Principles of Economics

Economic Analysis of Taxation

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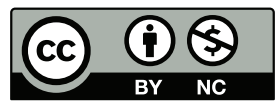
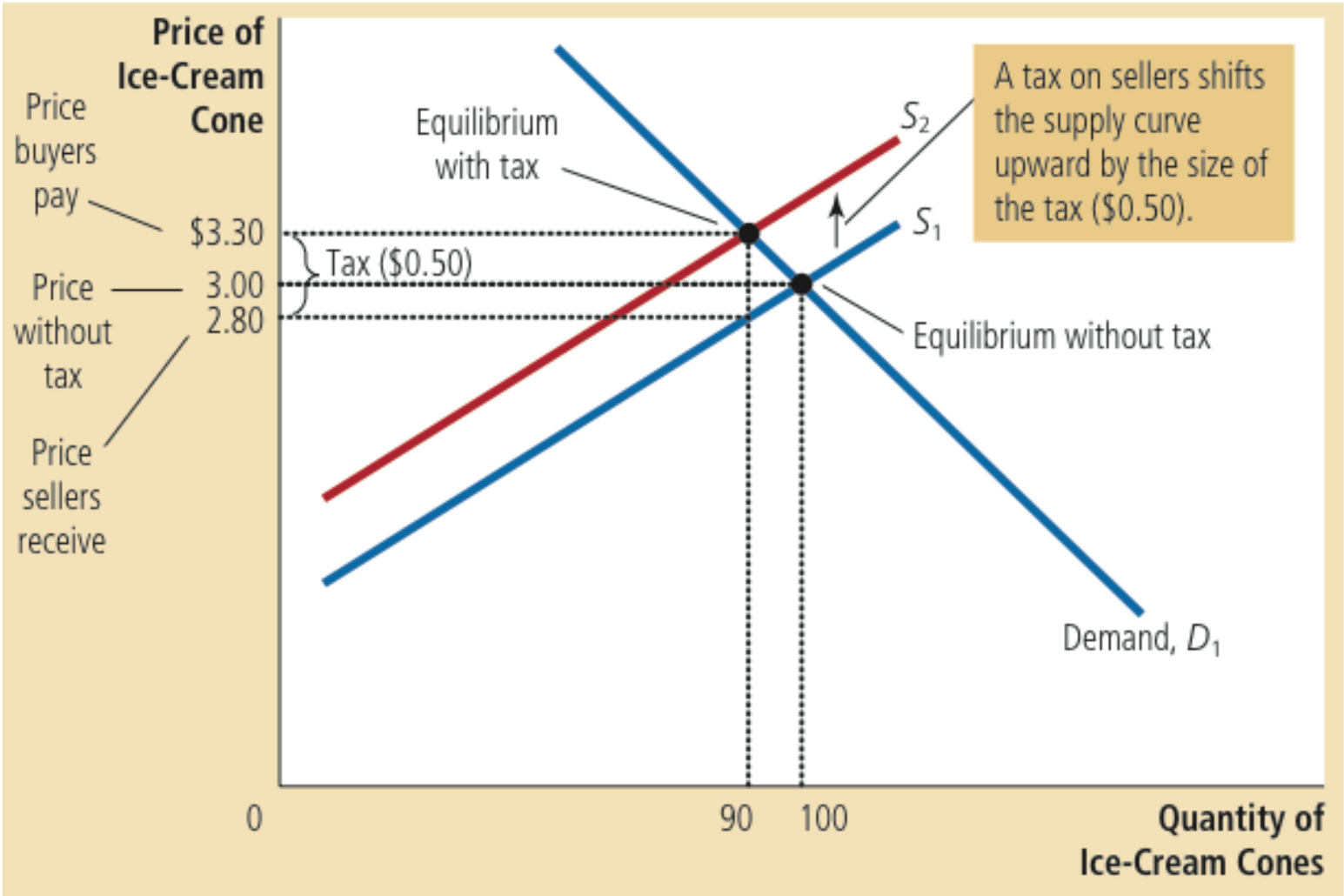


Taxes

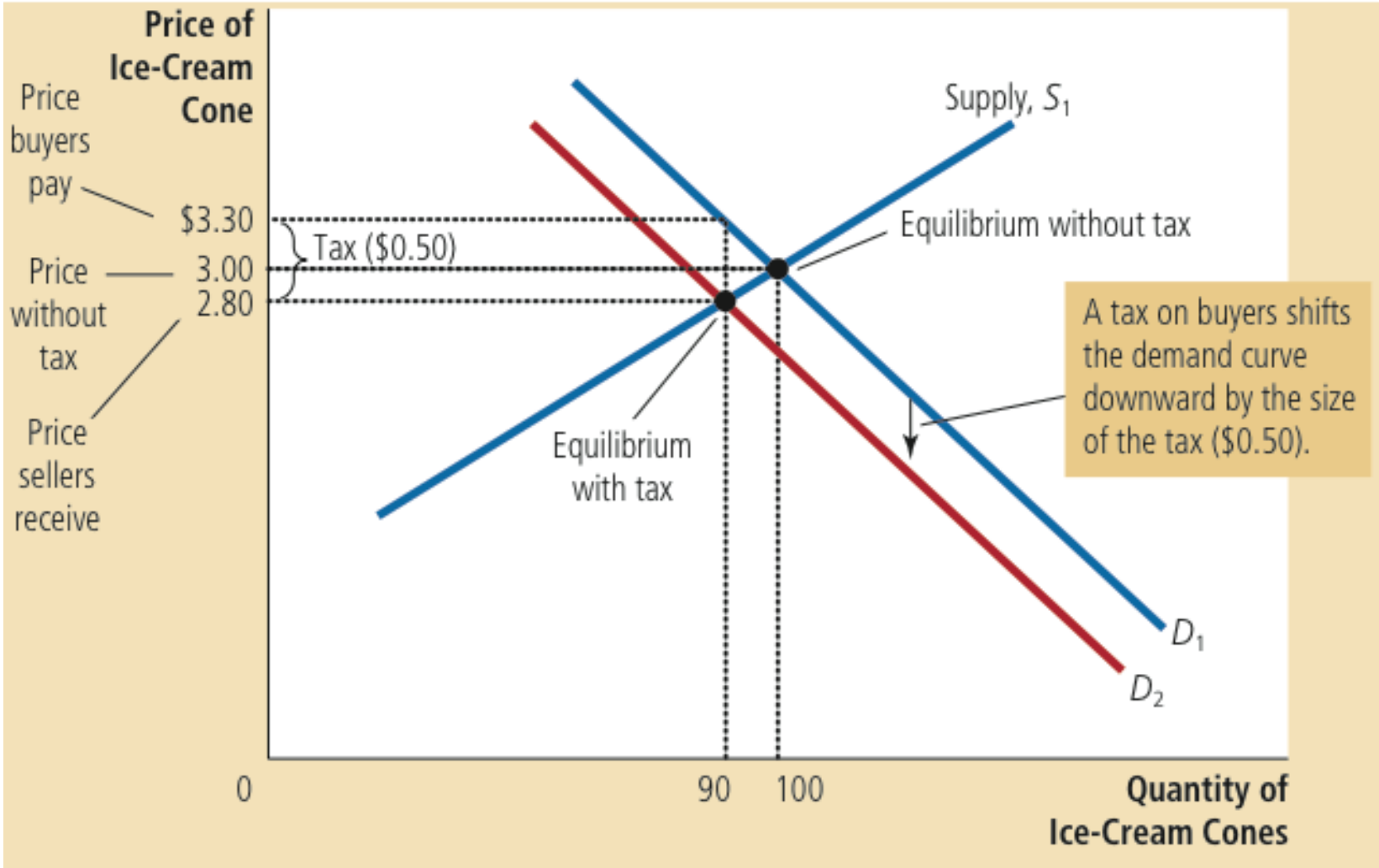
- The government levies taxes on many goods and services to raise revenue to pay for its spending.
- The government can make either buyers or sellers pay the tax.
- The tax can be a percentage of transaction value (**ad valorem tax**), or a specific amount per unit of goods sold (**per unit tax**).
  - In this lecture, we analyze per unit tax, but the general lessons apply to both forms of taxation.

Unit Tax on Sellers



$0.5 sales tax on ice-cream cones

Unit Tax on Buyers



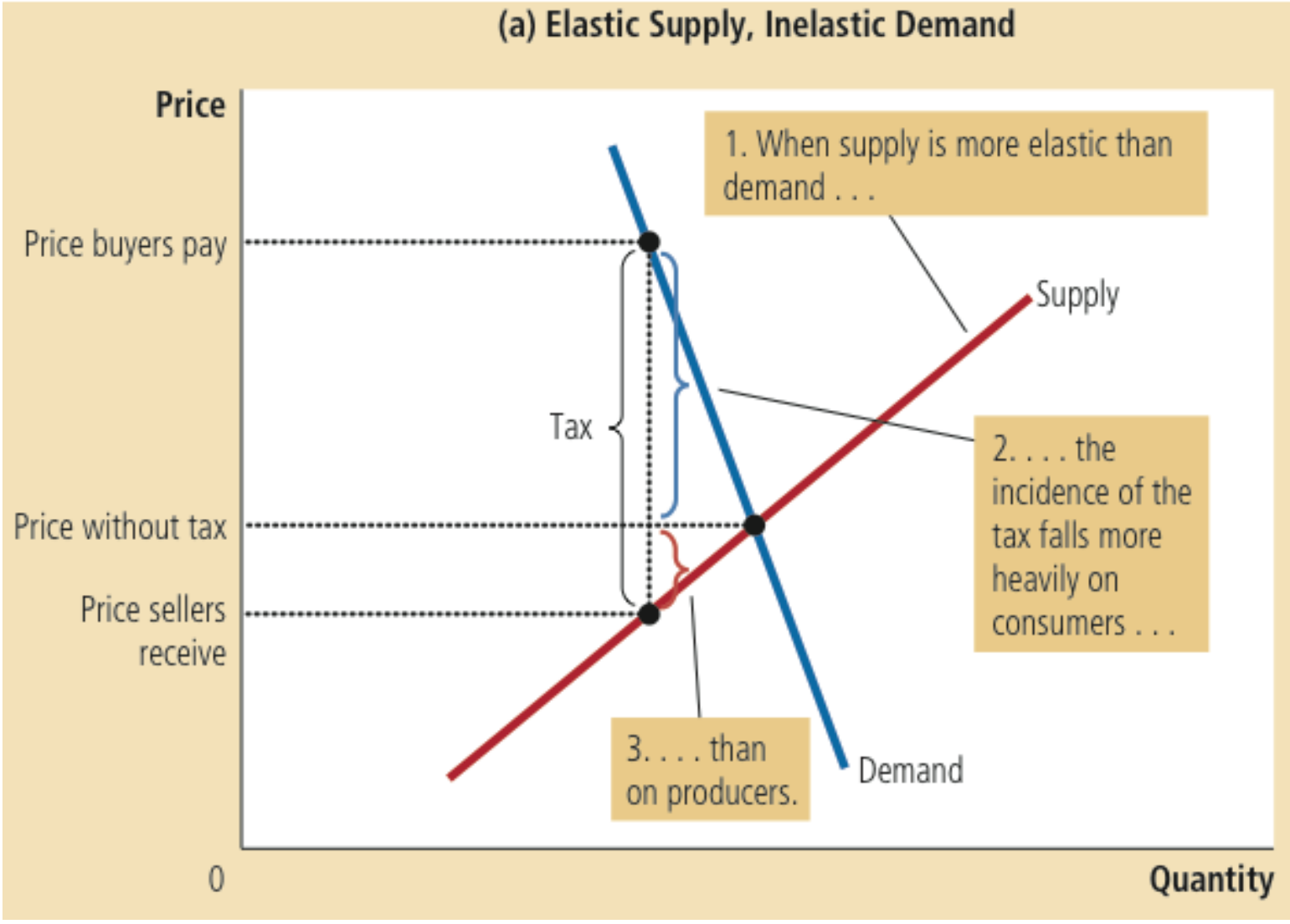
$0.5 sales tax on ice-cream cones

How Taxes Affect Market Outcomes

- Taxes levied on sellers and taxes levied on buyers are equivalent.
  - In this example, buyers pay 30 cents more and sellers receive 20 cents less for each ice-cream cone sold, whether the tax is levied on sellers or on buyers.
- Buyers and sellers share the tax burden[1].
  - When the tax is levied on sellers, buyers end up paying part of the tax in the form of higher price.
  - When the tax is levied on buyers, sellers end up paying part of the tax as a result of reduced demand.
- When the government levies a tax on a good, the equilibrium quantity of the good falls[2]: a tax on a market shrinks the size of the market.

[1] When neither supply nor demand is perfectly elastic or perfectly inelastic.
[2] When neither supply nor demand is perfectly inelastic.

Elasticity and Initial Tax Incidence



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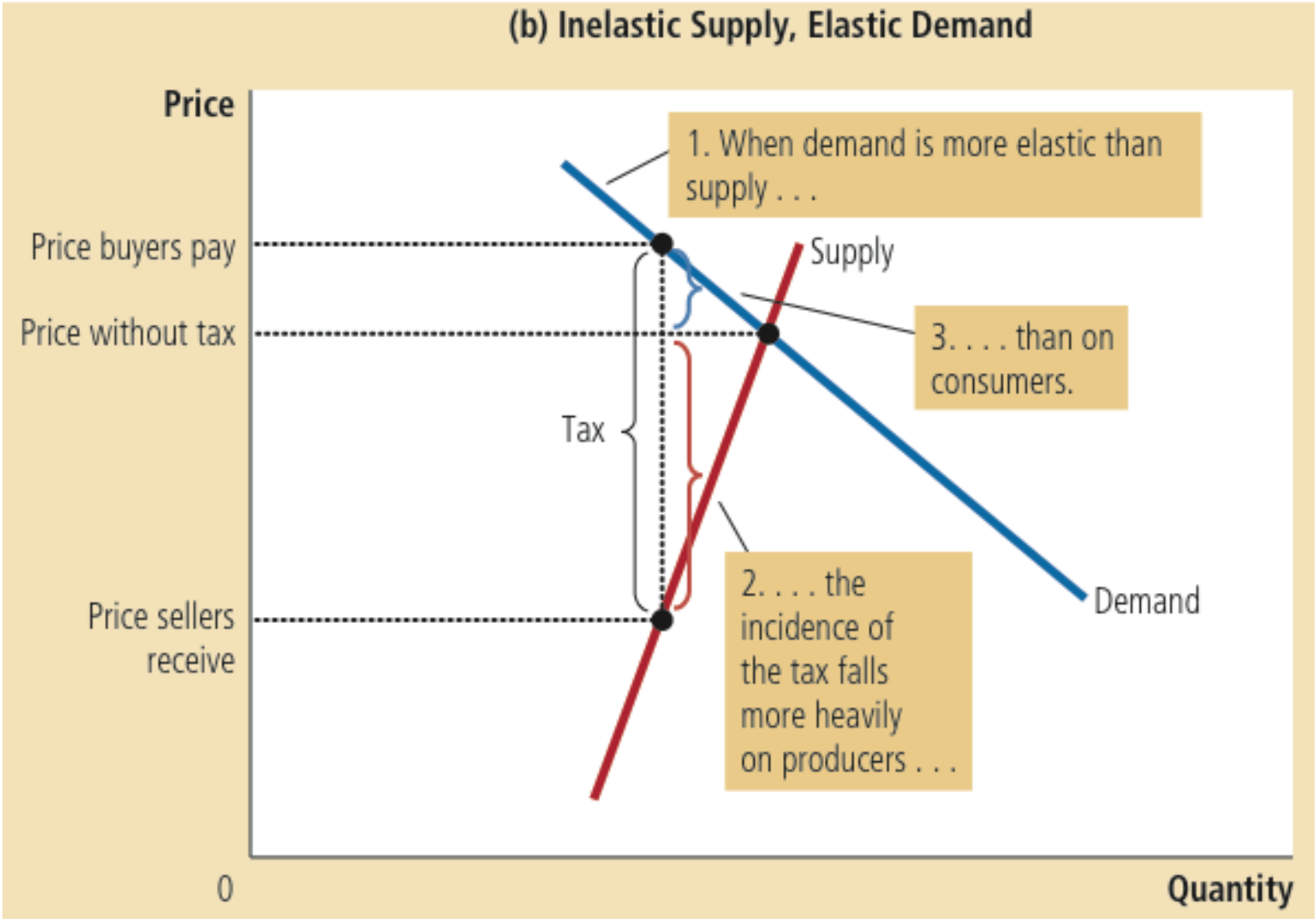
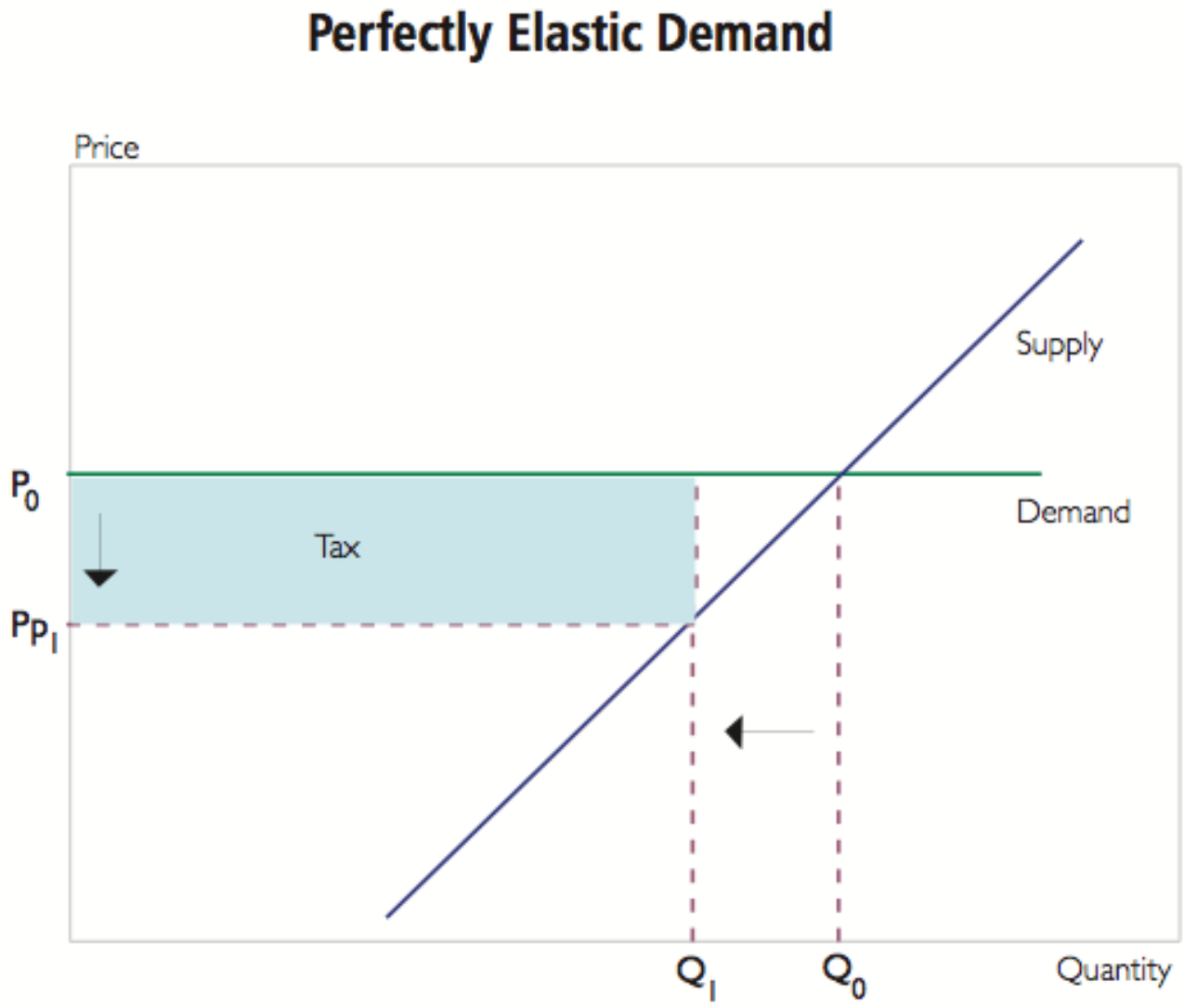


Elasticity and Initial Tax Incidence



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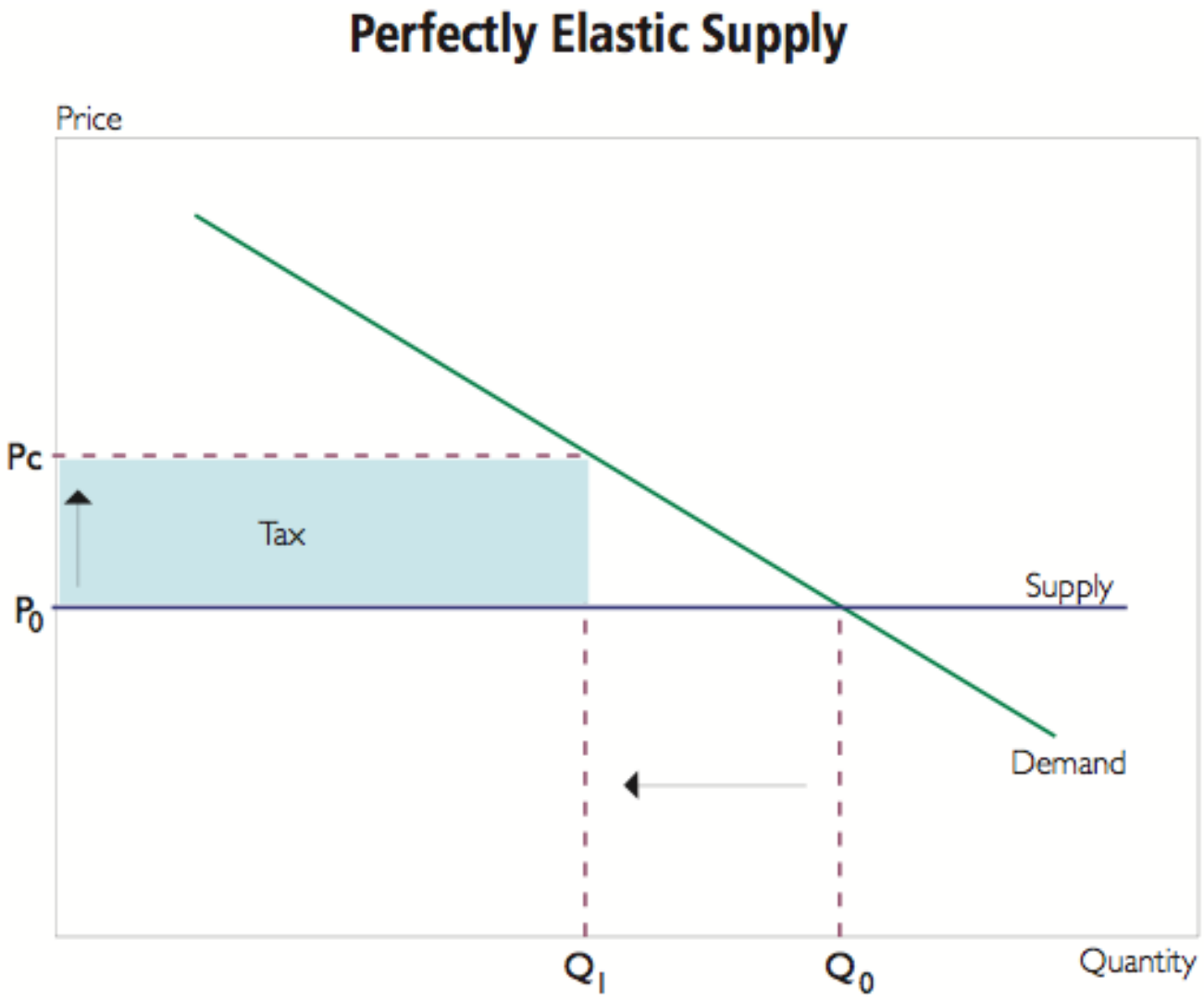

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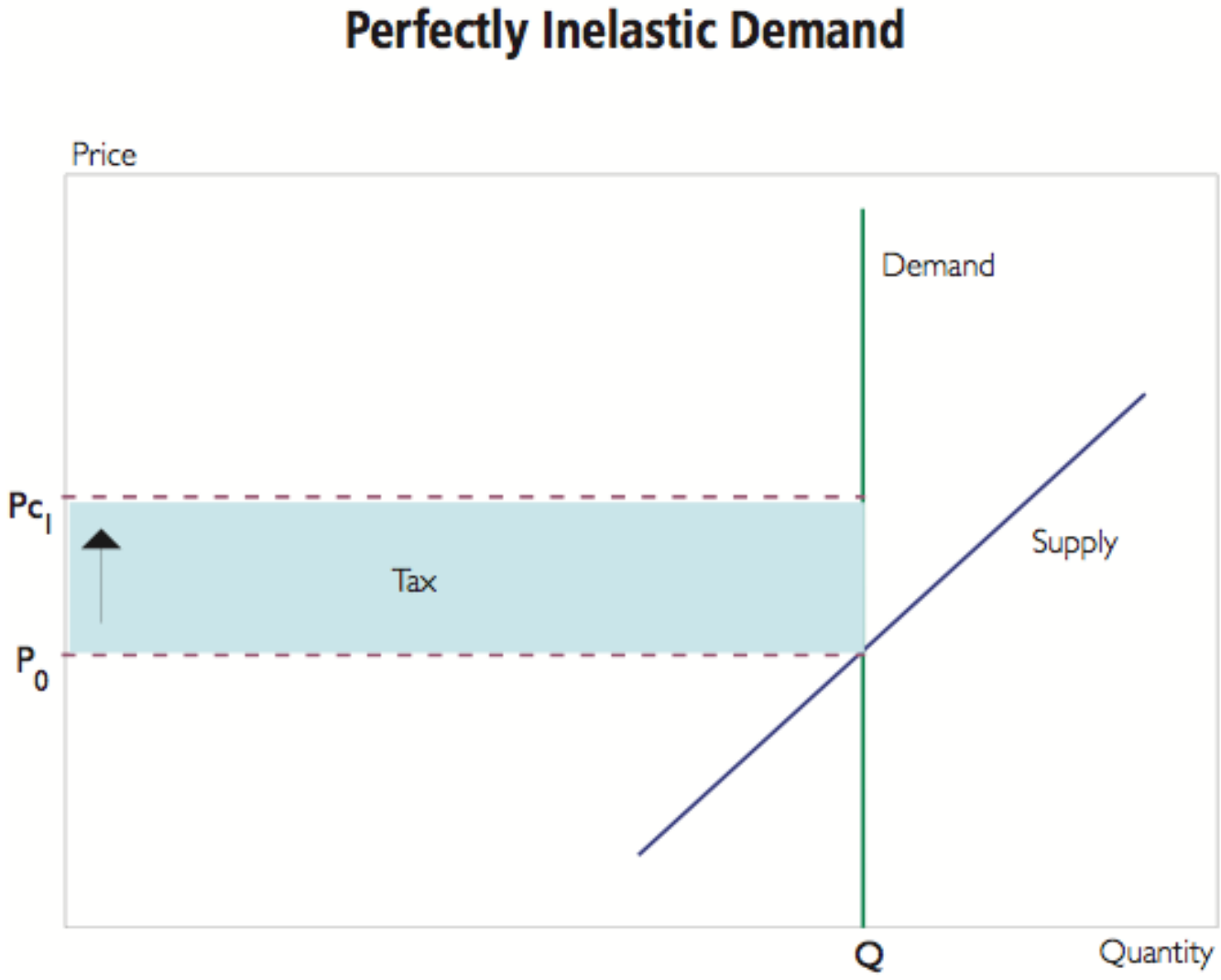

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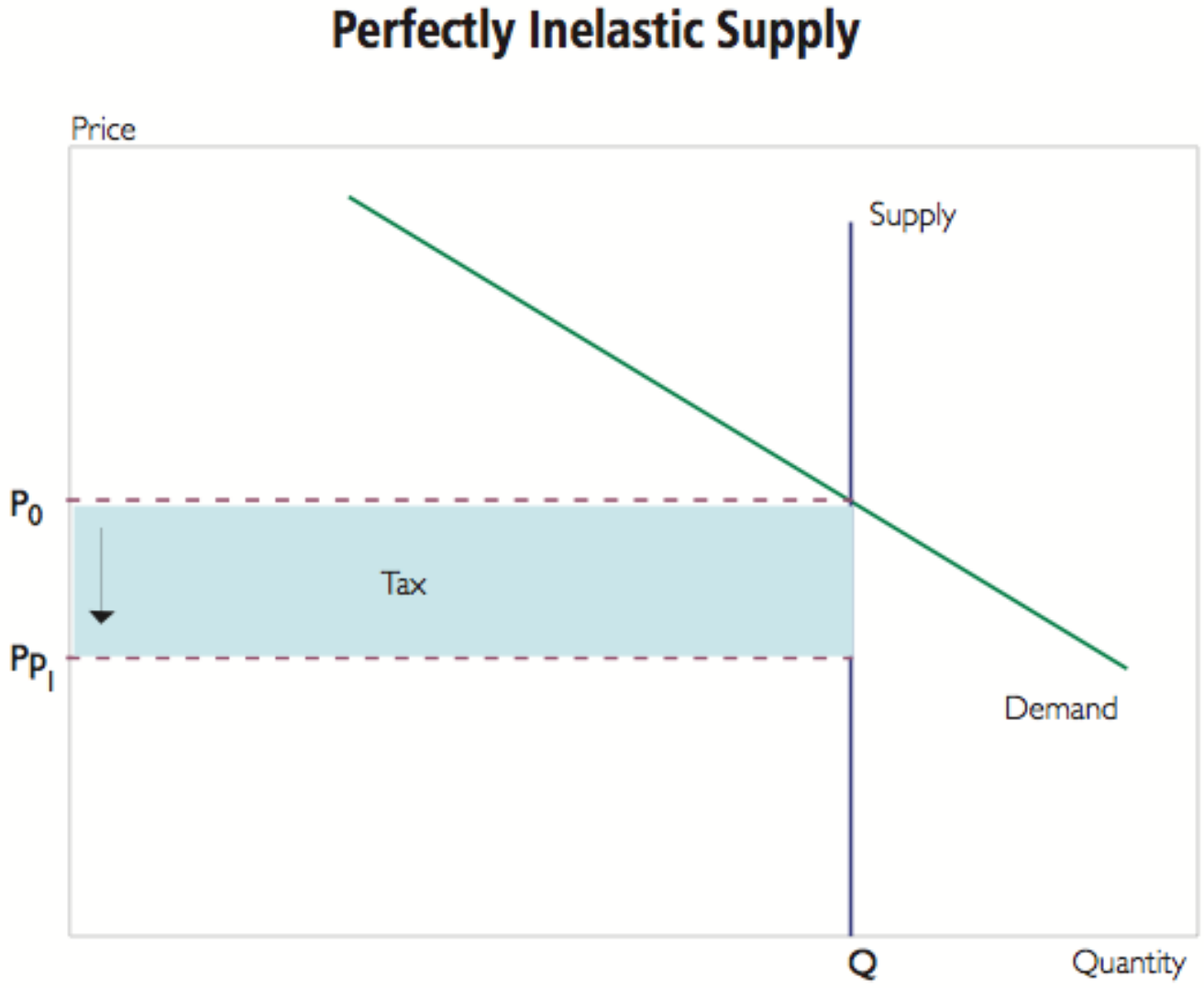
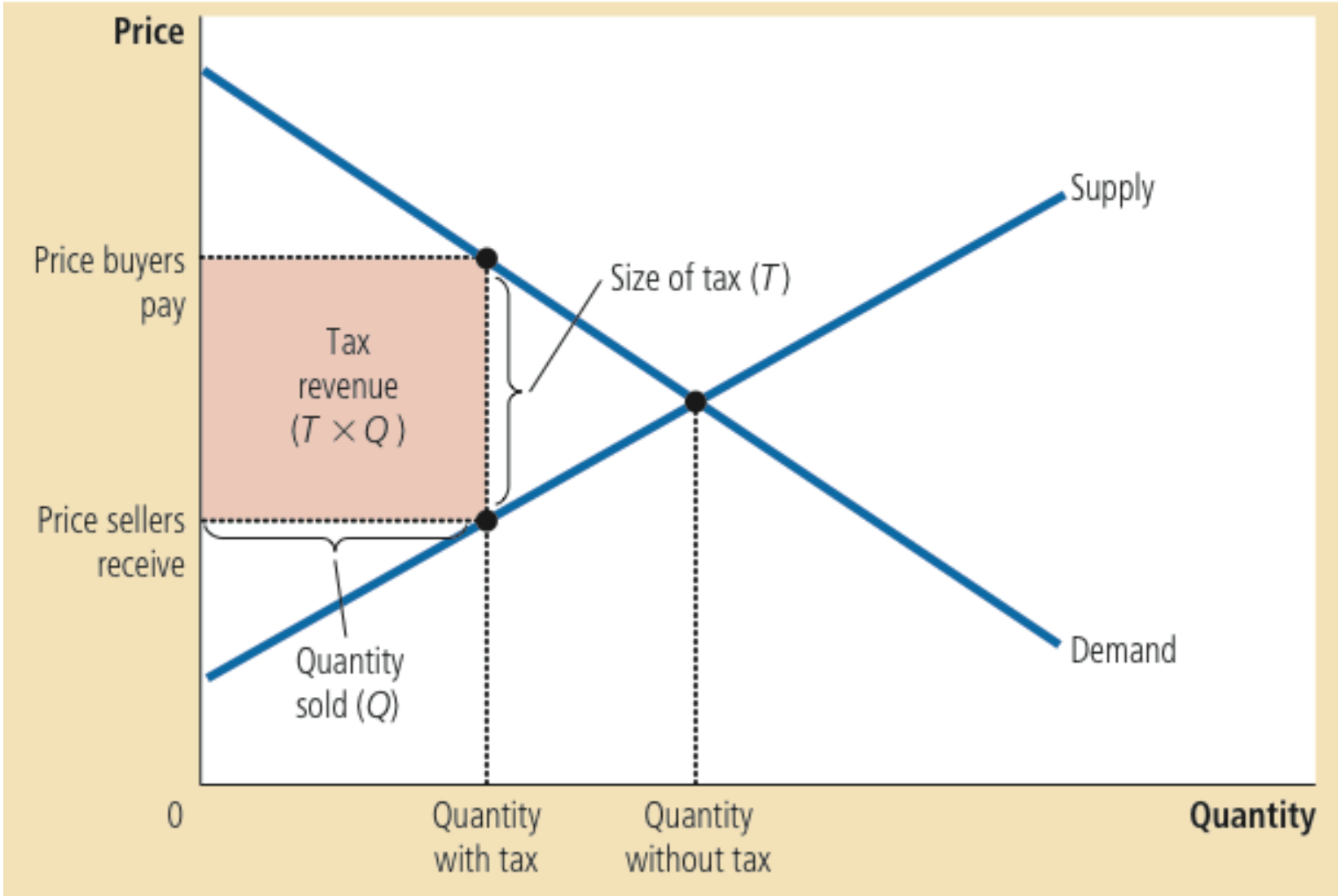


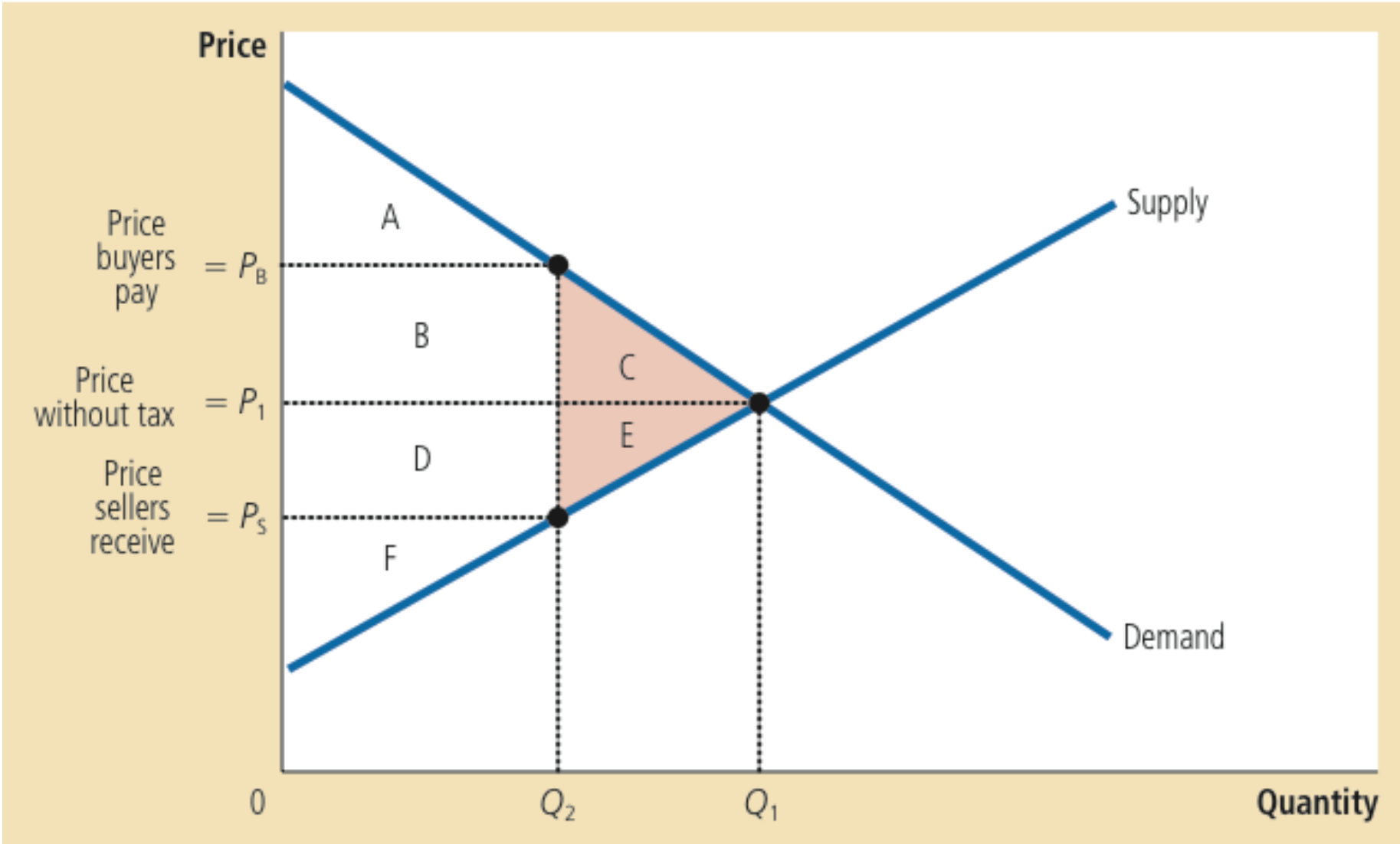
Elasticity and Initial Tax Incidence

- **Tax incidence**: how the burden of a tax is shared among individuals in an economy.
  - **Initial tax incidence**: how the burden of a tax is initially shared among participants in the market on which the tax is imposed.
- The initial incidence of a tax depends on the price elasticities of supply and demand: the tax burden falls more heavily on the side of the market that is less elastic.
  - The tax burden falls entirely on the sellers when supply is perfectly inelastic or demand is perfectly elastic.
  - The tax burden falls entirely on the buyers when supply is perfectly elastic or demand is perfectly inelastic.

Welfare Effects of Taxation



Welfare Effects of Taxation



Welfare Effects of Taxation

- **Deadweight loss**: the fall in total surplus that results from a market distortion.

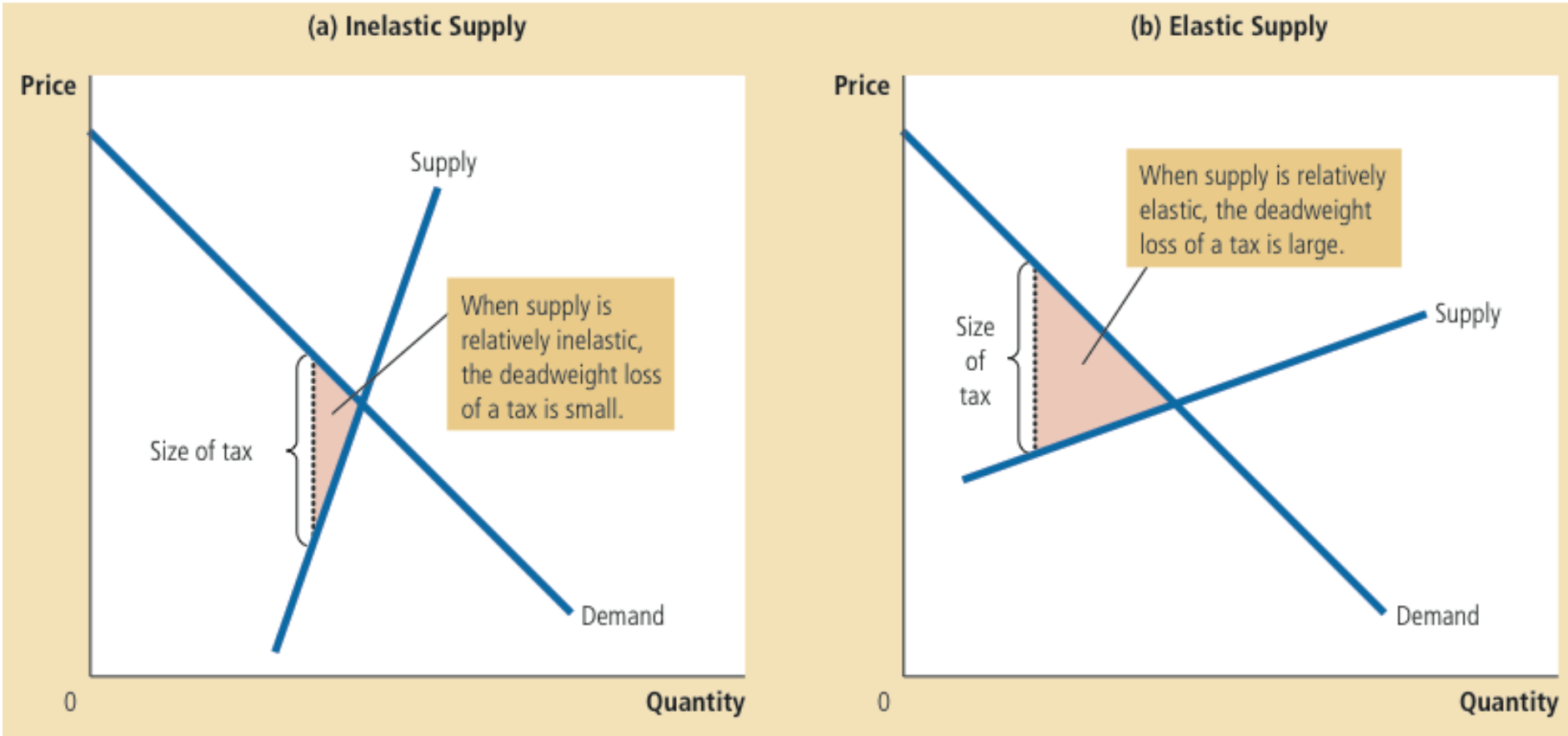
	Without Tax	With Tax	Change
Consumer Surplus	A + B + C	A	−(B + C)
Producer Surplus	D + E + F	F	−(D + E)
Tax Revenue	None	B + D	+(B + D)
Total Surplus	A + B + C + D + E + F	A + B + D + F	−(C + E)

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

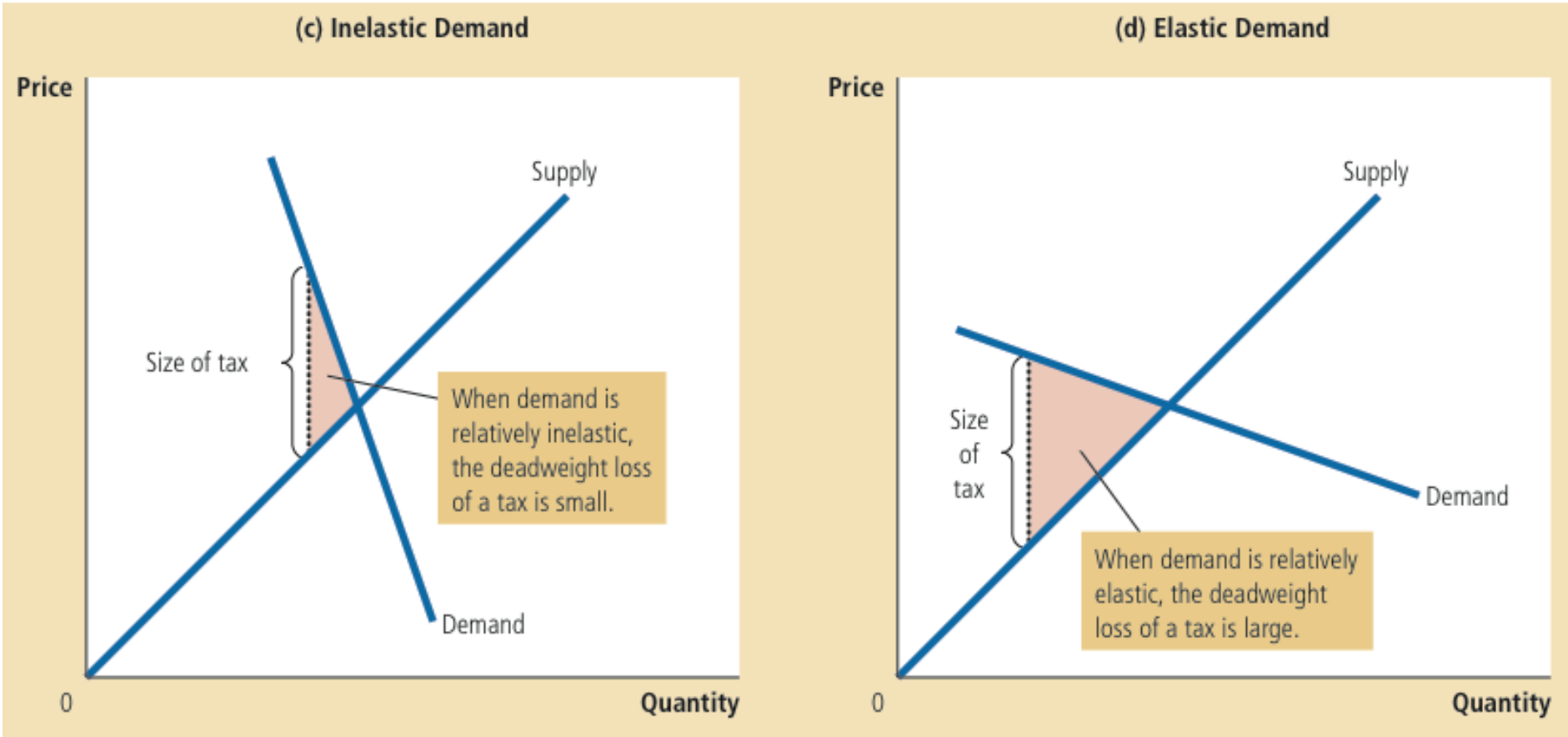
Welfare Effects of Taxation

- Taxes distort incentives by giving buyers an incentive to consume less and sellers an incentive to produce less.
- Because of distorted incentives, some mutually beneficial trades won't happen after a tax is imposed. This results in deadweight loss.

Elasticity and Tax Distortion



Elasticity and Tax Distortion



Elasticity and Tax Distortion

- The amount of deadweight loss depends on the price elasticities of supply and demand: the greater the elasticities of supply and demand, the greater the deadweight loss of a tax.
  - No deadweight loss when supply or demand is perfectly inelastic.
- **The Ramsey principle of optimal taxation**: government should impose lower tax rates on goods whose supply or demand is more elastic.

The Ramsey Principle

- Labor supply is fairly inelastic, while the supply of capital is highly elastic. By the Ramsey principle, which one should be taxed at a higher rate: labor or capital?
  - How about groceries and fancy restaurants?
- The labor supply of women is traditionally more elastic than the labor supply of men. By the Ramsey principle, should tax rates on labor income be lower for women than for men?
  - Gender-based taxation

Lump Sum Tax

- Not all taxes are distortive: a **lump sum tax** is a fixed tax that is the same amount for every person.
  - E.g., a tax of $100 per person.
- A lump sum tax is the most efficient tax possible: since the tax does not distort incentives, it does not cause deadweight losses.
- However, the lump sum tax is *regressive*: the poor pays a higher percentage of their income under a lump sum tax.
  - This is why lump sum taxes are rarely observed in reality.

How Taxes Affect Market Outcomes: General Equilibrium Effects

- The discussion so far has focused on analyzing the short run, partial equilibrium effects of a tax.
  - i.e., the analysis shows the short run effects of a tax on the market on which it is imposed, ignoring the effects the tax may have on other markets.
- In reality, a tax imposed on one market can have effects on other markets.
  - i.e., a tax has general equilibrium effects.

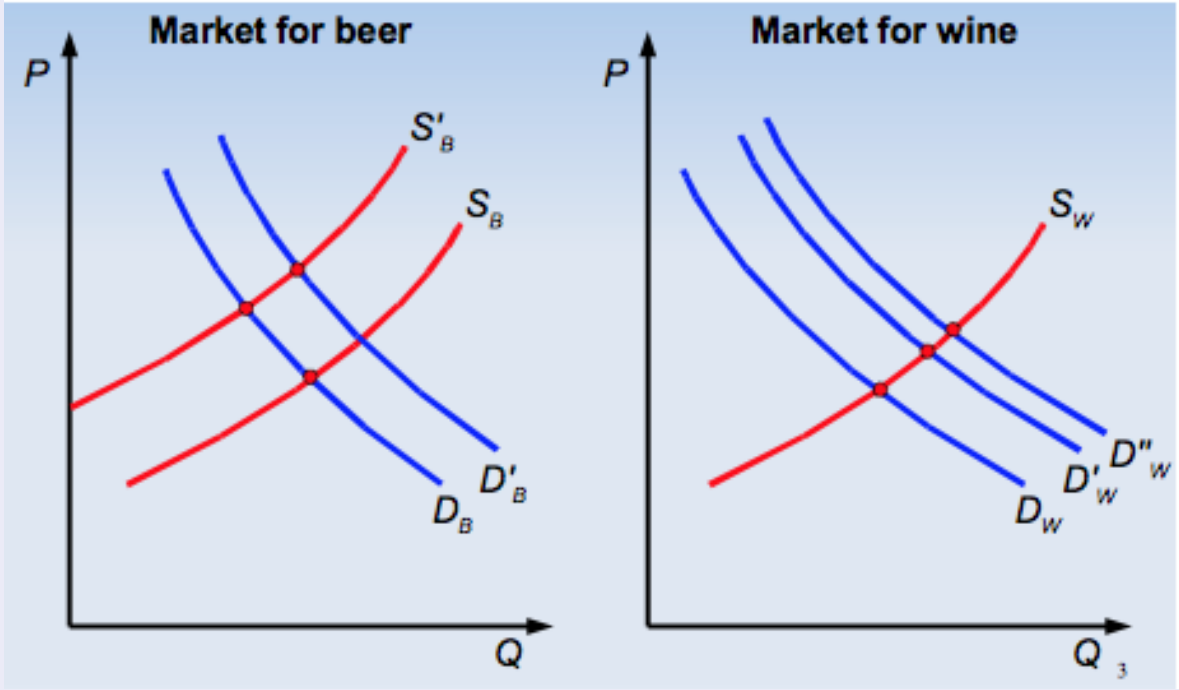
How Taxes Affect Market Outcomes: General Equilibrium Effects

Imposing a tax on good X may not only affect X's equilibrium quantity demanded and supplied, but also:

- the demand for related goods (complements/substitutes)
  - A tax on gasoline increases the demand for alternative fuels and decreases the demand for cars.
    - ⋆ In this case, car manufacturers share part of the burden of the tax, while alternative fuel producers benefit from the tax.
  - Changes in the demand for related goods will cause changes in their prices, which will in turn affect the demand for X. This is known as the **feedback effect**.

Example (Feedback Effect)

Imposing a tax on beer sellers shifts beer supply from $S_B \to S'_B$. The increase in beer price shifts wine demand from $D_w \to D'_w$. The increase in wine price in turn shifts beer demand demand from $D_B \to D'_B$, and so on. The process continues until reaching equilibrium price and quantity in both markets.



How Taxes Affect Market Outcomes: General Equilibrium Effects

Imposing a tax on good X may not only affect X's equilibrium quantity demanded and supplied, but also:

- the supply of other goods
  - After a tax is imposed on the fast food industry, some fast food restaurants may change into healthy food restaurants and some investors who would have invested in fast food restaurants will invest in other businesses.
  - A tax on labor earnings in the financial industry increases labor supply in other industries.
  - In these cases in which some sellers shift to sell other goods, consumers of those other goods benefit from the tax.

How Taxes Affect Market Outcomes: General Equilibrium Effects

Imposing a tax on good X may not only affect X's equilibrium quantity demanded and supplied, but also:

- the demand for inputs used to produce X
  - A tax on trucks decreases the demand for truck tires and truck drivers.
    - ★ In this case, tire manufacturers and truck drivers share part of the burden of the tax.
- the supply of goods for which X serves as an input
  - A tax on rubber decreases the supply of tires.
    - ★ In this case, tire consumers share part of the burden of the tax.

How Taxes Affect Market Outcomes: General Equilibrium Effects

Who pays for a tax on housing?

Impact on:

- Housing market
- Rental market
- Construction industry
- Other capital markets
- Individual consumption and savings
- etc.

How Taxes Affect Market Outcomes: Short Run vs. Long Run

- Demand and supply are more elastic in the long run.
  - A tax on wine may be borne mainly by the wineries in the short run as their vines and equipments cannot be wasted. In the long run, the vines may be dug up and the land shifted to other crops, causing the tax burden to be shifted to consumers.
  - A tax on local factories is borne by the factories and their workers in the short run. In the long run, factories can move to other places.
  - A tax on cosmetic surgery may be borne mainly by the cosmetic surgeons in the short run. In the long run, fewer people will become cosmetic surgeons, causing the tax burden to be shifted to consumers in the long run.

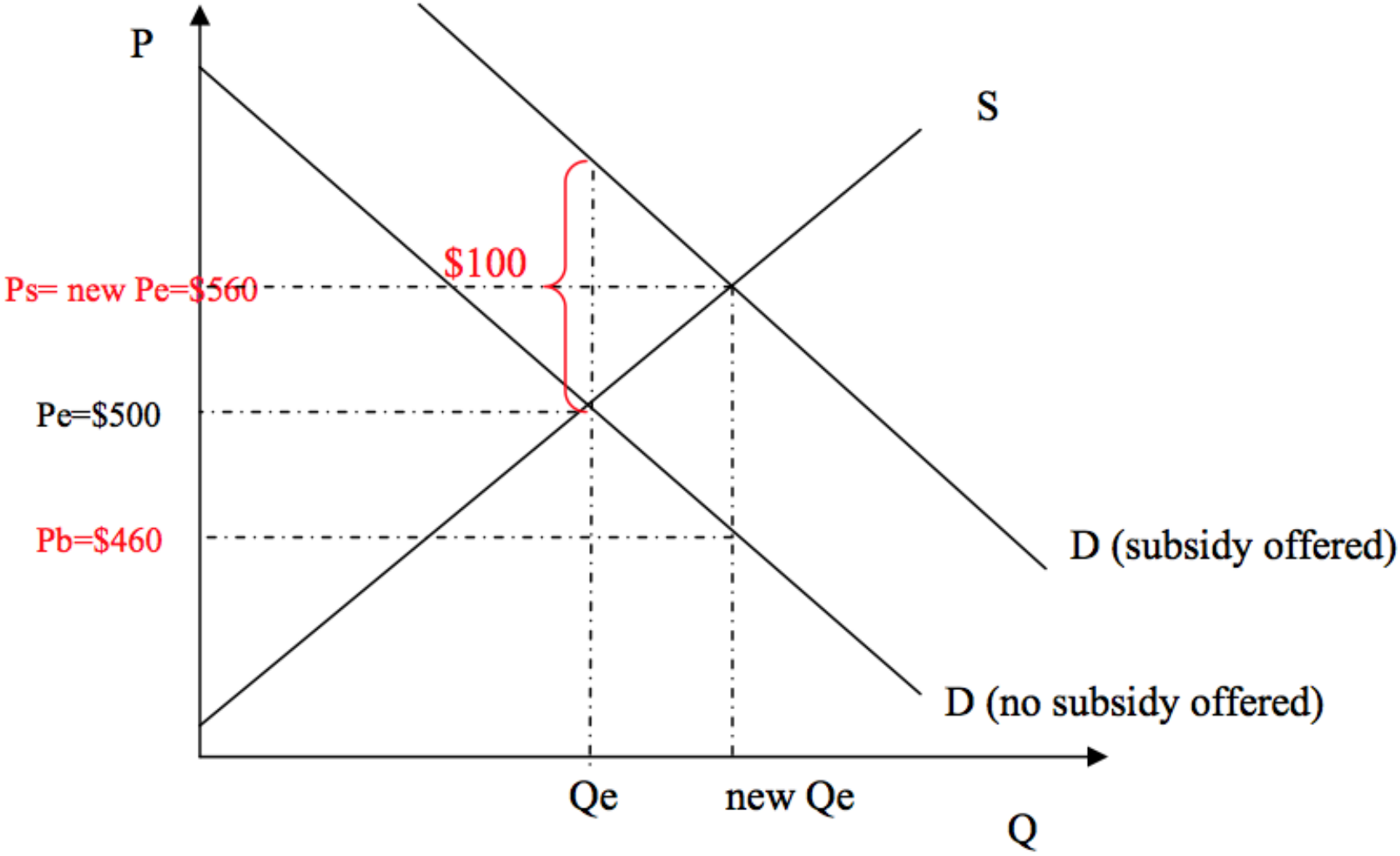
How Taxes Affect Market Outcomes: Short Run vs. Long Run

- By changing the incentives in different markets, taxes can affect people's consumption, production, savings, and investment decisions, leading to long run consequences.
  - Taxes on labor are borne by workers and to a lesser extent by firms in the short run. In the long run, firms may shift labor-intensive production offshore and workers may be discouraged from investing in human capital, resulting in lower productivity and long run growth.
  - Taxes on capital may discourage savings and investment, leading to lower future capital stock. They could also discourage R&D. Both lead to lower productivity and long run growth.

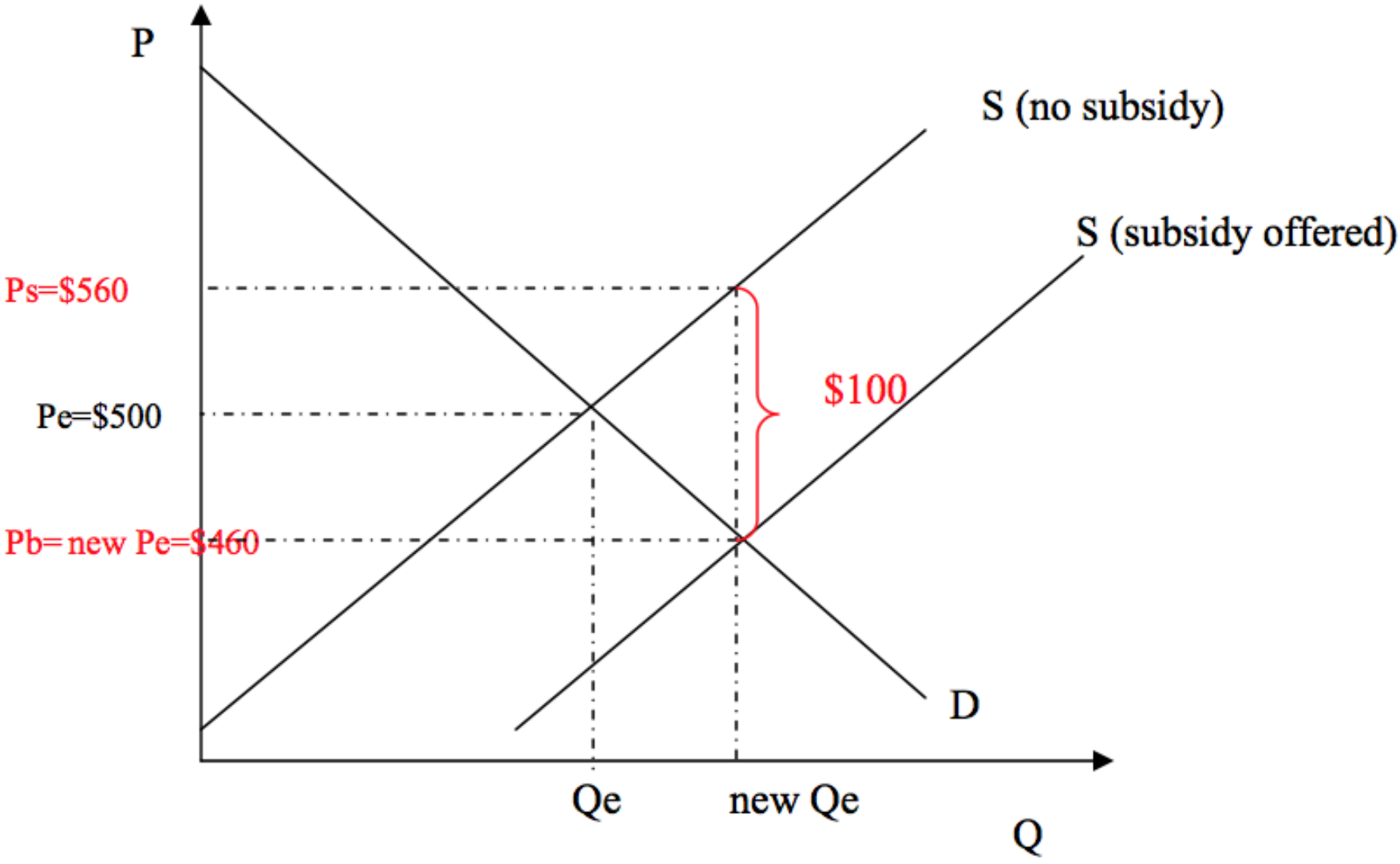
How Taxes Affect Market Outcomes

- The **final tax incidence** measures the changes in individual welfare after all the economic adjustments to the tax have occurred across all affected markets.
- Because initial and final tax incidence differ, the Ramsey principle of optimal taxation may not be optimal.

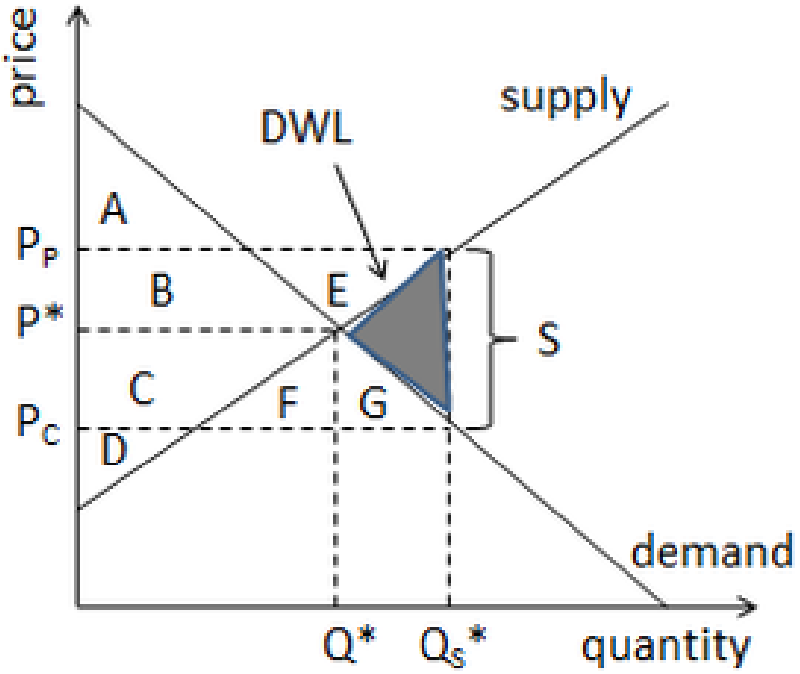
Unit Subsidy on Buyers



Unit Subsidy on Sellers



Welfare Effects of a Subsidy



	Free Market	Subsidy
Consumer Surplus	A+B	A+B+C+F+G
Producer Surplus	C+D	B+C+D+E
Government Revenue	0	-(B+C+E+F+G+H)
Total Surplus	A+B+C+D	A+B+C+D-H

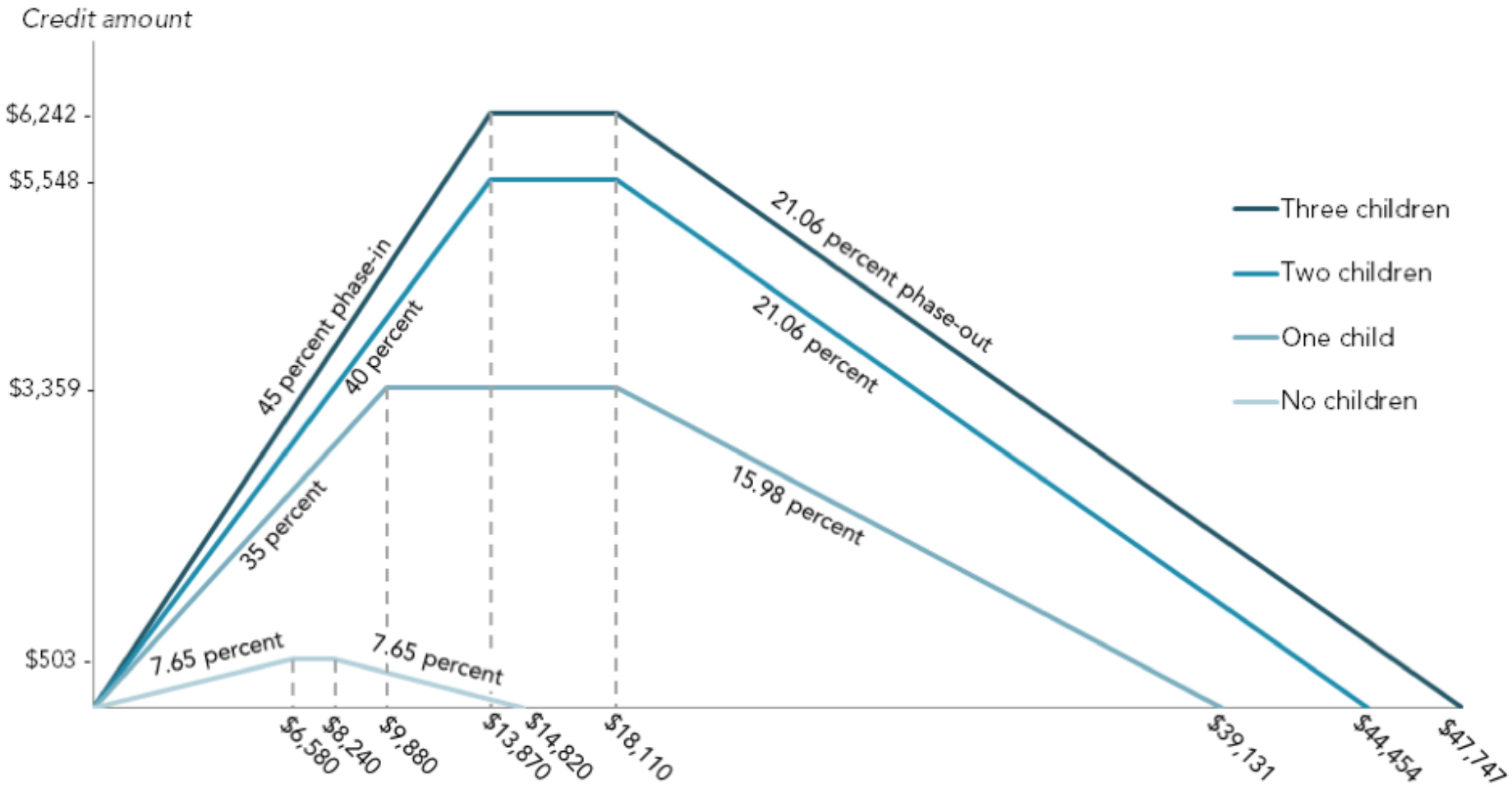
Subsidies

- A subsidy is a negative tax.
- Subsidies given to sellers and subsidies given to buyers are equivalent.
- The side of the market that is less elastic benefits more from a subsidy in its initial incidence.
- The greater the elasticities of supply and demand, the greater the deadweight loss of a subsidy.

EITC

- The **Earned Income Tax Credit (EITC)** is a tax benefit in the U.S. for low-to-middle income *working* individuals and households. The amount of benefit rises with income up to a maximum amount.
- The goal of the EITC is to help the poor while encouraging them to work, potentially avoiding the problems of welfare programs, which may disincentivize working, and higher minimum wages, which may cause unemployment.

EITC



Source: Tax Policy Center

EITC

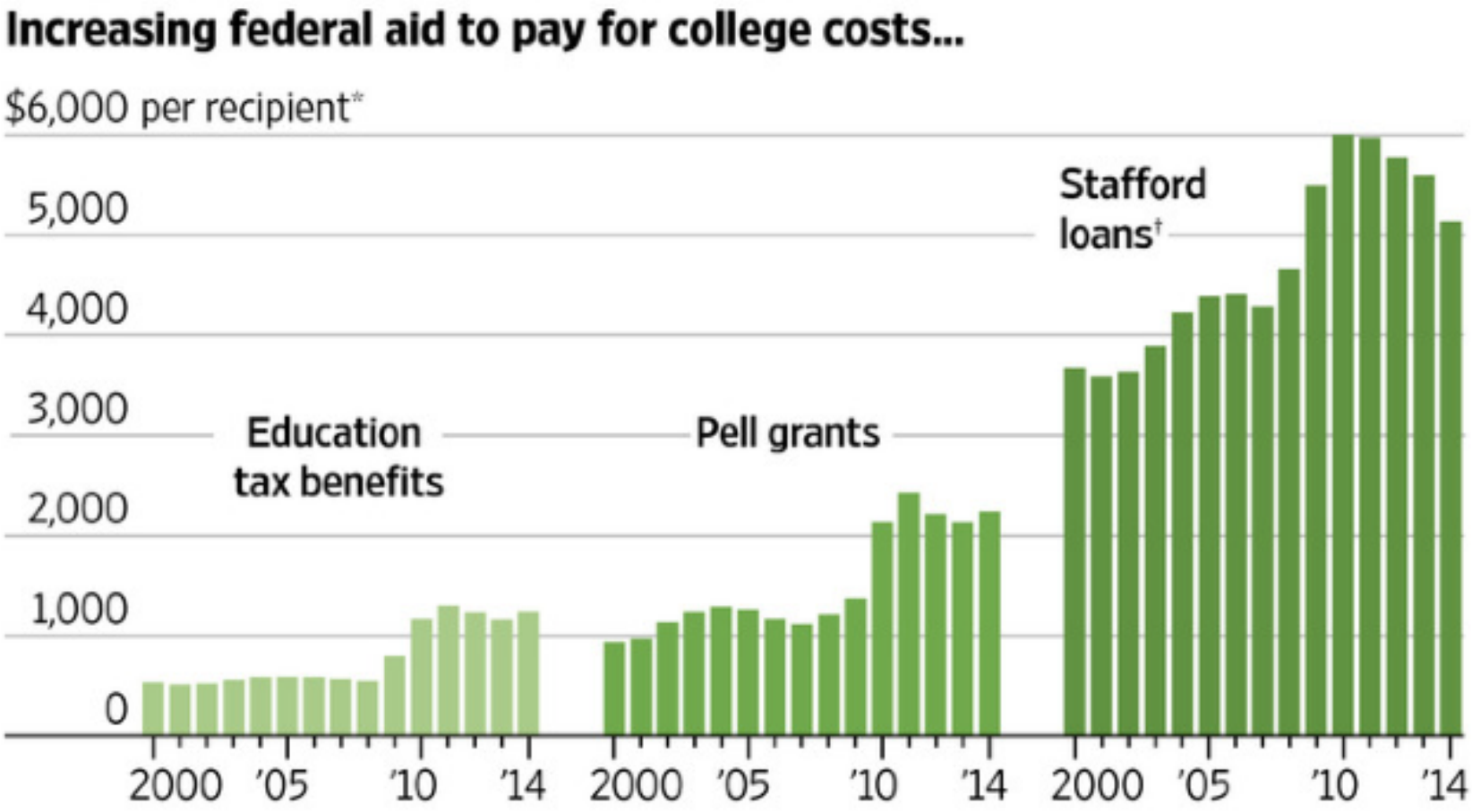
	All women
	(1)
Panel A. EITC expansion	
Intended tax transfer	$ 1.00
To families with earned income	$ 1.00
Labor market effects	
Change in labor supply (in $ of earnings)	$ 0.09
Change in wages (in $ of earnings)	$(0.36)
Change in total earnings	$(0.27)
Net effects	
Change in after-tax income	$ 0.73
Net total transfer	$ 0.64

Source: Rothstein (2010)

Who Benefits from College Financial Aid?

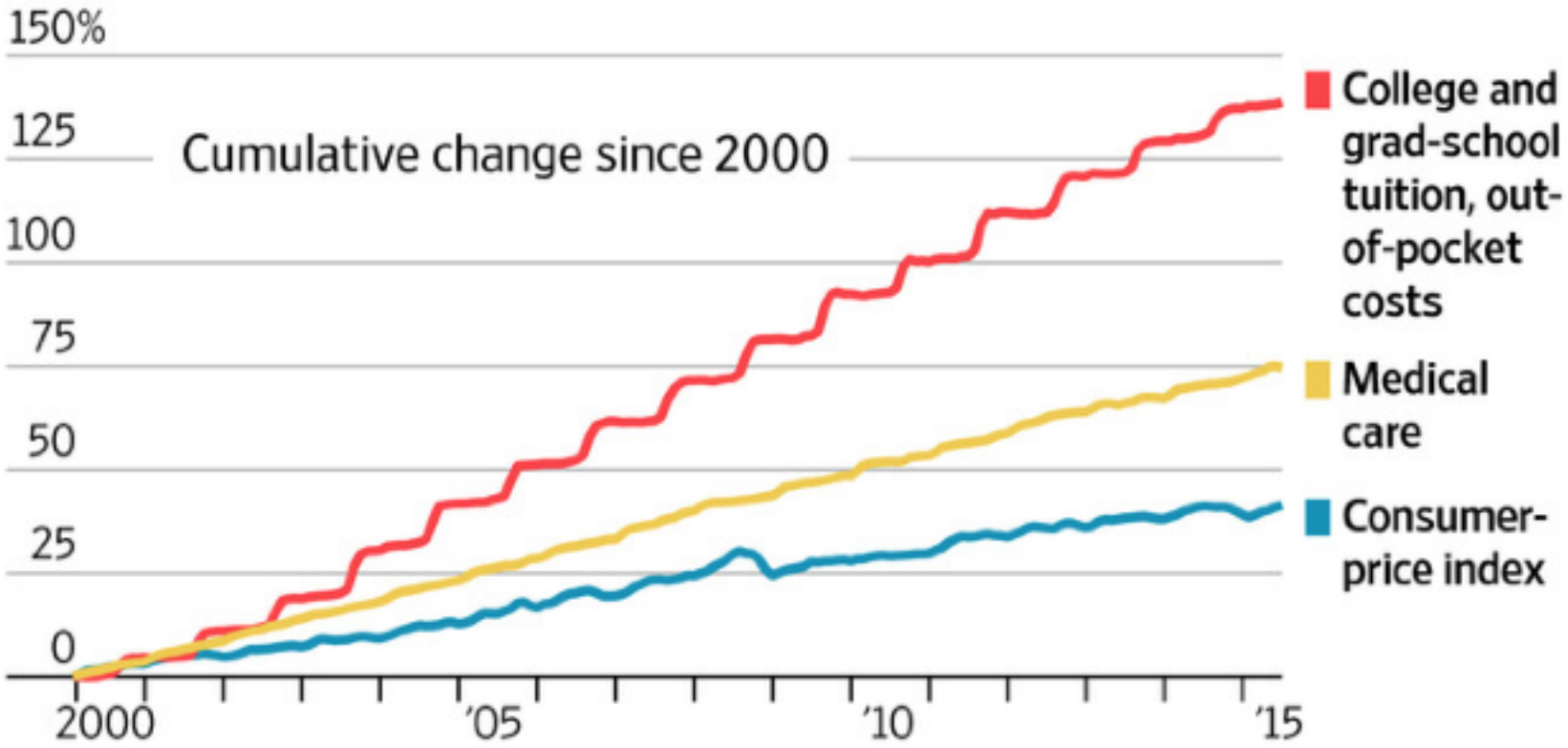
- The U.S. government uses financial aid programs to help students from poorer families afford college.
  - There are three main types of financial aid: grants, subsidized loans, and unsubsidized loans.
- As the government increases financial aid for students, however, college tuition is rising even faster. As a result, college is becoming more unaffordable.
  - Average undergraduate tuition nearly doubled between 2001 and 2012.

Who Benefits from College Financial Aid?



Source: WSJ

Who Benefits from College Financial Aid?



Source: WSJ

Who Benefits from College Financial Aid?

- **Bennett Hypothesis**: increase in financial aid leads to tuition inflation.

  "If anything, increases in financial aid in recent years have enabled colleges and universities blithely to raise their tuitions, confident that Federal loan subsidies would help cushion the increase." – William J. Bennett, New York Times, 1987/2/18

Who Benefits from College Financial Aid?

	ΔStickerTuition$_{it}$			
	(1)	(2)	(3)	(4)
ΔPellGrants$_{it}$	0.403**			0.577***
	[0.172]			[0.198]
ΔSubsidizedLoans$_{it}$		0.633***		0.657**
		[0.242]		[0.270]
ΔUnsubsidizedLoans$_{it}$			0.262***	0.300***
			[0.099]	[0.101]
Year FEs	Yes	Yes	Yes	Yes
Institution FEs	Yes	Yes	Yes	Yes
Number of Institutions	790	790	790	790
Observations	7600	7600	7600	7600

Source: Lucca et al. (2015)

Who Benefits from College Financial Aid?

Event	Date	Mkt Weights	Policy	Event Window	Mean Cum. Abnormal Ret.
Congress reauthorized the Higher Education Act	2/1/2006	v	Sub. Loans	(-1,+1)	3.64%
Congress reauthorized the Higher Education Act	2/1/2006	e	Sub. Loans	(-1,+1)	2.90%
College Cost Reduction and Access Act Passes Congress	9/7/2007	v	Pell Grants	(-1,+1)	2.17%
College Cost Reduction and Access Act Passes Congress	9/7/2007	e	Pell Grants	(-1,+1)	2.22%
Ensuring Equal Access to Student Loans Act of 2008 is passed by the Senate	4/30/2008	v	Unsub. Loans	(-1,+1)	4.86%
Ensuring Equal Access to Student Loans Act of 2008 is passed by the Senate	4/30/2008	e	Unsub. Loans	(-1,+1)	4.80%
Ensuring Equal Access to Student Loans Act of 2008 is passed by Congress	5/1/2008	v	Unsub. Loans	(-1,+1)	3.30%
Ensuring Equal Access to Student Loans Act of 2008 is passed by Congress	5/1/2008	e	Unsub. Loans	(-1,+1)	3.62%

Stock Market Reactions to Changes in Federal Aid Policy (based on a portfolio of 14 publicly traded for-profit universities). Source: Lucca et al. (2015)

Reference

Mankiw, N. G. (2017). *Principles of Economics* (8th ed.). Boston, MA: Cengage Learning.