Chapter 6

Taxes and Subsidies

See the Invisible Hand • Understand Your World

Tyler Cowen • Alex Tabarrok

Outline

- Commodity Taxes
- Who Ultimately Pays the Tax Does Not Depend on Who Writes the Check
- Who Ultimately Pays the Tax Depends on the Relative Elasticities of Supply and Demand
- A Commodity Tax Raises Revenue and Creates a Deadweight Loss (Reduces the Gains from Trade)
- Subsidies

Introduction

- In this chapter we examine taxes and subsidies using the supply and demand model.

Key points:

1. Who ultimately pays the tax *does not* depend on who writes the check to the government.
2. Who ultimately pays the tax *does* depend on the relative elasticities of demand and supply.
3. Commodity taxation raises revenue and creates deadweight loss (i.e., reduces the gains from trade).

Taxes

Not only are more children born in late December than in early January, but also the extra births appear to be clustered among those who have the most to gain from a tax deduction

Taxes

Unless you're a cynic, or an economist, I realize you might have trouble believing that the intricacies of the nation's tax code would impinge on something as sacred as the birth of a child. But it appears that you would be wrong.

- David Leonhardt – *New York Times*

Taxes – Quotables

"In this world nothing can be said to be certain, except death and taxes."

- Benjamin Franklin

"The difference between death and taxes is death doesn't get worse every time Congress meets."

 - Will Rogers

"No nation has ever taxed itself into prosperity"

 - Ronald Reagan

"No Nation ever borrowed itself into prosperity"

 - Unknown

"It's as if people think that if the government imposed a tax on cows, the tax would be paid by the cows."

- Hebert Stein

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Taxes – Quotables

"The power to tax is the power to destroy."

    - John Marshall, American Jurist, Statesman

"The Income Tax has made more liars out of the American people than golf has."

    – Will Rogers

Rich bachelors should be heavily taxed. It is not fair that some men should be happier than others."

    – Oscar Wilde

"Oh my God, what happened to my paycheck?"

    - Mike Mace, on receiving his first full-time paycheck in December 1977

Taxes – Milton Friedman

Milton Friedman on taxes:

"Inflation is taxation without legislation"

"I am favor of cutting taxes under any circumstances and for any excuse, for any reason, whenever it's possible."

"We have a system that increasingly taxes work and subsidizes non-work."

"The real cost of government is measured by what government spends, not by receipts labeled taxes."

Definition

Commodity Taxes: Taxes on goods, such as those on fuel, cigarettes, and liquor*.*

Some truths about commodity taxation:

1. **Who pays the tax does *not* depend on who writes the check to the government;**
2. **Who pays the tax *does* depend on the relative elasticities of demand and supply;**
3. **Commodity taxation raises revenue and creates *lost gains from trade* (dead-weight loss).**

Commodity Taxes

- The government can collect a tax in one of two ways:
  - Tax sellers for every unit sold.
  - Tax buyers for every unit bought.
- The tax has exactly the same effects whether it is "paid" for by sellers or by buyers.
- Who ultimately pays a tax is determined by the laws of supply and demand.

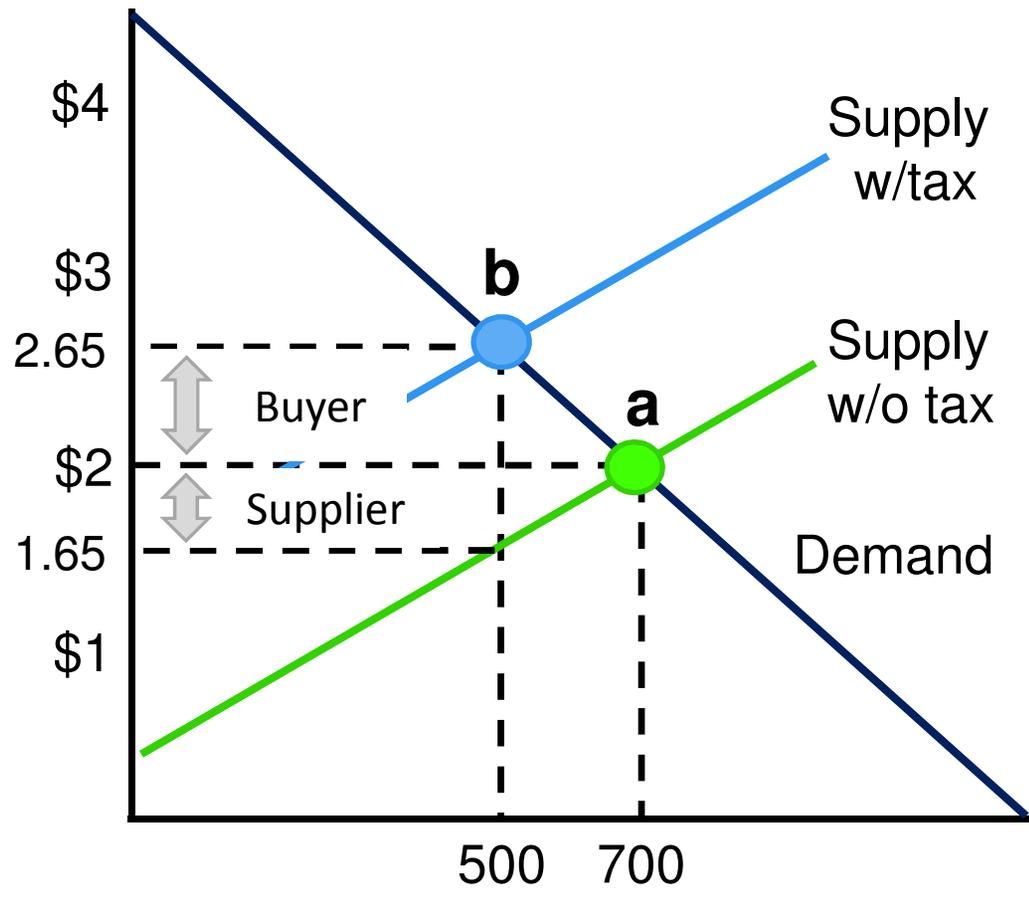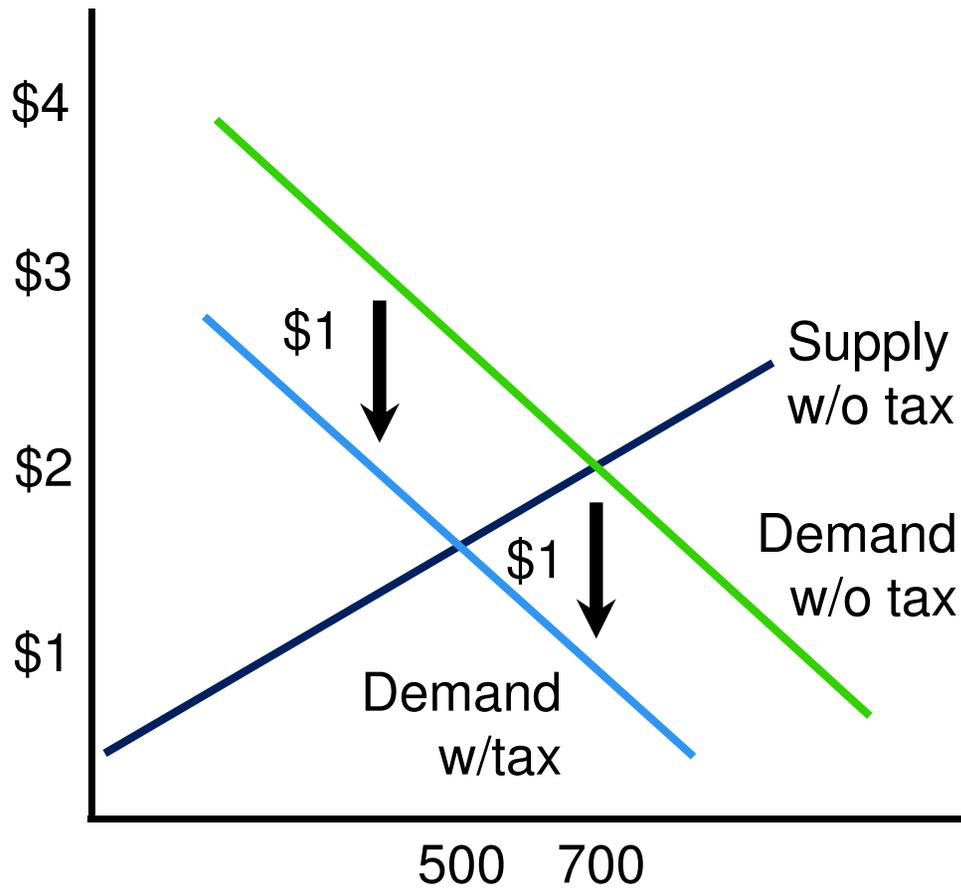# Who Ultimately Pays the Tax

Price of Apples (per basket)
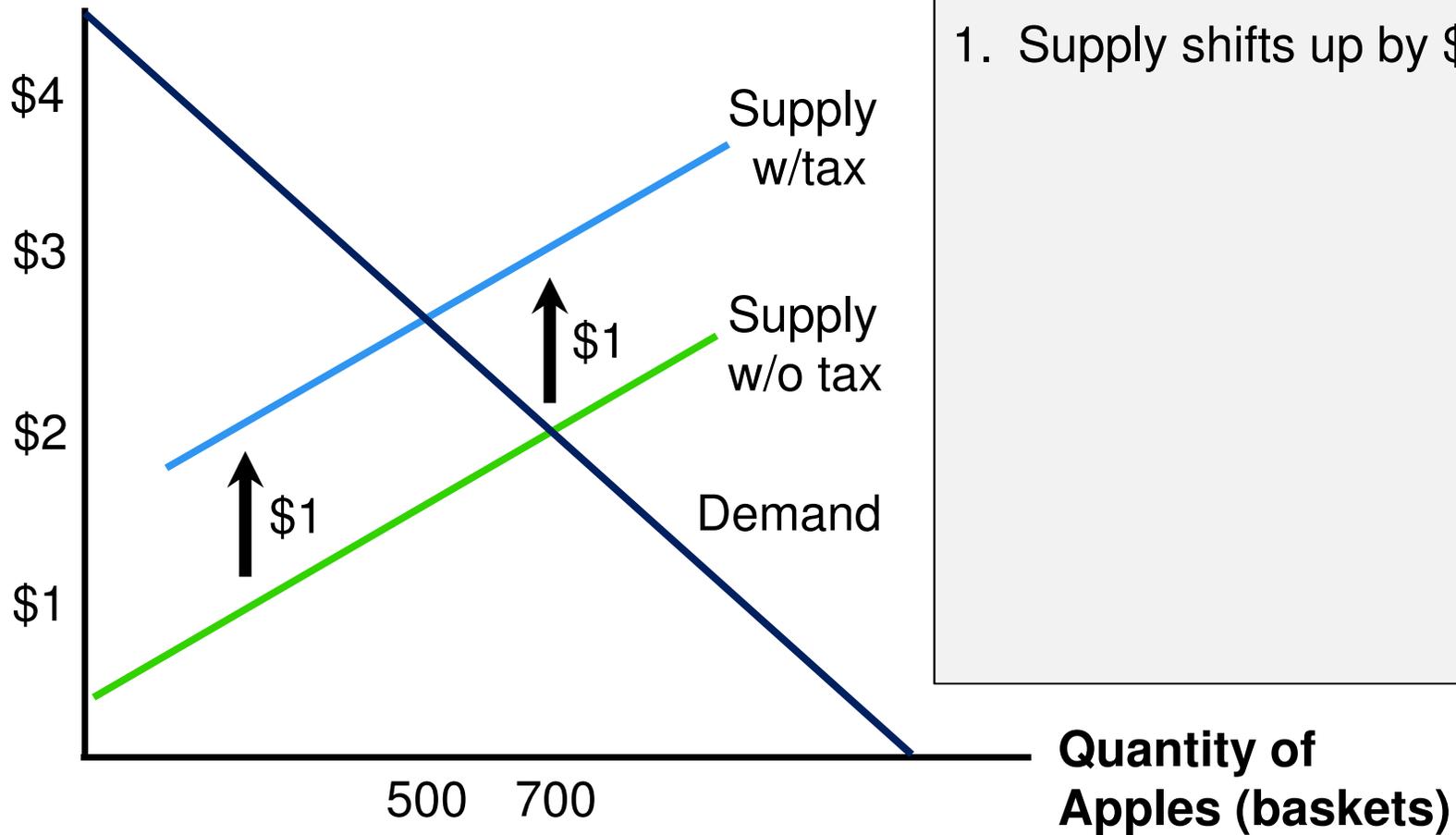
$1 Tax on Suppliers

1. Supply shifts up by $1
2. With no tax, equilibrium is at **a**: P=$2, Q=700
3. With tax, equilibrium is at point **b**: P=$2.65, Q=500
4. Buyers pay $2.65, Suppliers receive $2.65 - $1.00 = $1.65
5. Tax burden:
   Buyers $0.65
   Suppliers $0.35

Quantity of Apples (baskets)

Who Ultimately Pays the Tax
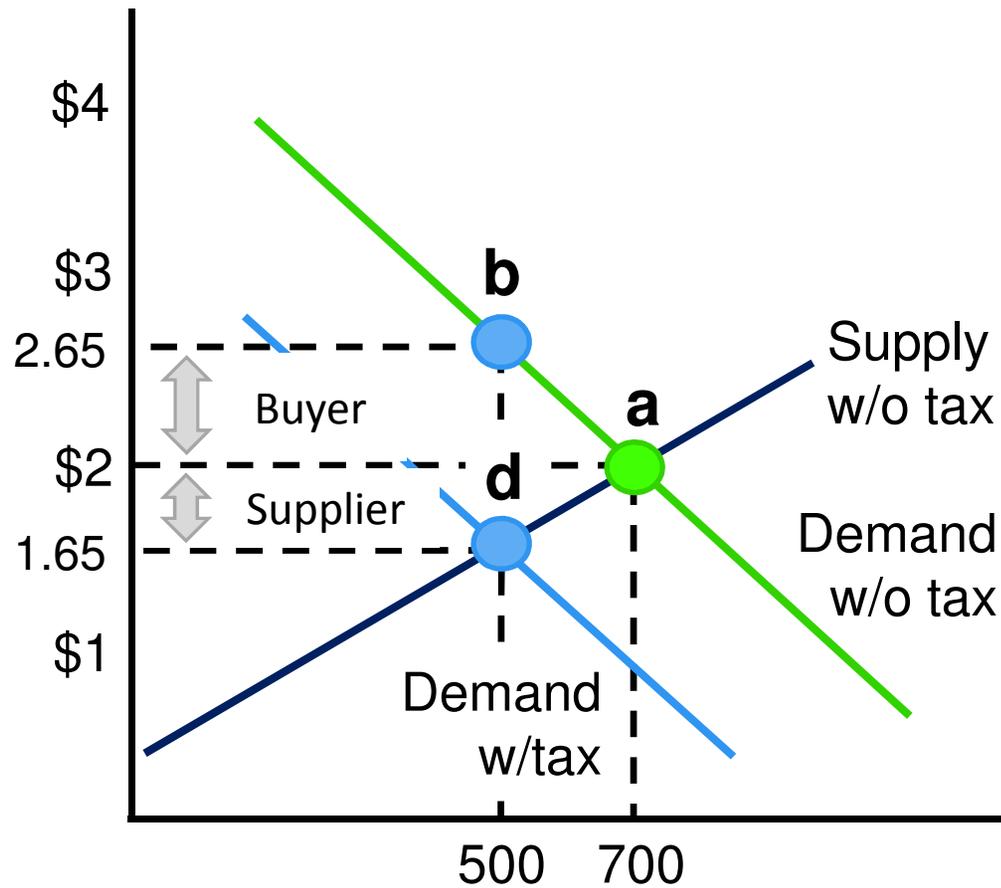
Price of Apples (per basket)

$4

$3

$1

$2

$1

$1

$1

Demand w/tax

Supply w/o tax

Demand w/o tax

500   700

Quantity of Apples (baskets)

$1 Tax on Buyers

1. Demand shifts down by $1

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Who Ultimately Pays the Tax

**Price of Apples
(per basket)**

**Quantity of
Apples (baskets)**

$4

$3

2.65

$2

1.65

$1

b

a

d

Buyer

Supplier

Supply
w/o tax

Demand
w/o tax

Demand
w/tax

500   700

$1 Tax on Buyers

1. Demand shifts down by $1
2. With no tax, equilibrium is at **a**: P=$2, Q=700
3. With tax, equilibrium is at point **d**: P=$1.65, Q=500
4. Buyers pay
   $1.65 + 1.00 tax = $2.65
   Suppliers receive $1.65
5. Tax burden:
   Buyers $0.65
   Suppliers $0.35

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Self-Check

If the government imposes a new tax on every car sold, most of the tax will be paid by:

a. Car buyers.
b. Car dealers.
c. It depends.

   Answer: c, it depends; who ultimately pays the tax depends on the laws of supply and demand.
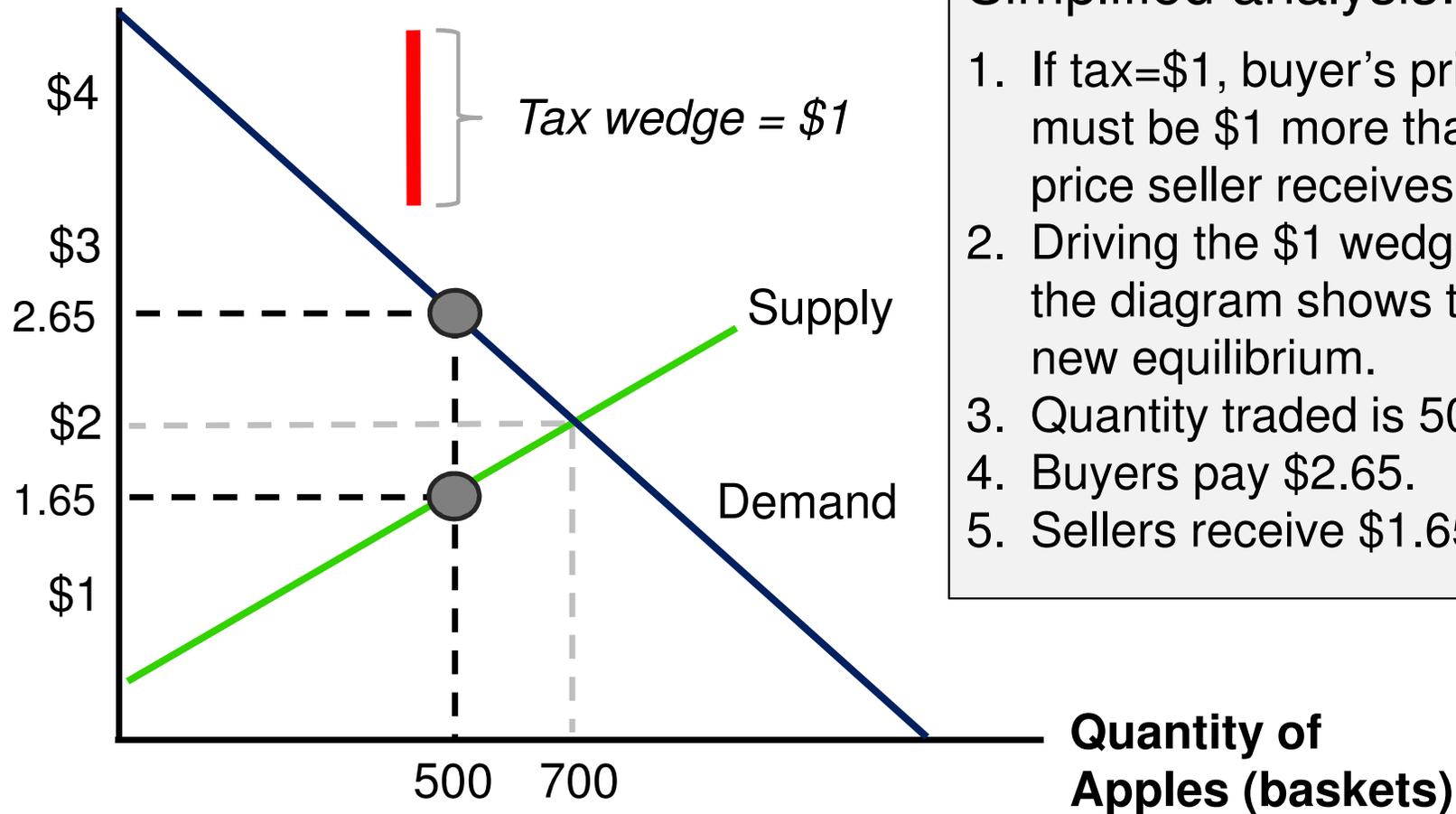
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The Tax Wedge

- A tax drives a tax wedge between the price paid by buyers and the price received by sellers.

Tax = Price paid by buyers − Price received by sellers

- We can use the tax wedge to simplify our analysis.

The Tax Wedge

Price of Apples (per basket)


Tax wedge = $1

Quantity of Apples (baskets)

Simplified analysis:

1. If tax=$1, buyer's price must be $1 more than the price seller receives.
2. Driving the $1 wedge into the diagram shows the new equilibrium.
3. Quantity traded is 500.
4. Buyers pay $2.65.
5. Sellers receive $1.65.

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The Tax Wedge

- We can use the wedge shortcut to show that who pays a tax is determined by the relative elasticities of demand and supply.

- Elasticity measures how responsive quantities demanded (or supplied) are to price changes.

- When demand is more elastic than supply, demanders pay less of the tax than sellers.

- When supply is more elastic than demand, suppliers pay less of the tax than buyers.

The Tax Wedge
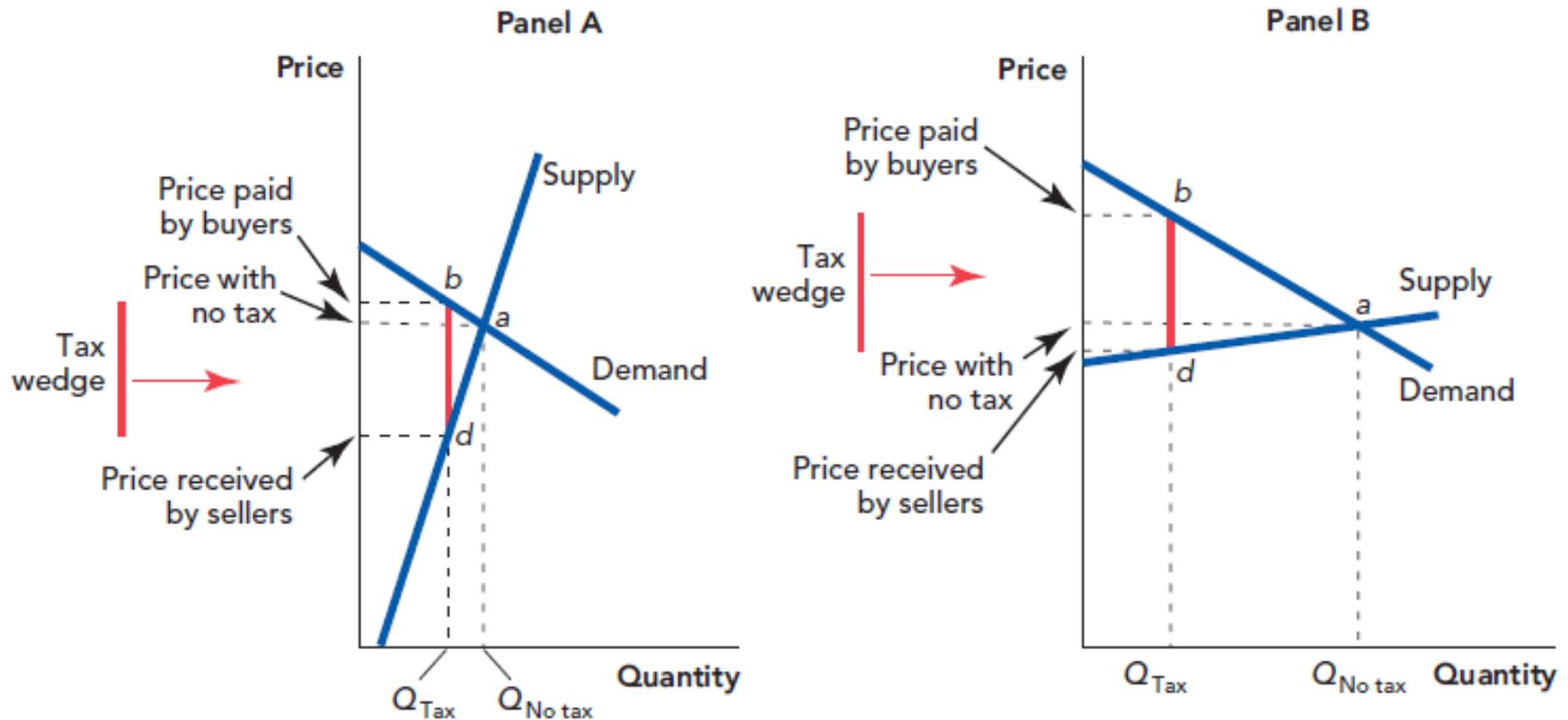
The more elastic side of the market can escape more of the tax.

Self-Check

If demand is more elastic than supply, more of the tax will be paid by:

a. Buyers.
b. Sellers.
c. Both share the tax burden equally.

Answer: b – If demand is more elastic than supply, buyers pay less of the tax and sellers pay more.

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Health Insurance Mandate

- 2010 Patient Protection and Affordable Care Act, or "Obamacare," required large employers to pay for employee health insurance.

- Who actually pays for health insurance depends on which is more elastic – supply or demand.

- Is it easier for *firms* or for *workers* to escape the tax?

Health Insurance Mandate

- **Firms** can escape the tax several ways:
  - Can substitute capital (machines) for labor.
  - Can move overseas.
  - Can shut down.
- **Workers** have fewer options:
  - Costs of leaving the labor force are high.
- Demand is therefore more elastic than supply.
- Result: most of the tax is paid by workers.

Cigarette Taxes

ENVISION/CORBIS

- Cigarettes are taxed from $2.57 per pack in New Jersey to $0.07 in South Carolina (2009 rates).

- Because nicotine is addictive, demand is inelastic.

- Manufacturers can escape the taxes by selling overseas or in other states.

- Conclusion: supply is more elastic than demand, so most of the tax is paid by buyers.
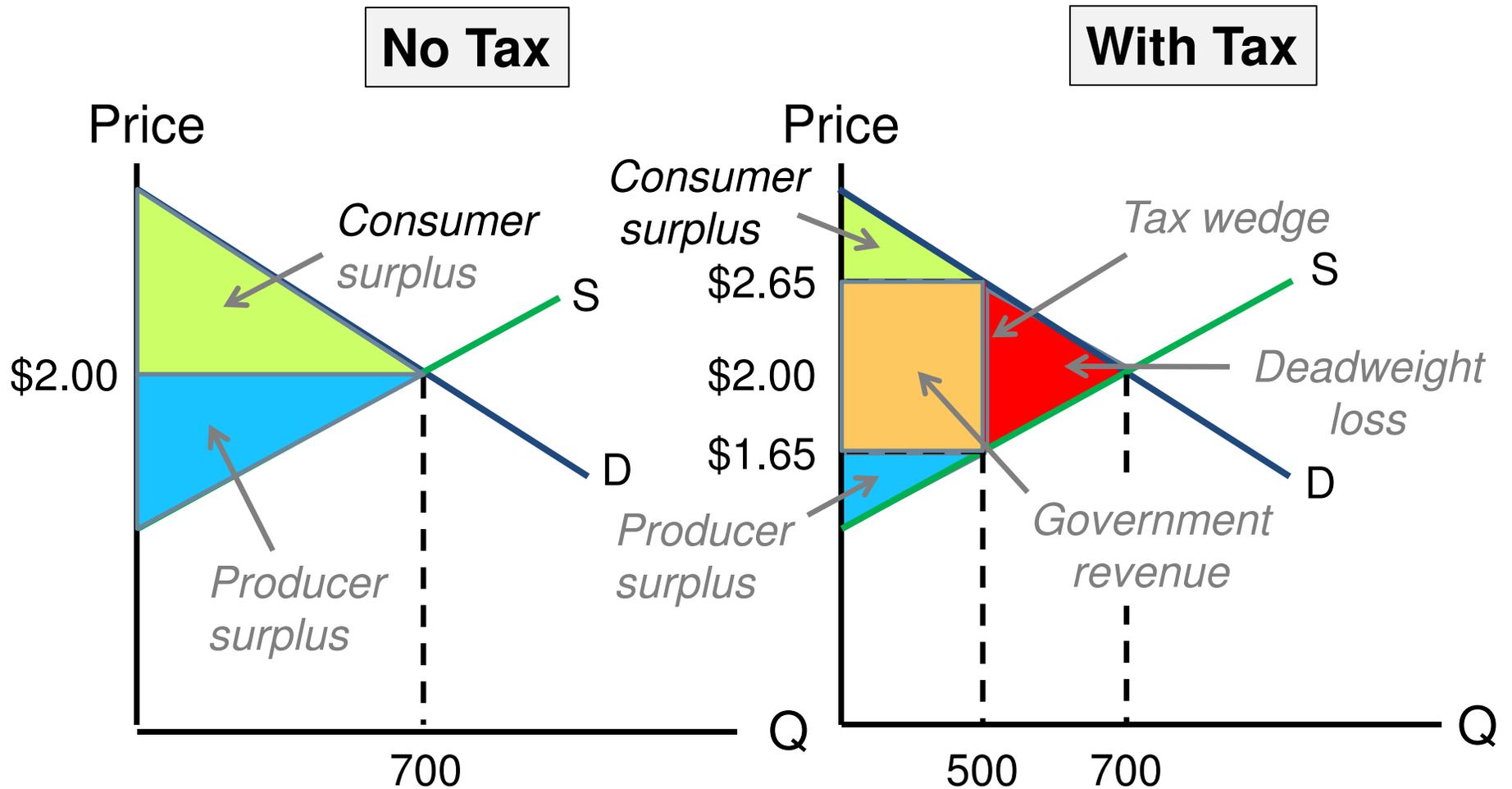
Commodity Taxes

- With no tax, consumer plus producer surplus is maximized.

- With tax, consumer plus producer surplus is smaller and tax revenues are larger.

- But tax revenues increase by less than the decrease in producer and consumer surplus.

- This creates a *deadweight loss* - lost gains from trades that do not occur.

- Results in reduced gains from trade.

Commodity Taxes

No Tax

Price

Consumer surplus

S

$2.00

D

Producer surplus

700

With Tax

Price

Consumer surplus

$2.65

$2.00

$1.65

Tax wedge

S

Deadweight loss

D

Producer surplus

Government revenue

500   700

Q

25

Self-Check

Commodity taxes result in:

a. Increased producer surplus.
b. Tax revenues and deadweight loss.
c. Tax revenues which just offset the lost producer and consumer surplus.

Answer: b; commodity taxes result in tax revenues which are lower than the lost producer and consumer surplus. The rest is deadweight loss.
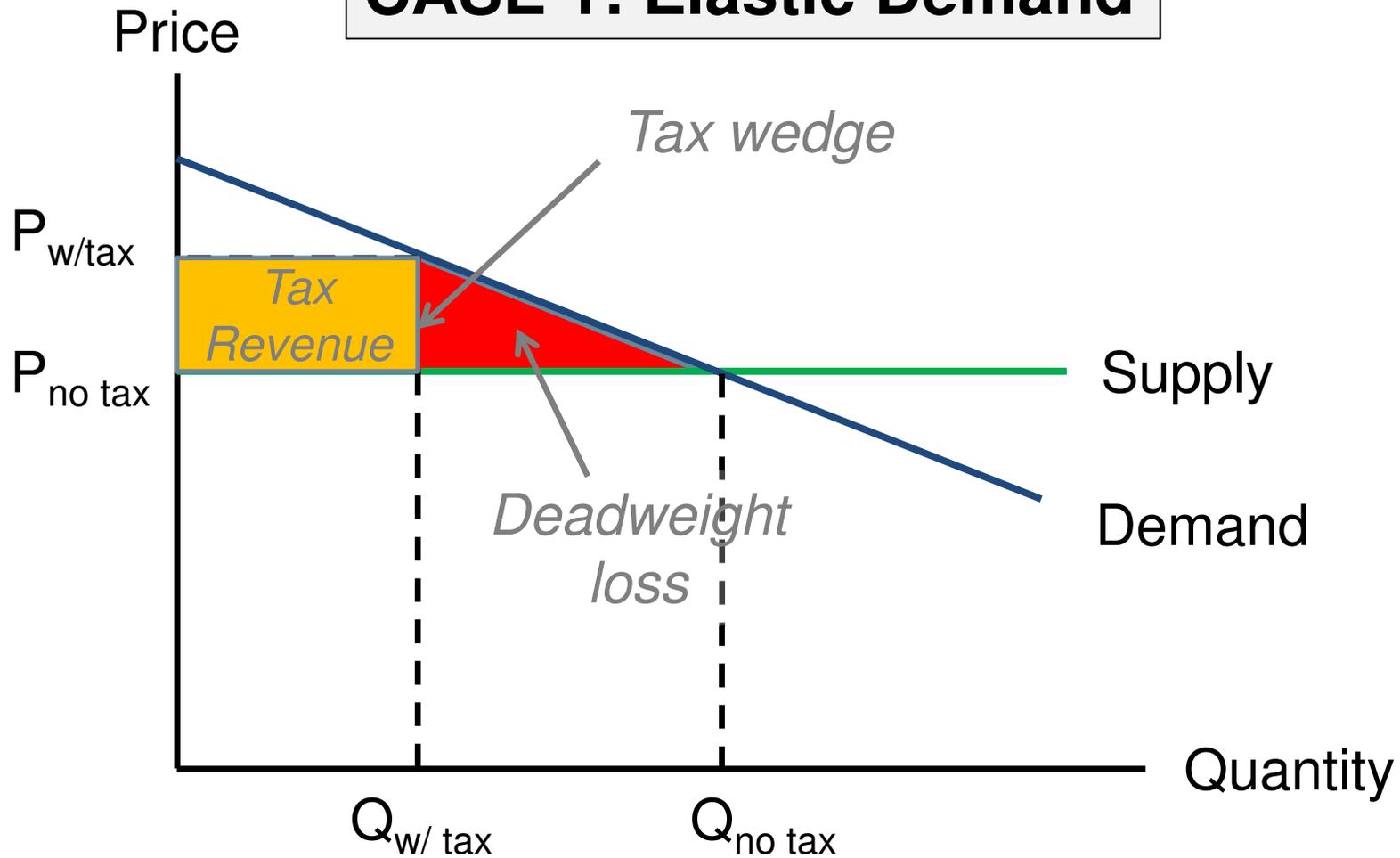
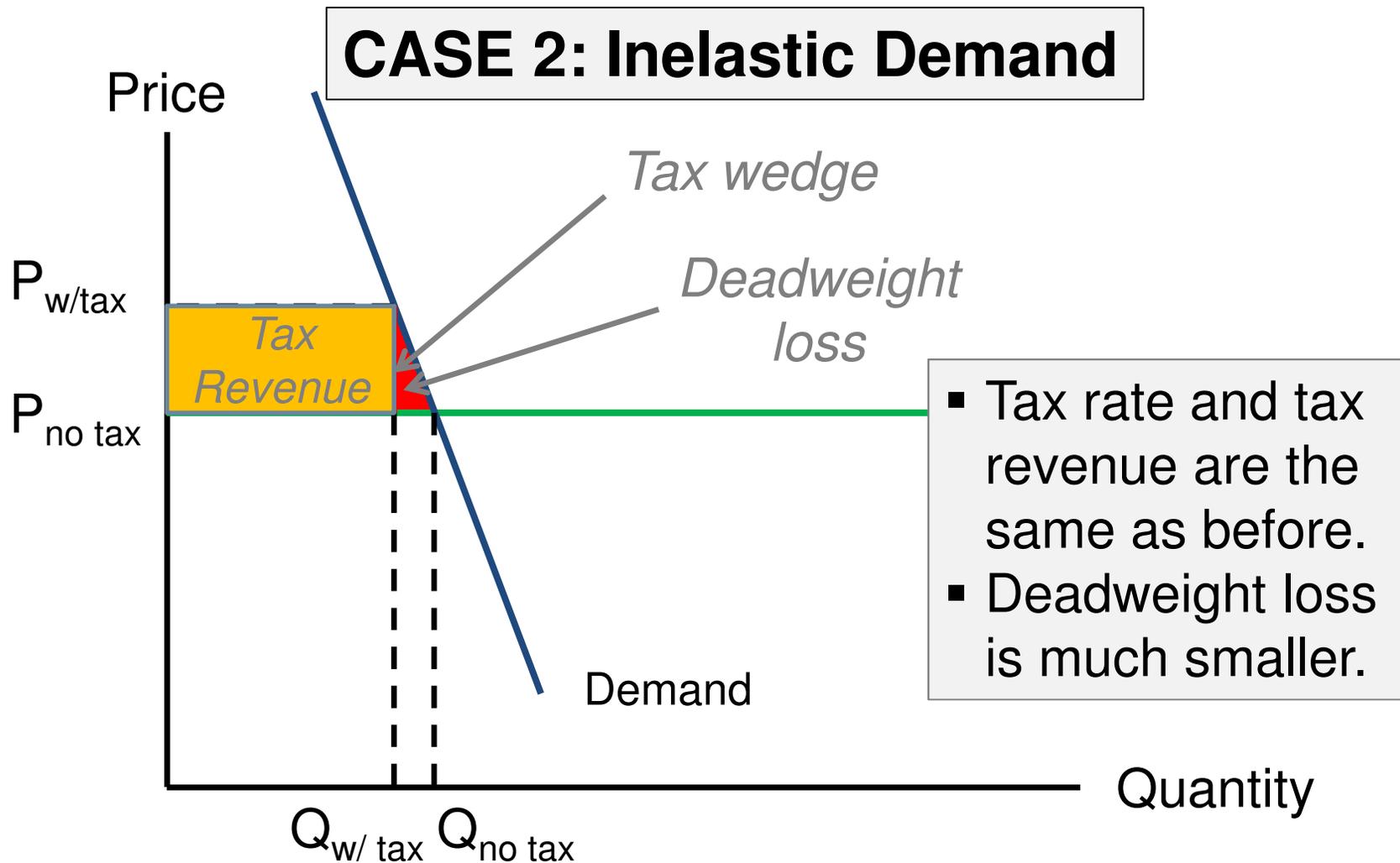# Elasticity and Deadweight Loss

Elasticity of Demand

- The deadweight loss from taxation is *lower* the *less elastic* the demand curve.

- If demand is elastic, a tax deters many trades.

- If demand is inelastic, there is little deterrence and thus fewer lost gains from trade.

Elasticity and Deadweight Loss

CASE 1: Elastic Demand

Price

$P_{w/tax}$

$P_{no\ tax}$

Tax wedge

Tax Revenue

Deadweight loss

Supply

Demand

$Q_{w/\ tax}$

$Q_{no\ tax}$

Quantity

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Elasticity and Deadweight Loss

CASE 2: Inelastic Demand

Price

$P_{w/tax}$

Tax Revenue

$P_{no\ tax}$

Tax wedge

Deadweight loss

Demand

Quantity

$Q_{w/\ tax}$ $Q_{no\ tax}$

- Tax rate and tax revenue are the same as before.
- Deadweight loss is much smaller.

Elasticity and Deadweight Loss

An example of DWL:

Imagine that you want to go to New York on a trip. You value the trip at $50 and a bus ticket costs $40. Do you take the trip?

A. Yes. The value ($50) of the trip exceeds the cost of the ticket ($40) so you travel to New York.

How much consumer surplus (net value) do you get from the trip?

A. $10=$50-$40.

Elasticity and Deadweight Loss

The government taxes bus tickets which raises the price of a bus ticket to $60. Do you take the trip?

A. No. The value of the trip is now less than the price of the ticket.

What happened to the $10 consumer surplus which you used to get when there was no tax?

A. It's gone since no trip takes place.

Did the government get any tax revenue from you?

A. No.

Key idea: Consumers lose but the government does not gain from *trips that are not taken*.
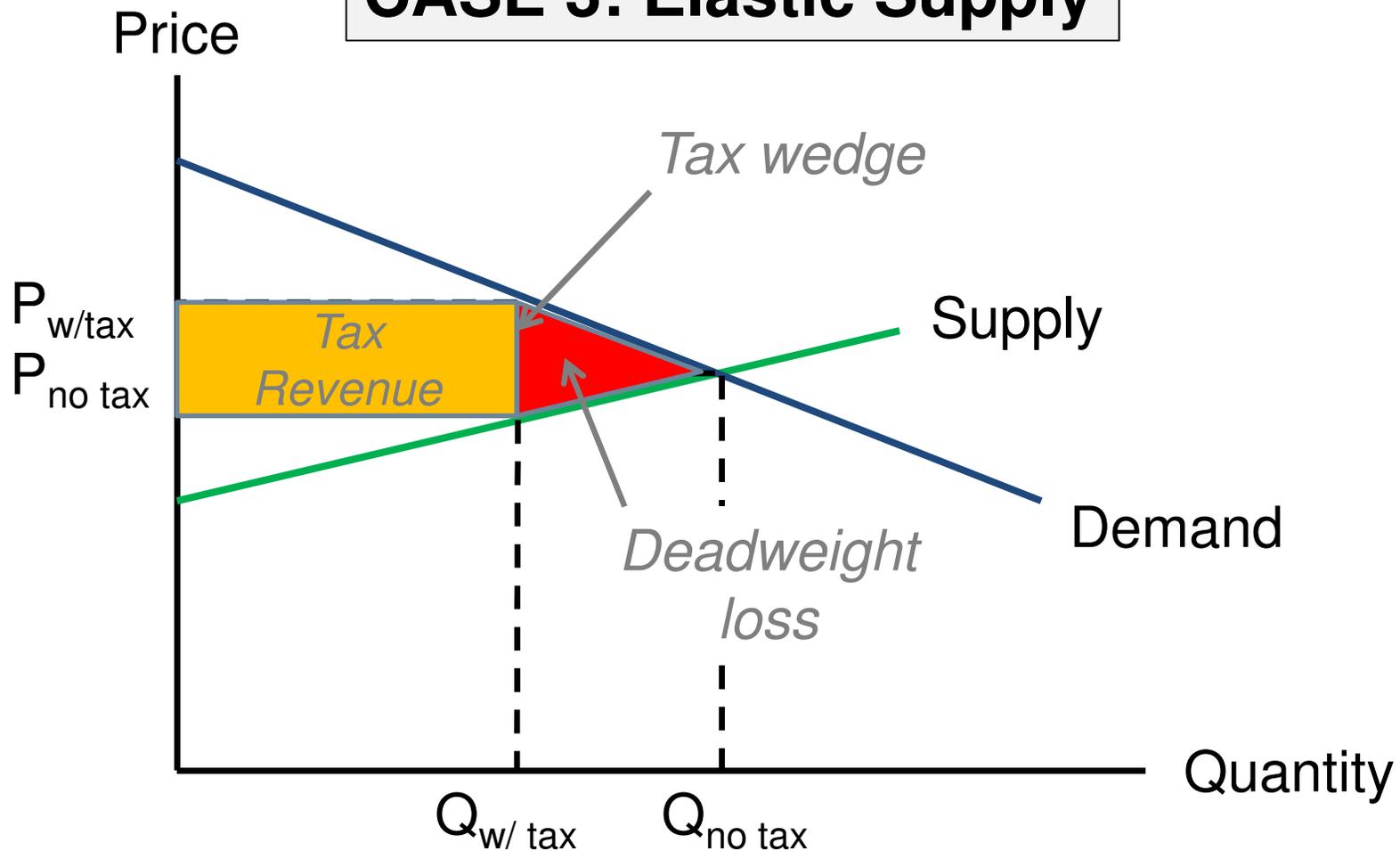
Elasticity and Deadweight Loss

Elasticity of Supply

- The deadweight loss from taxation is *lower* the *less elastic* the supply curve.

- If supply is elastic, a tax deters many trades.

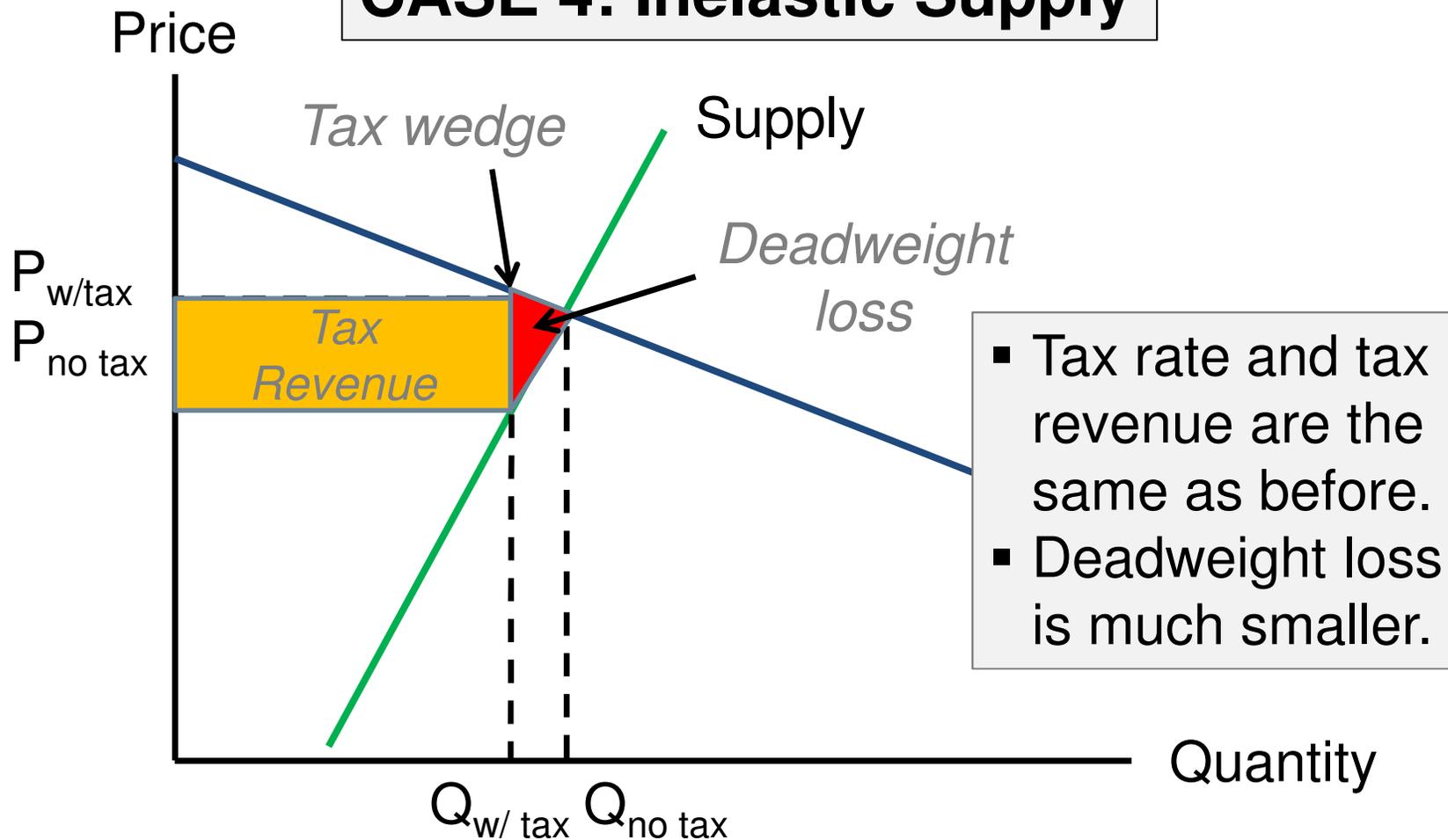- If supply is inelastic, there is little deterrence and thus fewer lost gains from trade.

Elasticity and Deadweight Loss

CASE 3: Elastic Supply

Price

Tax wedge

$P_{w/tax}$
$P_{no\ tax}$

Tax Revenue

Supply

Demand

Deadweight loss

Quantity

$Q_{w/\ tax}$ $Q_{no\ tax}$

Elasticity and Deadweight Loss

CASE 4: Inelastic Supply

Price

Tax wedge

Supply

Deadweight loss

$P_{w/tax}$
$P_{no\ tax}$

Tax Revenue

- Tax rate and tax revenue are the same as before.
- Deadweight loss is much smaller.

Quantity

$Q_{w/\ tax}$ $Q_{no\ tax}$

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Self-Check

Suppose elasticity of demand is 0.08 for product A and 1.17 for product B. If a $1 tax is imposed on both A and B, the deadweight loss will be:

a. Lower for product A.
b. Lower for product B.
c. The same for both products.

Answer: a – deadweight loss is lower the less elastic the demand curve.

Definition

Subsidy:

a reverse tax, where the government gives money to consumers or producers.

Subsidy = Price Received by Sellers – Price Paid by Buyers

Can be thought of as shifting the demand or supply curve outwards (increase)
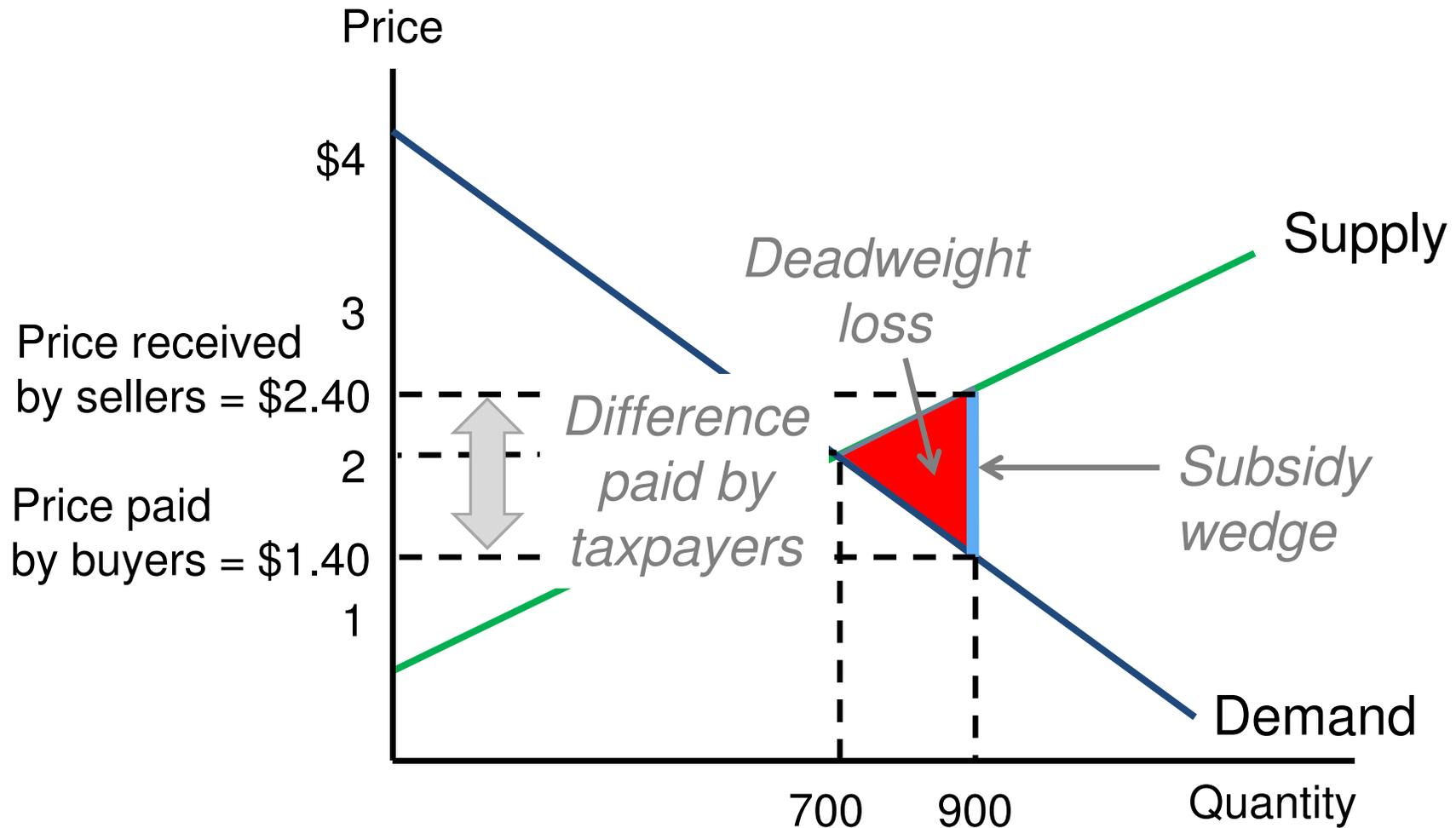
Subsidies

- The close connection between subsidies and taxes means that their effects are analogous.

Key points:

1. Who gets the subsidy does not depend on who gets the check from the government.
2. Who benefits from a subsidy *does* depend on the relative elasticities of demand and supply.
3. Subsidies must be paid for by taxpayers and they create inefficient *increases* in trade (deadweight loss).

Subsidies

Price

$4

3

Price received
by sellers = $2.40

2

Price paid
by buyers = $1.40

1

Deadweight
loss

Supply

Difference
paid by
taxpayers

Subsidy
wedge

Demand

700   900   Quantity

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Subsidies

- A subsidy creates a deadweight loss because some nonbeneficial trades occur.

- The supply curve tells us the cost of producing.

- The demand curve tells us the value to buyers.

- Producing goods for which the cost exceeds the value creates waste.

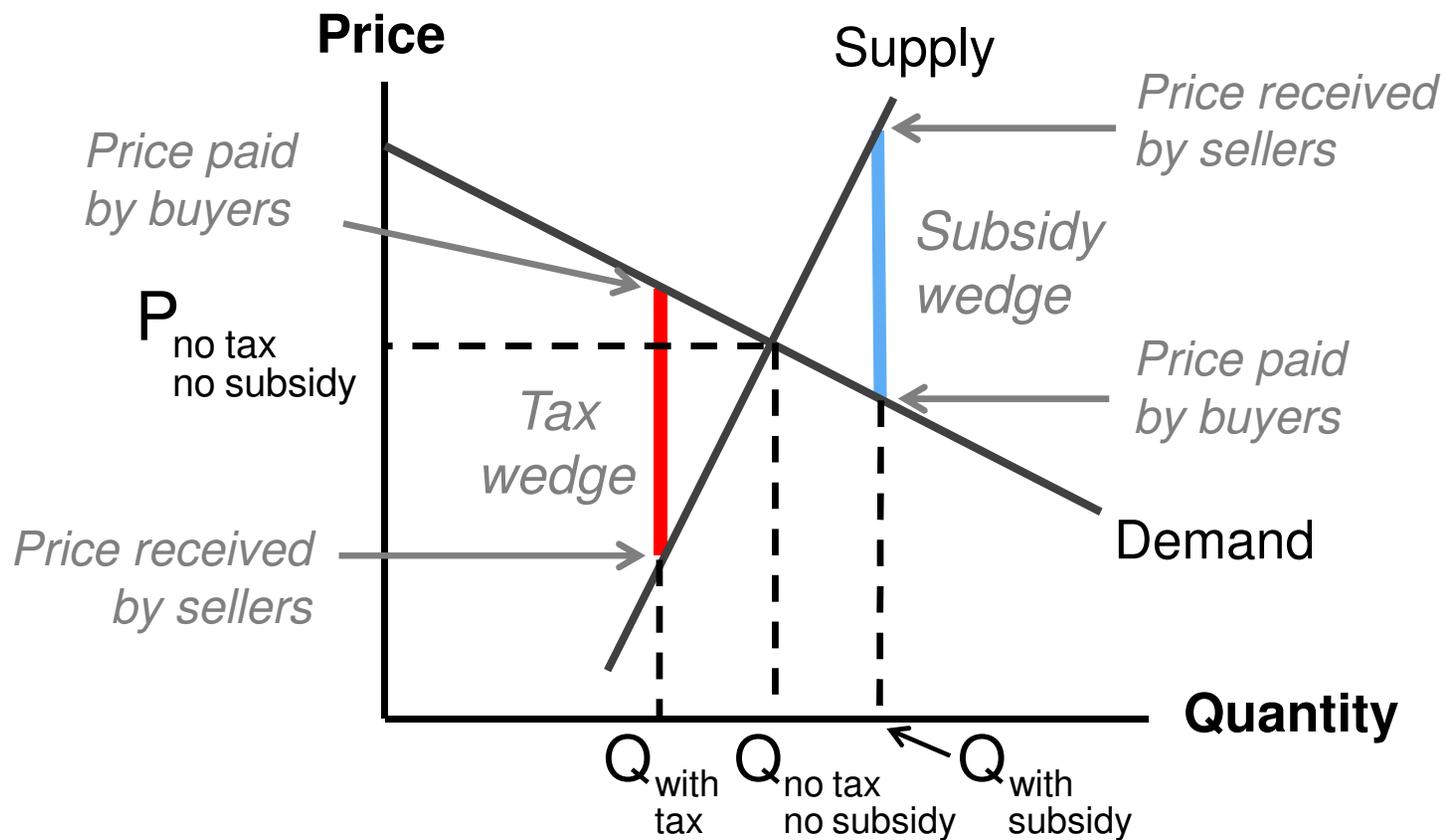- Whoever bears the burden of a tax receives the benefit of a subsidy.

Self-Check

If the government provides a subsidy to buyers of apples:

a. There will be a deadweight loss.

b. There will be a decrease in the quantity of apples supplied.
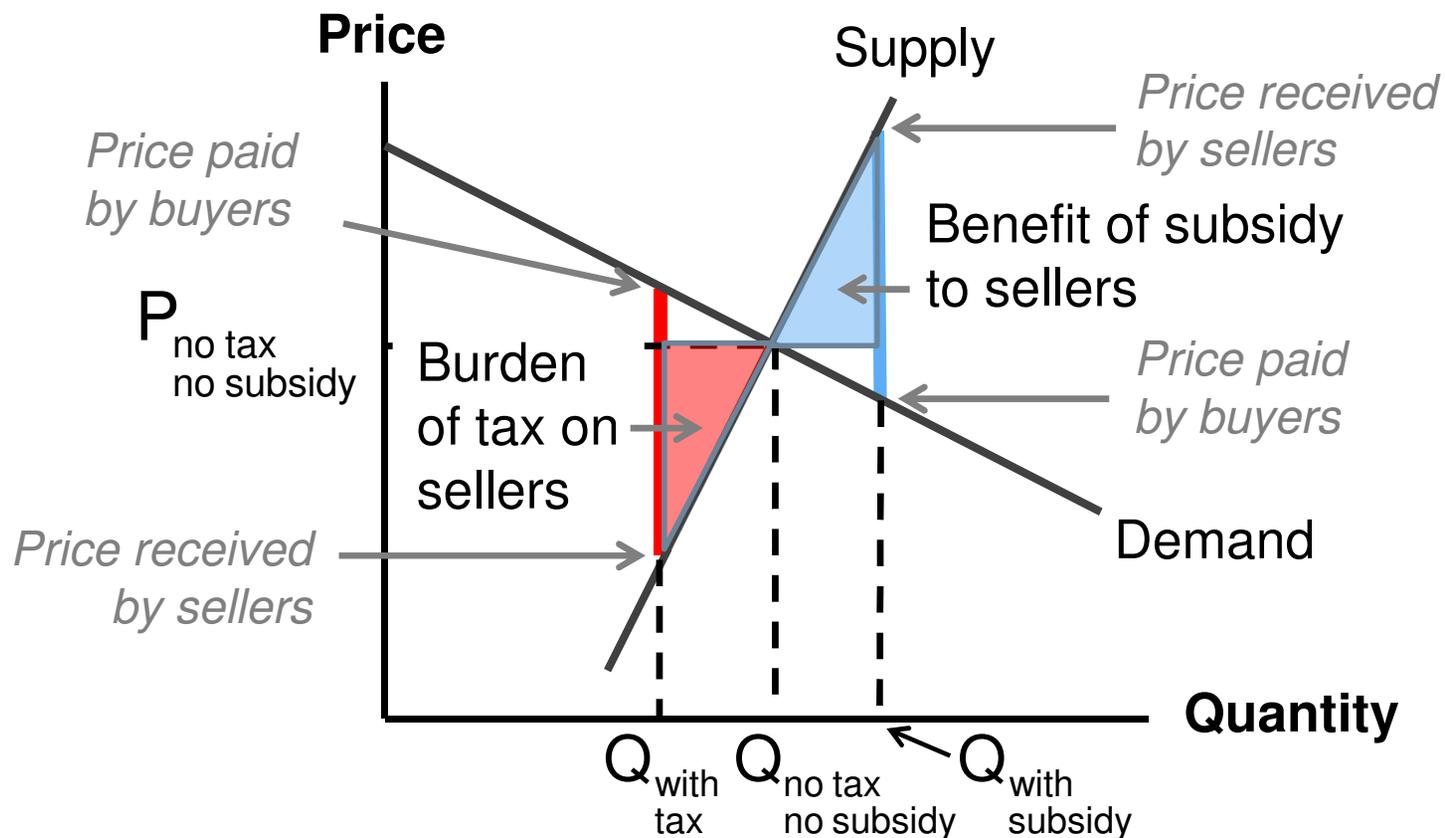
c. Producers will lose money.

Answer: a; there will be a deadweight loss, as some nonbeneficial trades will occur.

Taxes and Subsidies Compared

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Taxes and Subsidies Compared

Whoever Bears the Burden of the Tax
Receives the Benefits of a Subsidy

Cotton Subsidy

- In some states, there are very large subsidies to water used in agriculture.
  - California farmers pay $20-$30 an acre-foot for water that costs $200-$500 an acre-foot.
  - The difference represents the government subsidy

- The elasticity of demand for *California* cotton is very high since cotton grown elsewhere is almost a perfect substitute.

- Supply is much more inelastic, which means that cotton farmers get most of the benefit of the subsidies.
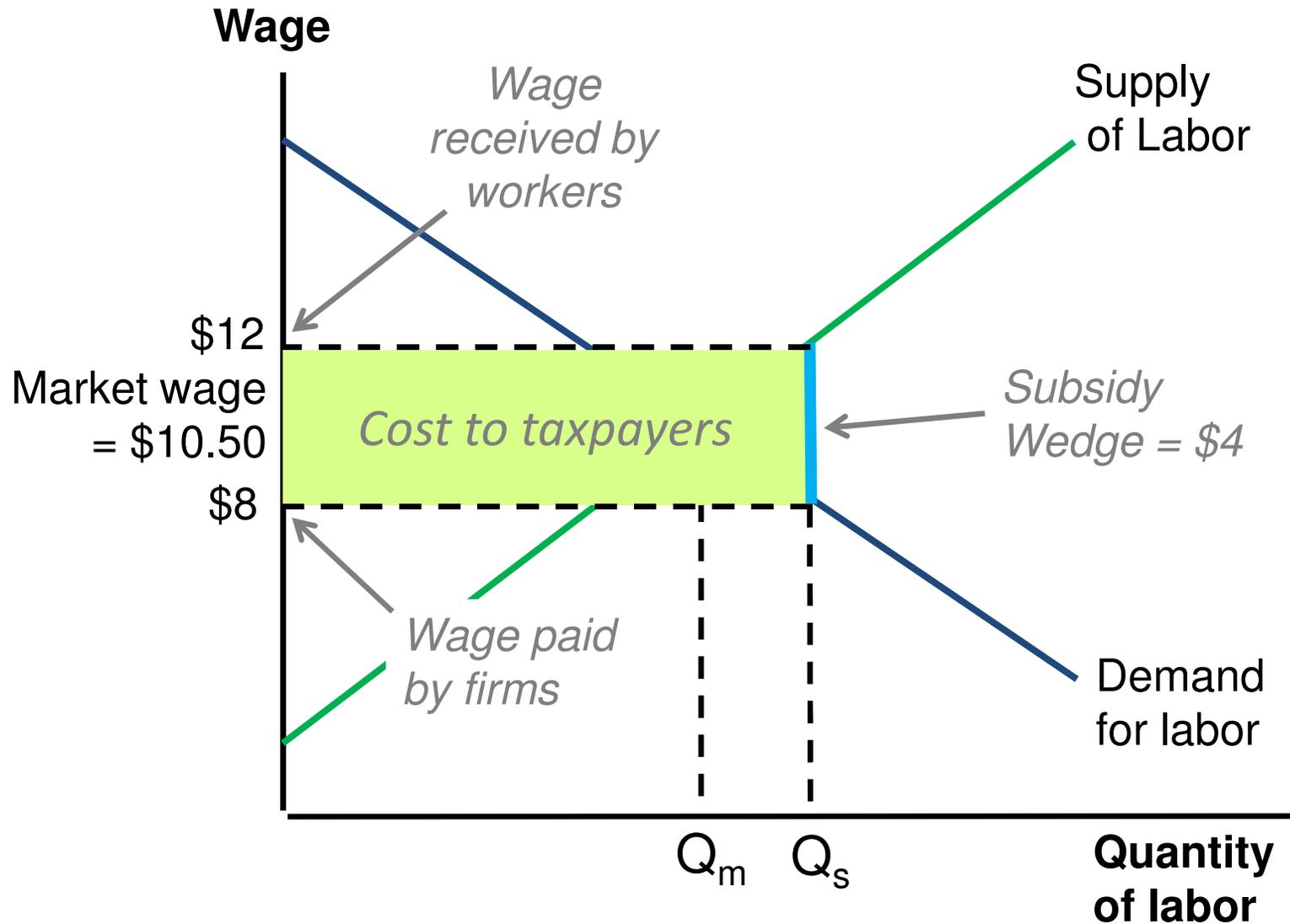
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Cotton Subsidy

- Rice, cotton, alfalfa are grown in a "Cadillac Desert"
- Other subsidies abound:
  - Subsidized water used to grow subsidized corn to feeds cows producing subsidized milk
- Without the subsidies, there would be much less water intensive farming
  - Would definitely affect the debate on environmental issues in Central Valley

Wage Subsidy

- A subsidy might be beneficial if it increased something of importance.

- Edmund Phelps suggested wage subsidies to increase employment of low-wage workers.

- Offsetting benefits include:
  - Lower welfare payments
  - Reduced crime
  - Reduced drug dependency
  - Reduced culture of rational defeatism

Wage Subsidy

Wage

Wage received by workers

Supply of Labor

$12

Market wage = $10.50

Cost to taxpayers

Subsidy Wedge = $4

$8

Wage paid by firms

Demand for labor

Q_m Q_s

Quantity of labor

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Takeaway

- We can use the tools of supply and demand to understand the effects of taxes and subsidies.

- The burden of a tax and the benefit of a subsidy depend on the relative elasticities of supply and demand.

- The side of the market (buyers or sellers) with the more elastic curve will escape more of the tax.

- The wedge shortcut shows that
  - Taxes decrease the quantity traded
  - Subsidies increase the quantity traded
  - Both taxes and subsidies create a deadweight loss.

Takeaway

- The elasticities of demand and supply determine the deadweight loss of a tax.

- The more elastic either the demand or the supply curve is, the more a tax deters trade.

- The more trades that are deterred, the greater the deadweight loss (for a given amount of tax revenue).