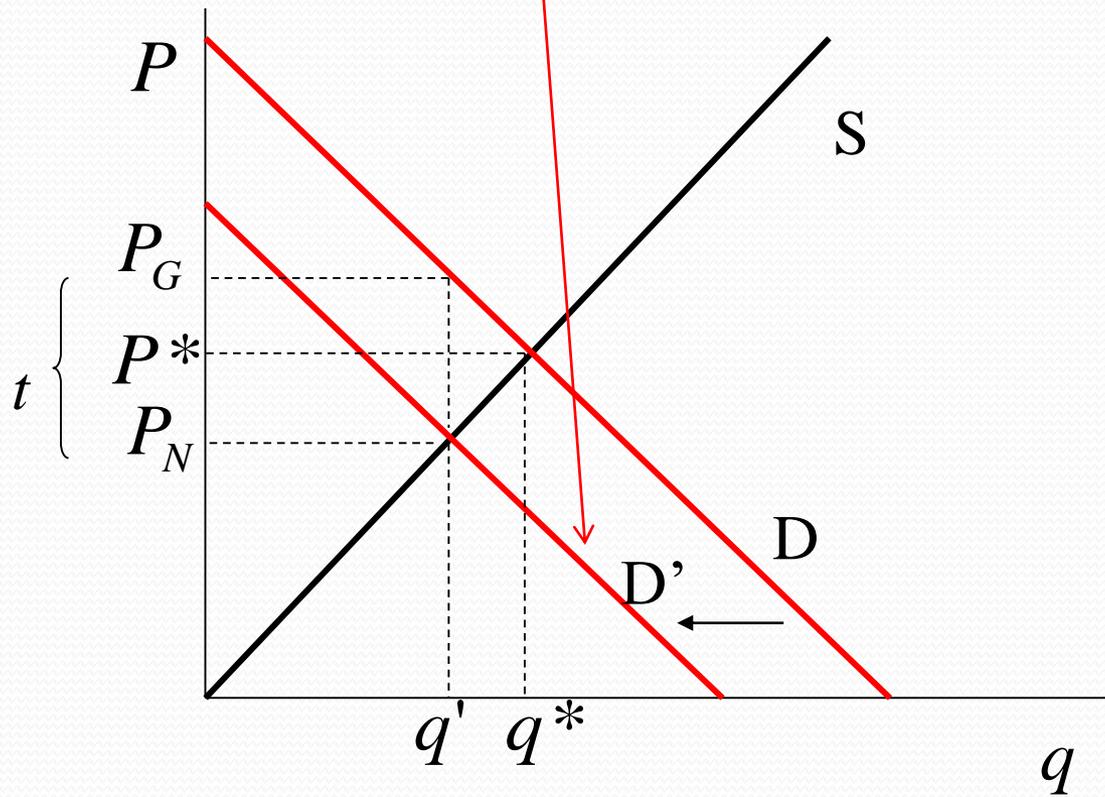
Supply curve gives the price charged to cover the cost (the lowest price the seller is willing to accept). Tax works just as an increase in cost

Tax on sellers: $P_G(q) = P_N(q) + t$
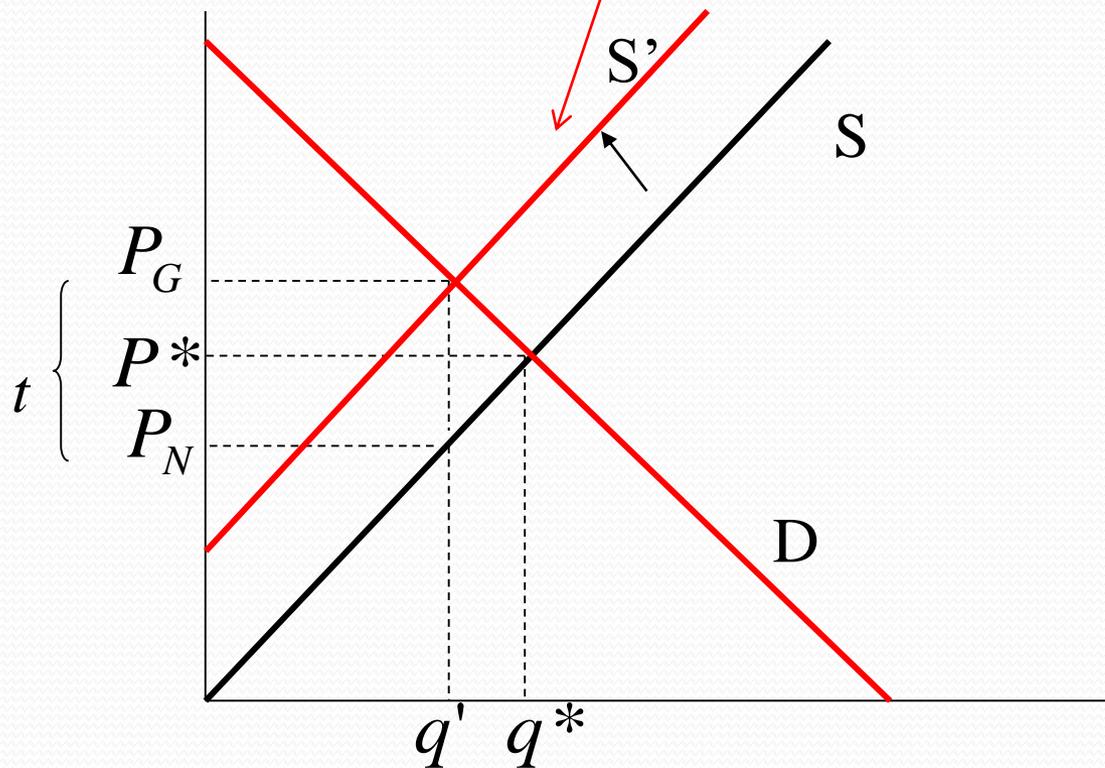
Example: linear demand and supply

Direct domand curve: $D(p) = a - bp_G$

Direct supply curve: $S(p) = c + dp_N$

No-tax equilibrium price is:

$$a - bp_G = c + dp_N \longrightarrow p^* = \frac{a - c}{b + d}$$

With a tax on sellers:

$$p_N + t = p_G$$

By substituting in the equilibrium condition:

$$a - b\left(p_N + t\right) = c + dp_N$$

The price that the seller will receive in equilibrium is:

$$p_N^* = \frac{a - c - bt}{d + b} < p*$$

The price paid by the buyer:

$$p_G^* = \frac{a - c - bt}{d + b} + t = \frac{a - c + dt}{d + b} > p*$$

THE DEADWEIGHT LOSS OF TAXATION

…..Remember

- It does not matter whether a tax on a good is on buyers or sellers…
. . . the price
paid by buyers rises and
the price received by
sellers falls.
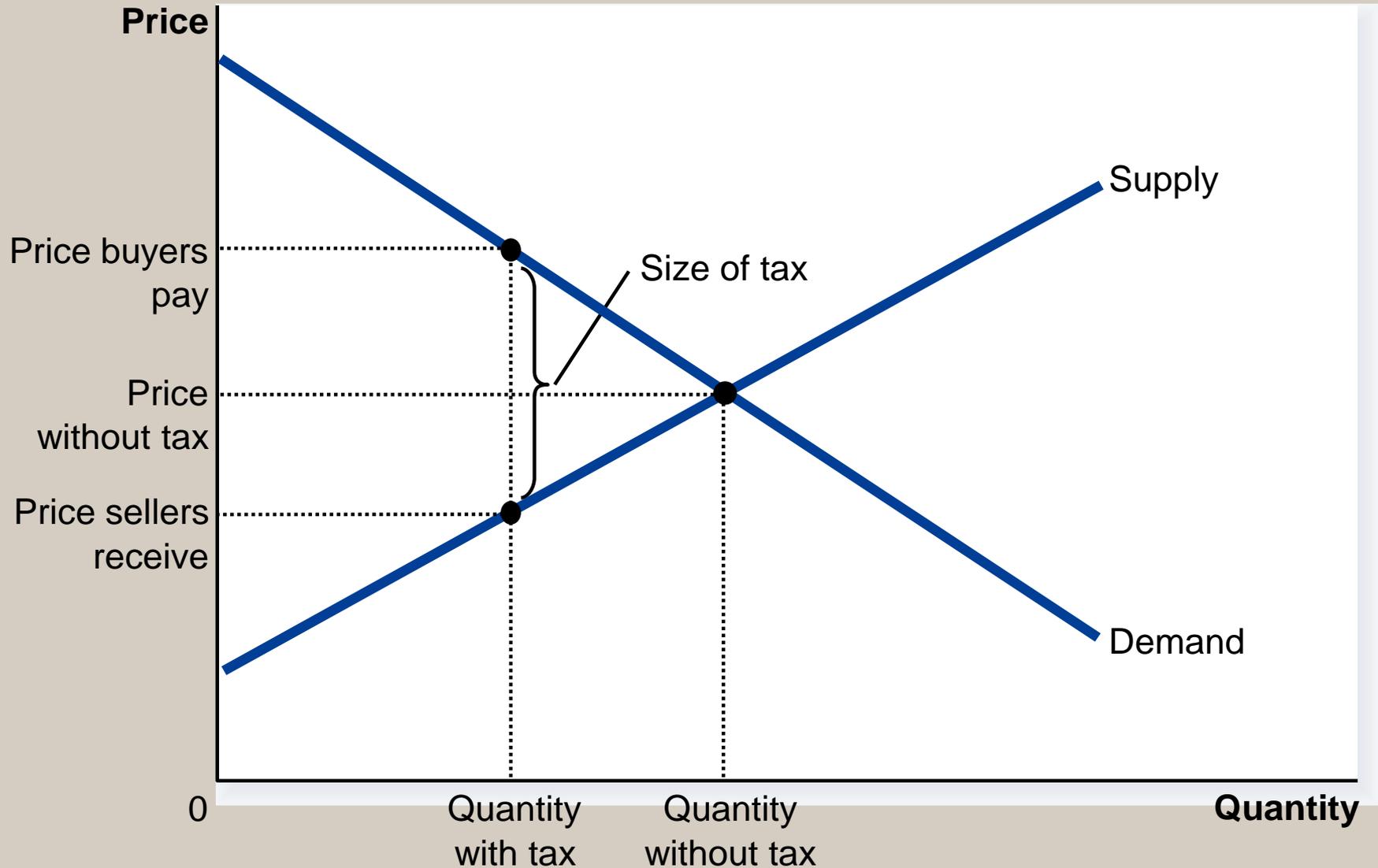
# How a Tax Affects Market Participants

- 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.

- Buyers and sellers share the tax burden.

How a Tax Affects Market Participants

- Tax Revenue
  - T = the size of the tax
  - Q = the quantity of the good sold

$$T \times Q = \text{the government's tax revenue}$$
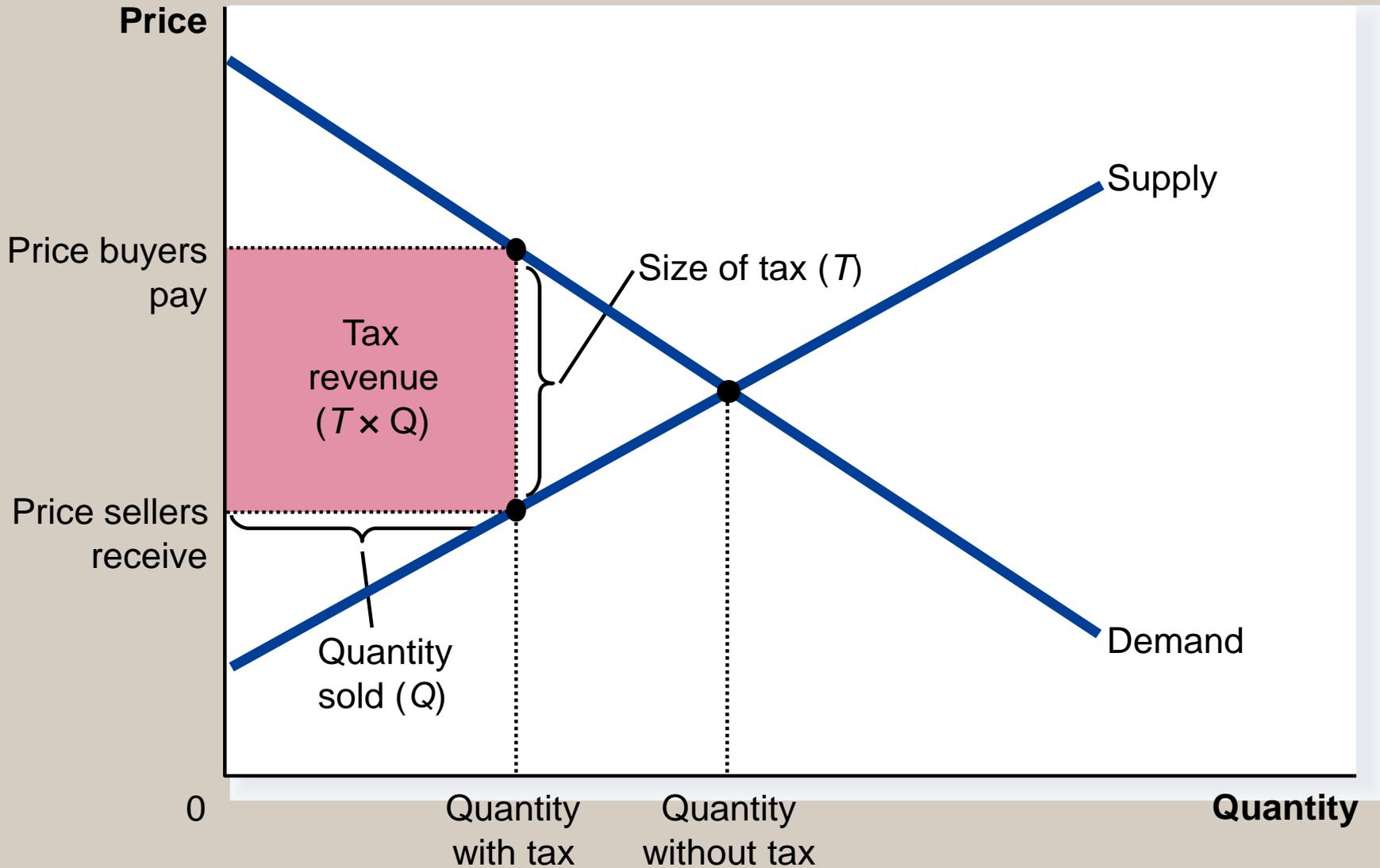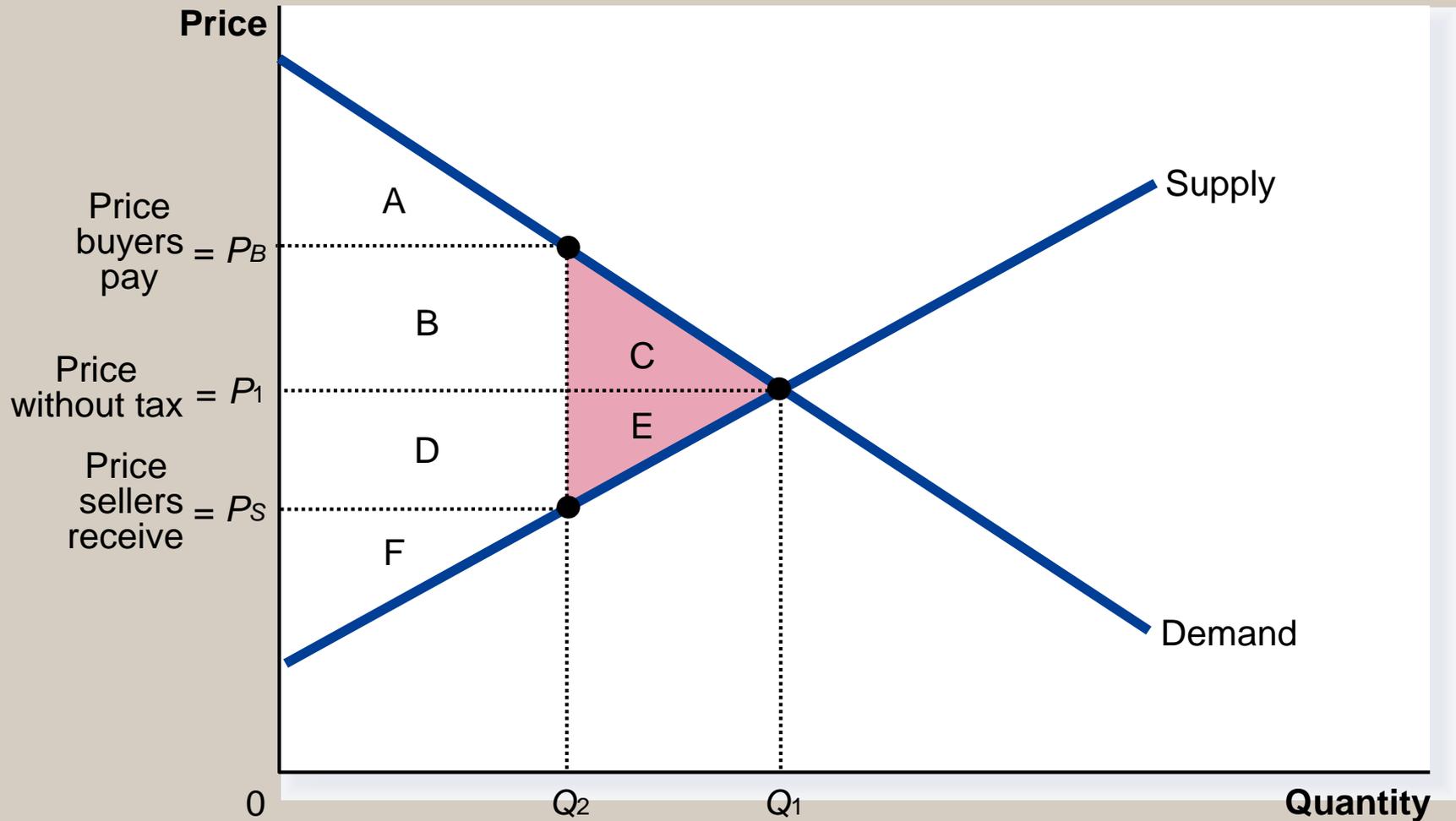
How a Tax Affects Market Participants

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

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.

How a Tax Affects Market Participants

- 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.*

Deadweight Losses and the Gains from Trade

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

The Deadweight Loss

Price

P_B

Price without tax

P_S

Size of tax

Lost gains from trade

Supply

Demand

Value to buyers

Cost to sellers

0   Q_2 ← Q_1 Quantity

Reduction in quantity due to the tax
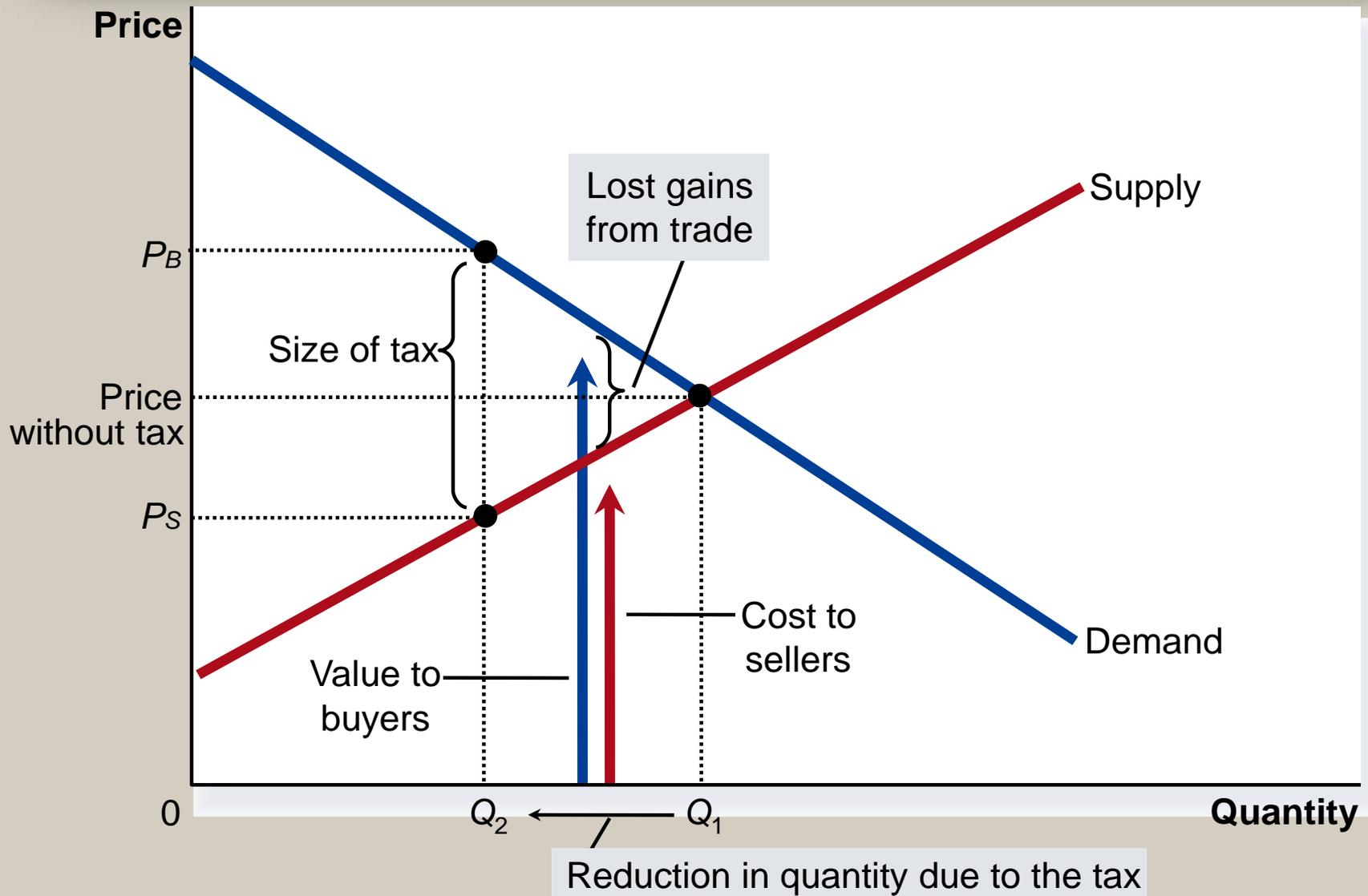
DETERMINANTS OF THE DEADWEIGHT LOSS

- What determines whether the deadweight loss from a tax is large or small…

  - The magnitude of the deadweight loss depends how the supplied and demanded quantity respond to changes in the price.

 - ….in turn, it depends on the price elasticities of supply and demand.
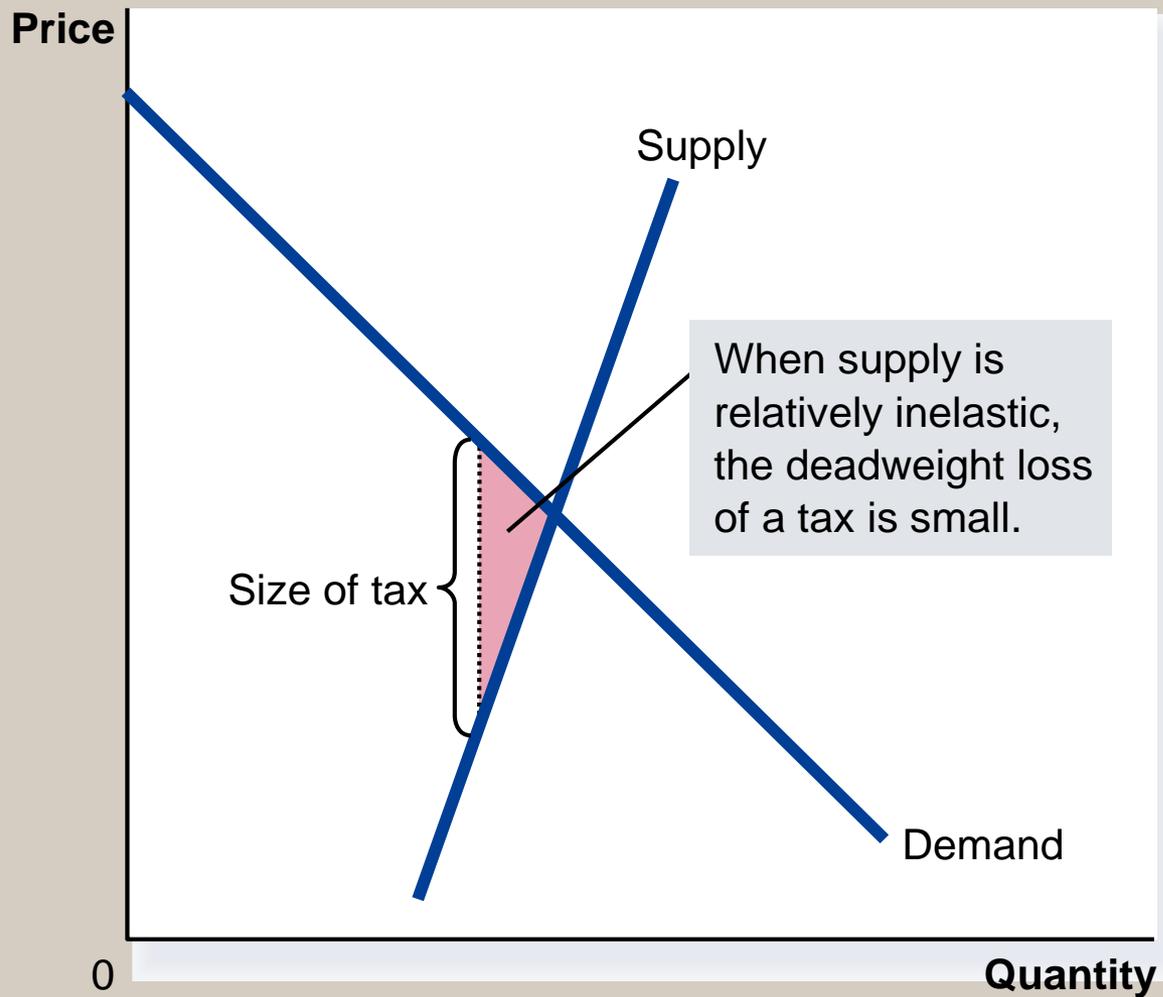
(a) Inelastic Supply

(b) Elastic Supply

When supply is relatively elastic, the deadweight loss of a tax is large.

(c) Inelastic Demand

(d) Elastic Demand

Price

Supply

Size
of
tax

Demand

When demand is relatively elastic, the deadweight loss of a tax is large.

0
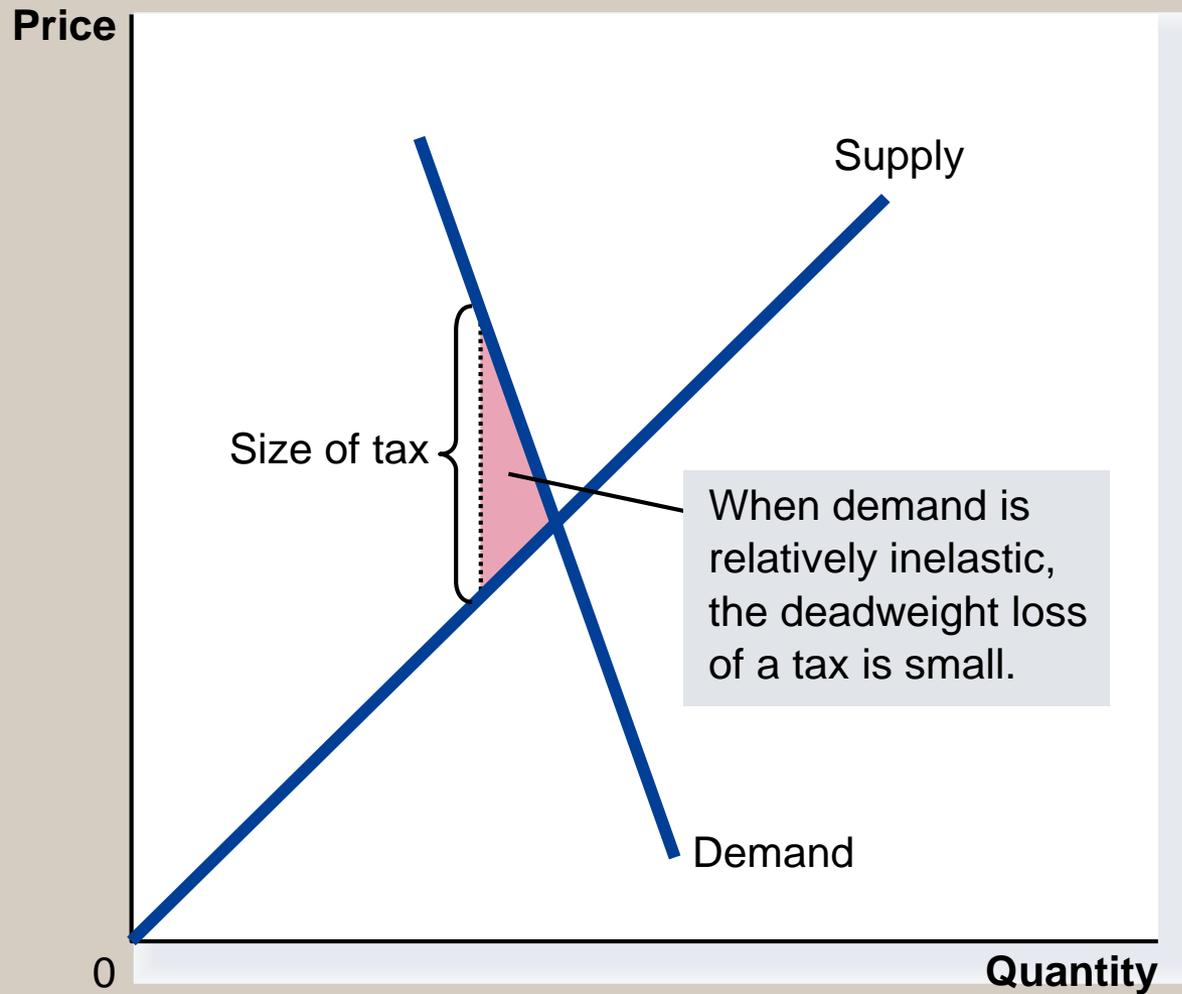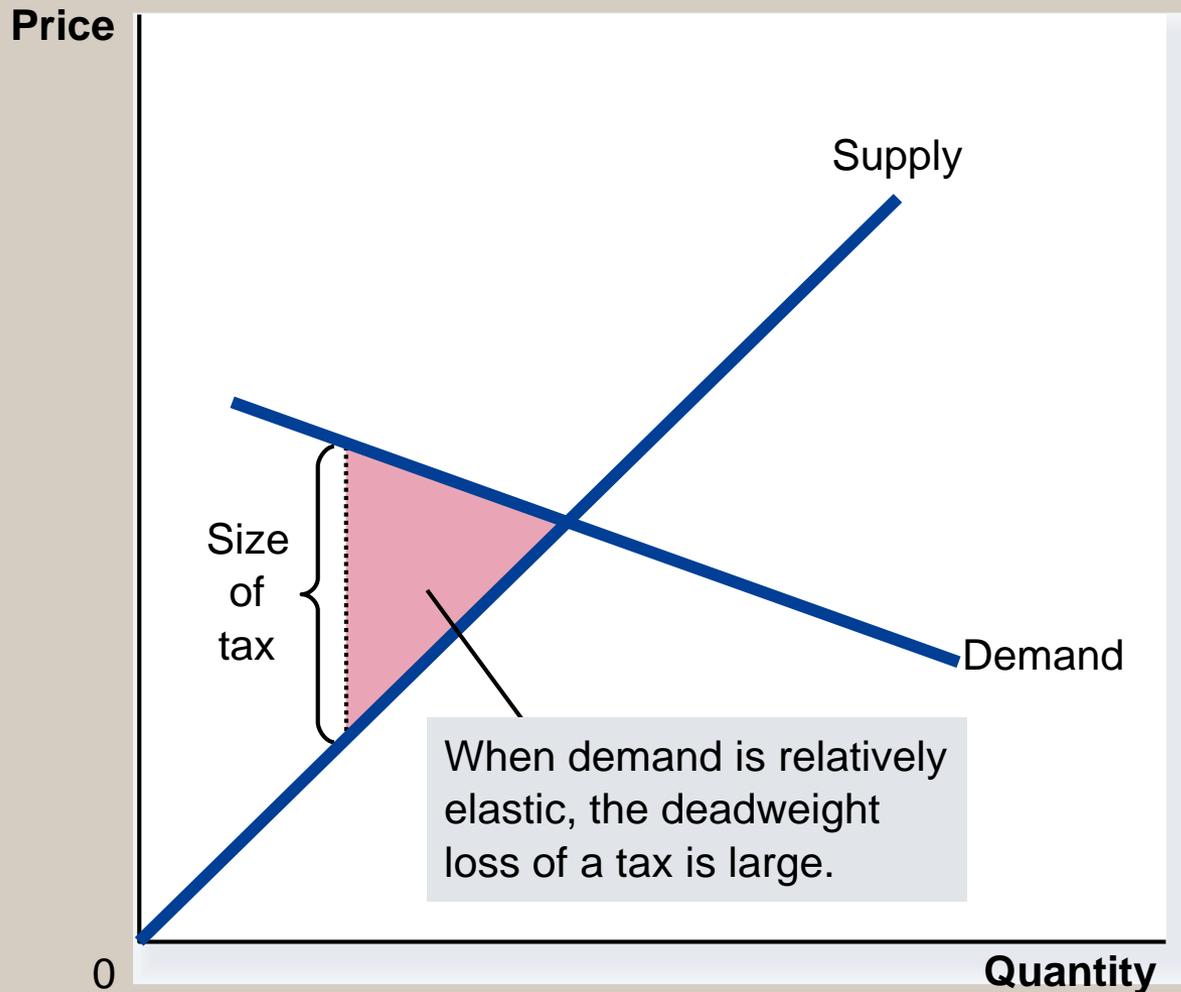
Quantity

DETERMINANTS OF THE DEADWEIGHT LOSS

- The greater the elasticity of demand and supply:

  - the larger will be the decline in equilibrium quantity

  - the greater the deadweight loss of a tax.

DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

- The Deadweight Loss Debate

  ➢ Some economists argue that labor taxes are highly distorting and believe that labor supply is more elastic.

  ➢ Some examples of workers who may respond more to incentives:
    - Workers who can adjust the number of hours they work
    - Families with second earners
    - Elderly who can choose when to retire
    - Workers in the underground economy (i.e., those engaging in illegal activity)

DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

- When the tax rate increases, the deadweight loss rises even more rapidly than the size of the tax

- More technically… DWL is a convex function of the tax rate
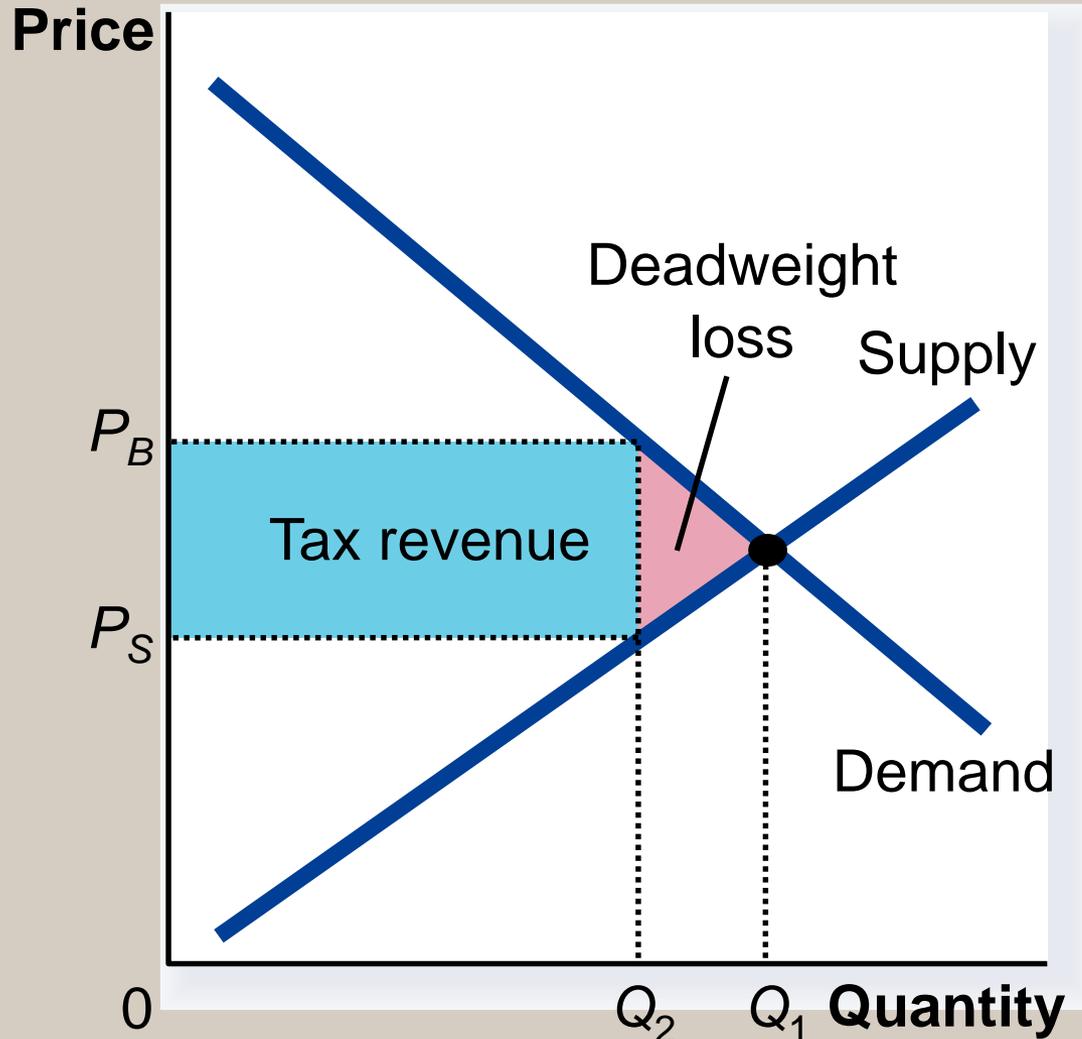
(a) Small Tax

## (b) Medium Tax
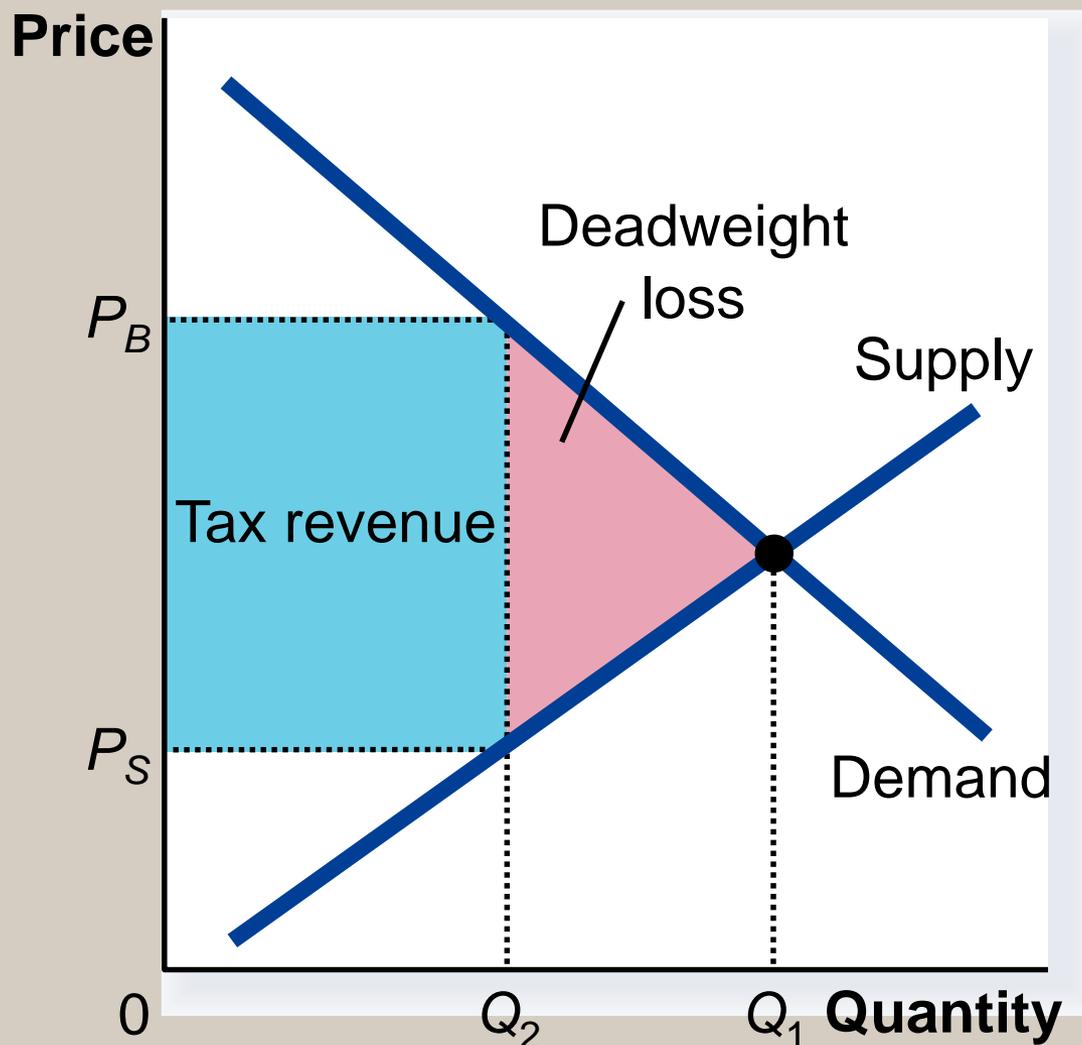
(c) Large Tax
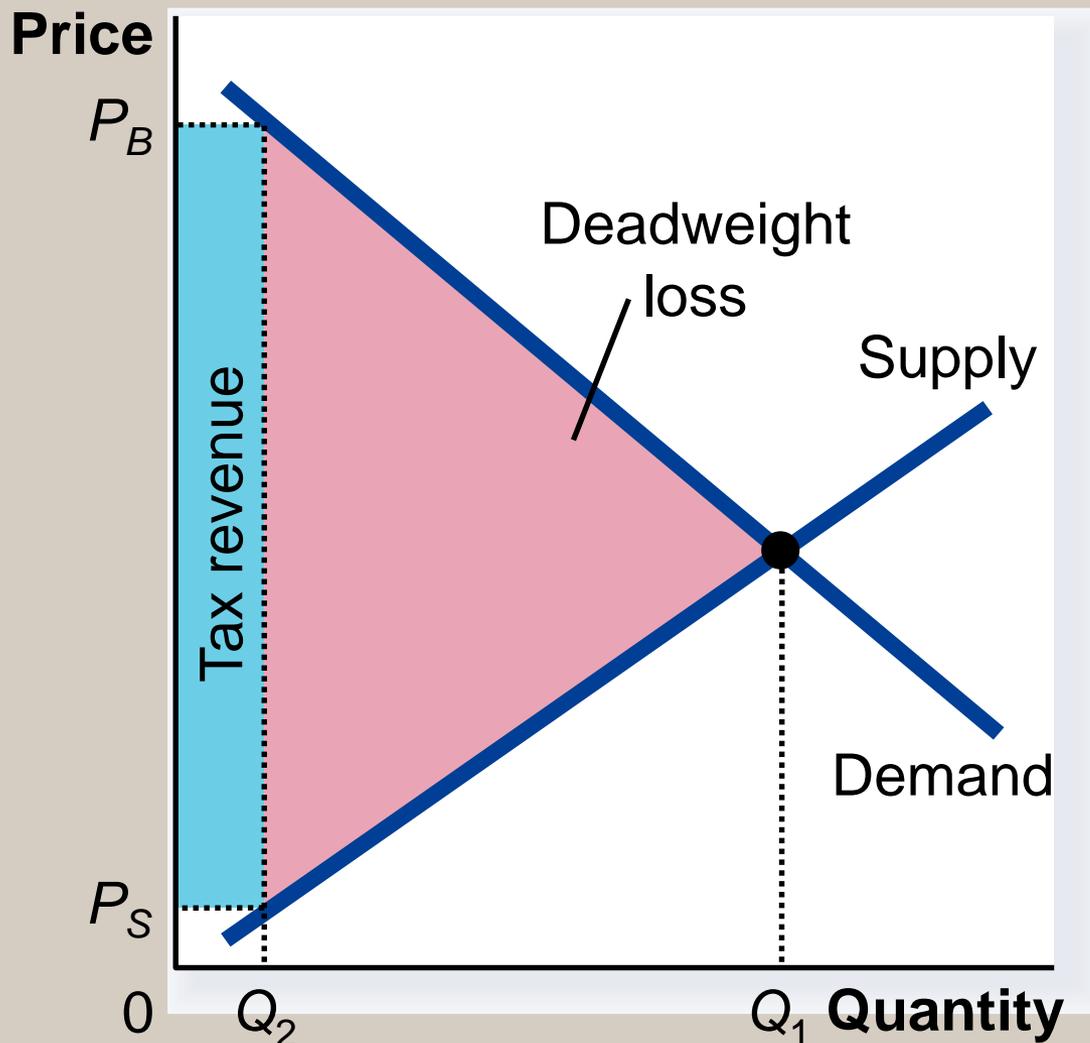
DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

o For the small tax, tax revenue is small.

o As the size of the tax rises, tax revenue grows.

o But as the size of the tax continues to rise, tax revenue falls because the higher tax reduces the size of the market.

(a) Deadweight Loss

Deadweight Loss (vertical axis)

Tax Size (horizontal axis)

0
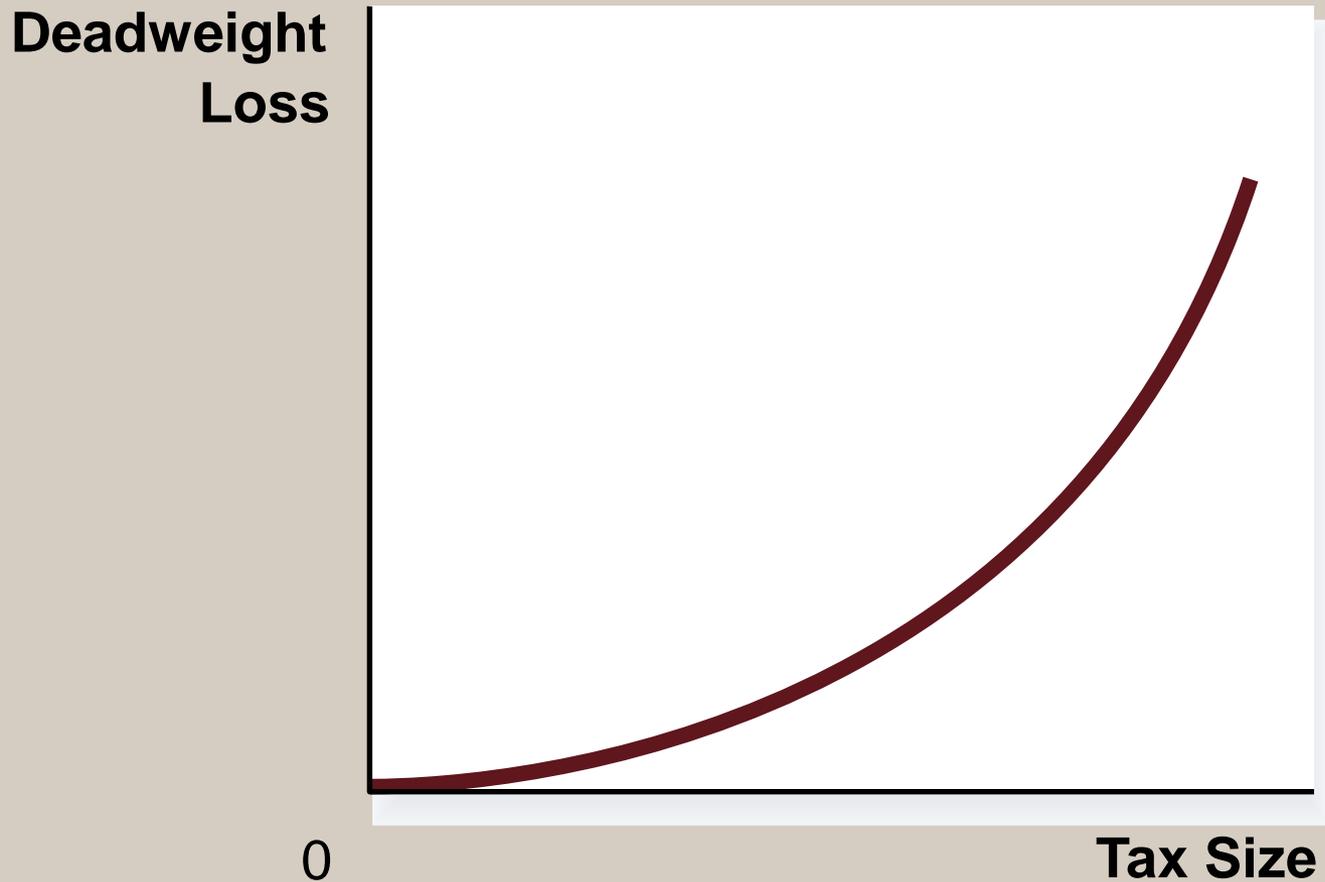
(b) Revenue (the Laffer curve)

Tax Revenue (vertical axis), Tax Size (horizontal axis), 0
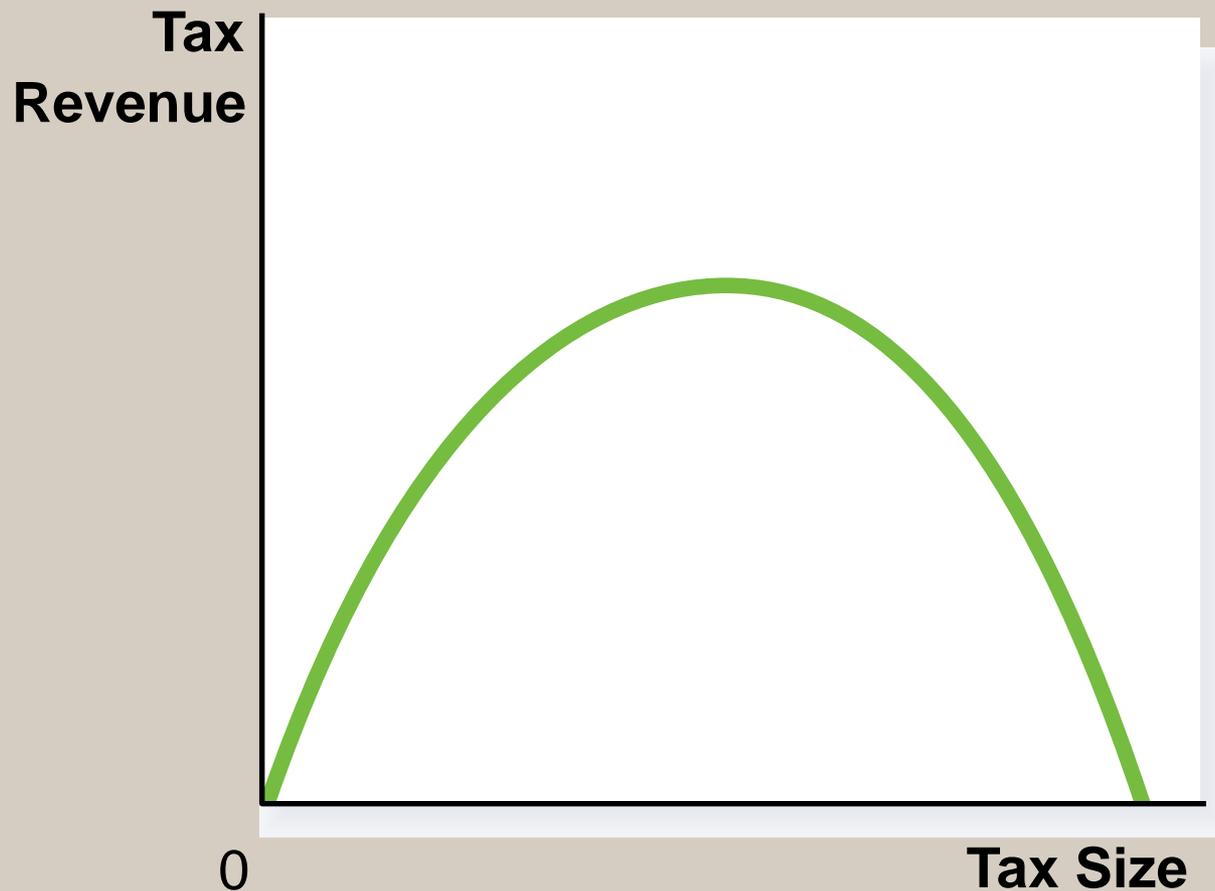
DEADWEIGHT LOSS AND TAX REVENUE AS TAXES VARY

- 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.

CASE STUDY: The Laffer Curve and Supply-side Economics

- The *Laffer curve* depicts the relationship between tax rates and tax revenue.

Elasticity and Tax Incidence

- *Tax incidence* is the manner in which the burden of a tax is shared among participants in a market.

# Elasticity and Tax Incidence

- 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.

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.

(a) Elastic Supply, Inelastic Demand

1. When supply is more elastic than demand . . .

Supply

2. . . . the incidence of the tax falls more heavily on consumers . . .

3. . . . than on producers.

Demand

Tax

Price buyers pay

Price without tax

Price sellers receive

Price

Quantity

0
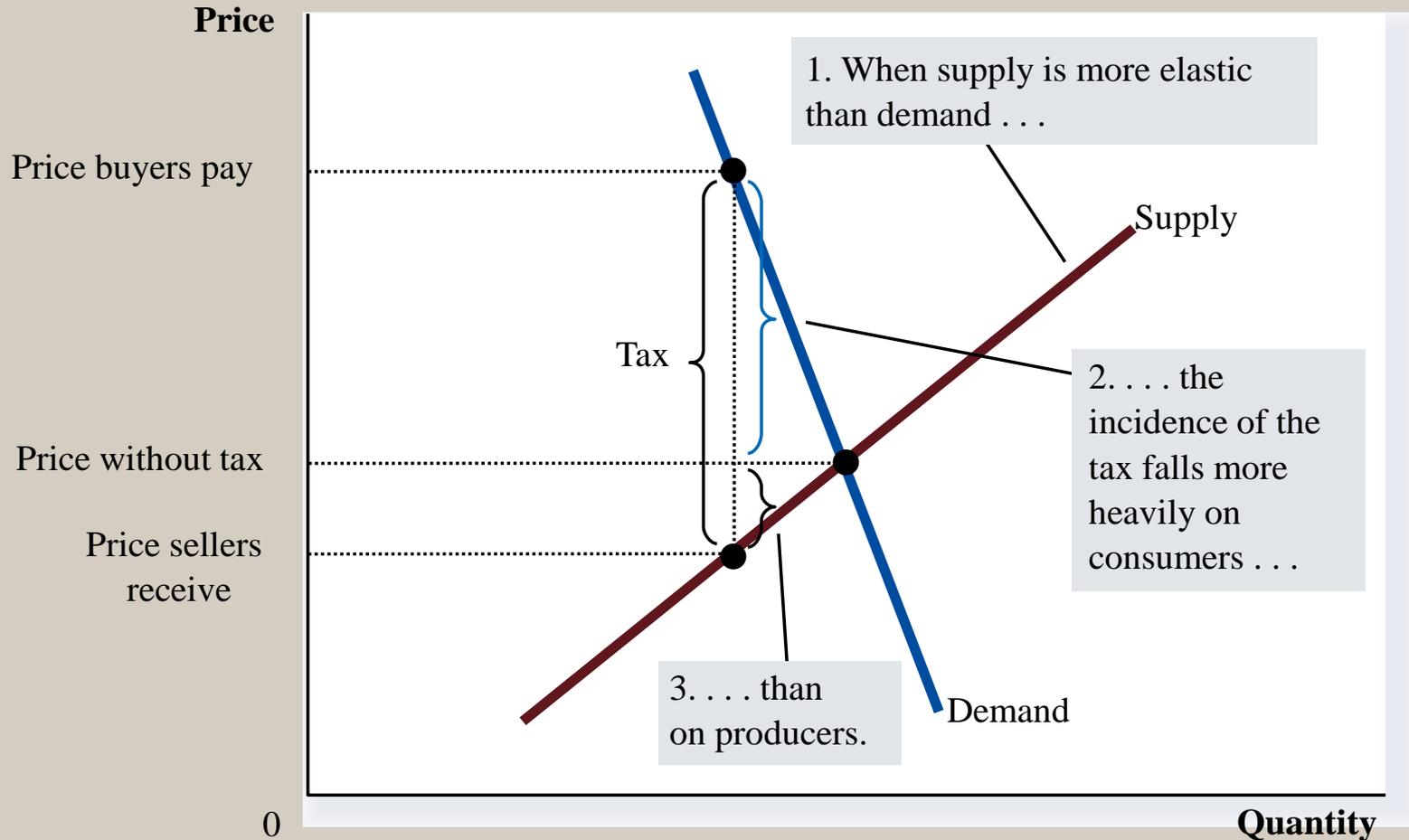
(b) Inelastic Supply, Elastic Demand

Price

Price buyers pay

Price without tax

Price sellers receive

1. When demand is more elastic than supply . . .

Supply

3. . . . than on consumers.

Tax

2. . . . the incidence of the tax falls more heavily on producers . . .

Demand

0

Quantity
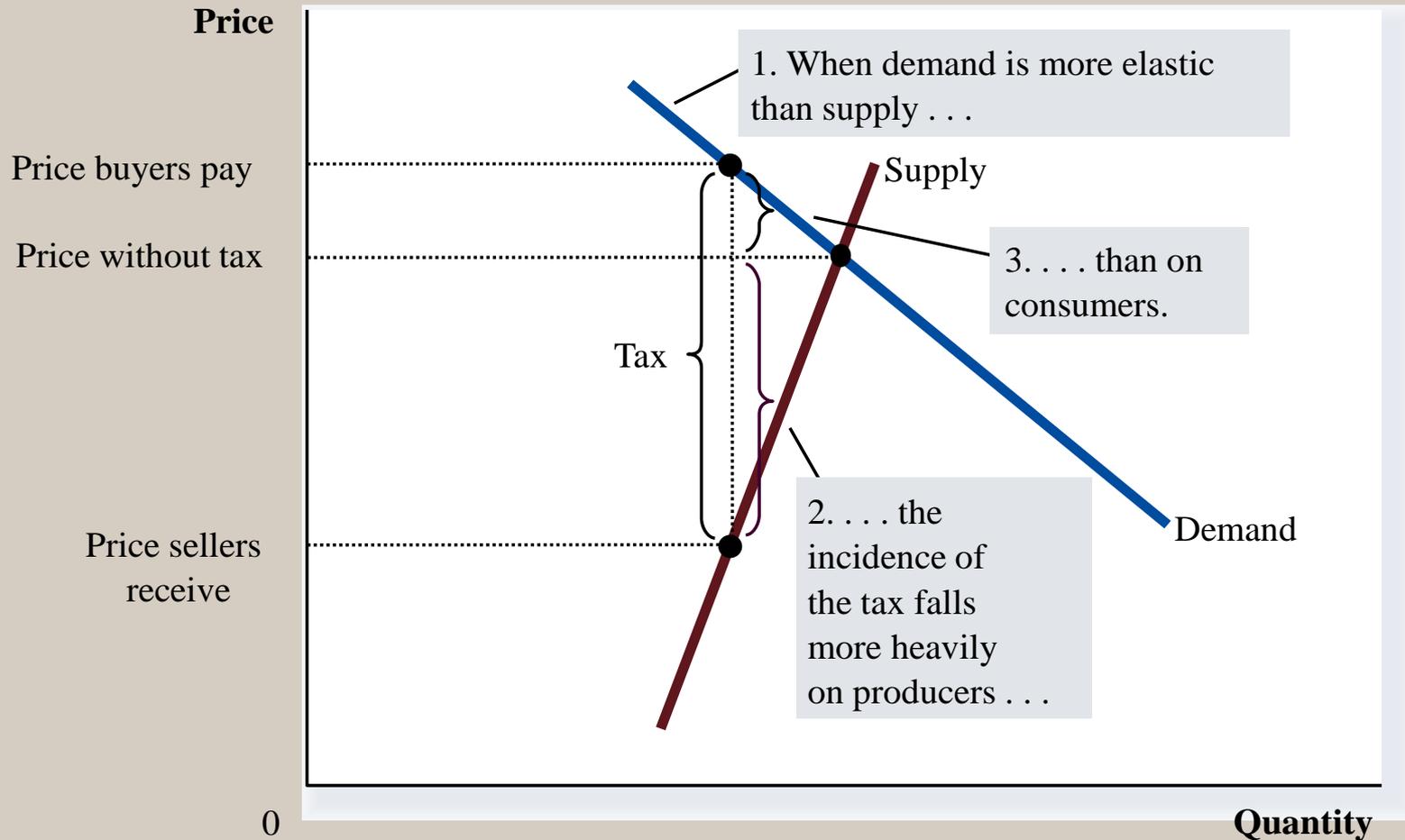
ELASTICITY AND TAX INCIDENCE

So, how is the burden of the tax divided?

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

Basics of Income and substitution effect
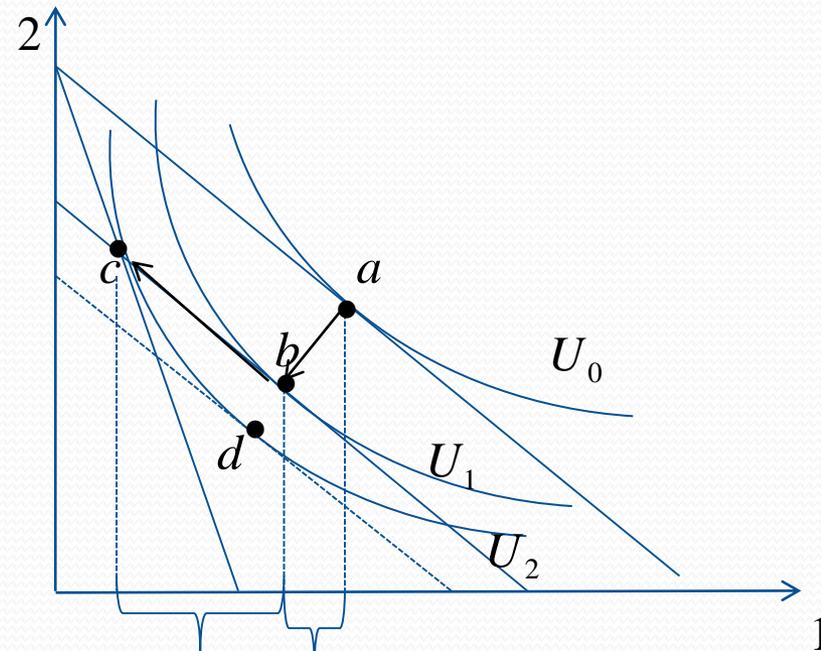
Slutsky Substitution effect   Income effect

Normal and Inferior Goods

- Normal goods:
  - For a normal good, and a price increase, the income effect is negative.
    - As purchasing power falls, you buy less of a good.
- Inferior goods:
  - For an inferior good, and a price increase, the income effect is positive.
    - As income falls, you buy more of the good.

Giffen Good

- When a good is so strongly inferior that the income effect outweighs the substitution effect, it is called a Giffen good.
  - How likely is this?
    - Not very. (Any examples?)
  - Giffen goods imply an upward sloping demand curve.
  - No substitute goods
  - Irish potatoes (standard example, famine '800)