The Costs of Taxation

Chapter 8

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Introduction

Why do taxes matter?

- Some taxation is necessary in a civilized society

> Taxes are what we pay for civilized society ~ Oliver Wendell Holmes, Jr
>
> Taxation without representations is tyranny

- We already went over the effect of taxation in chapter 6
- In this chapter, we will analyze how taxes affect the welfare

The Effects of Taxation

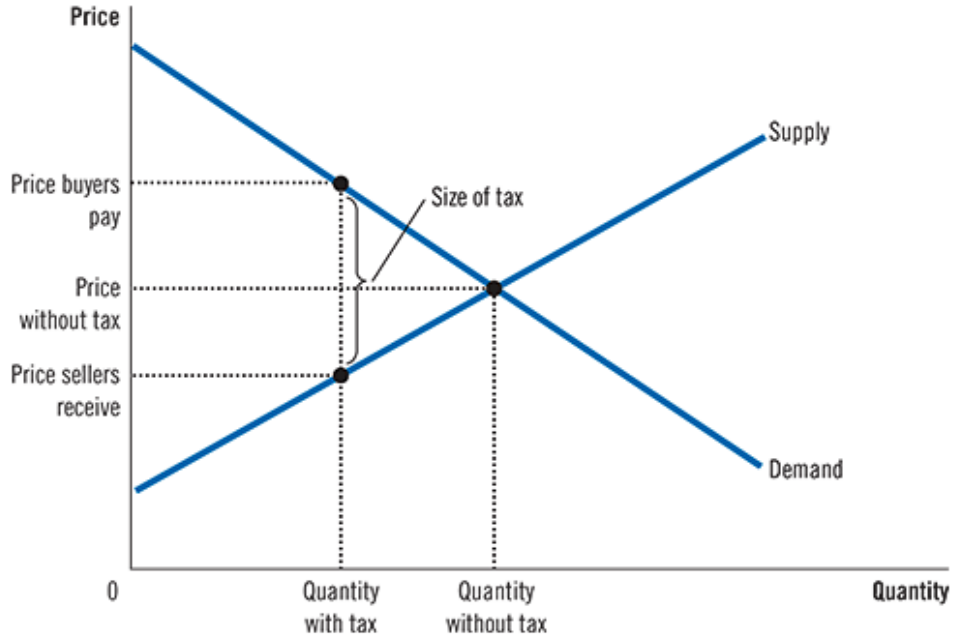
The Deadweight Loss of Taxation (DWL)

- A tax on buyers shifts demand
- A tax on sellers shifts supply
- A tax raises the price paid by buyers and reduces the price received by sellers
- Who pays for the tax depends on the elasticities of demand and supply

Taxation on a graph

Figure 1 **The Effects of a Tax**

A tax on a good places a wedge between the price that buyers pay and the price that sellers receive. The quantity of the good sold falls.



Effect of a tax on market participants

- We will use what we learned to analyze the effect of taxation
- We need to know how does a tax affect buyers, sellers and the government
- Benefits to buyers is measured by *consumer surplus*
- Benefits to sellers is measured by *producer surplus*

How can we measure the effect of a tax on the government?

- If the size of a tax is T and the quantity of a good sold is Q, then the revenue from a tax is $\textbf{Tax Revenue } = T \times Q$
- Revenues from taxes fund roads, police, public education, help the needy, national security, defense, etc.
- To analyze the benefits of a tax, we will use the government's tax revenue to measure public revenue from the tax
- The benefits will not be reaped by the government, but by those that are spent on

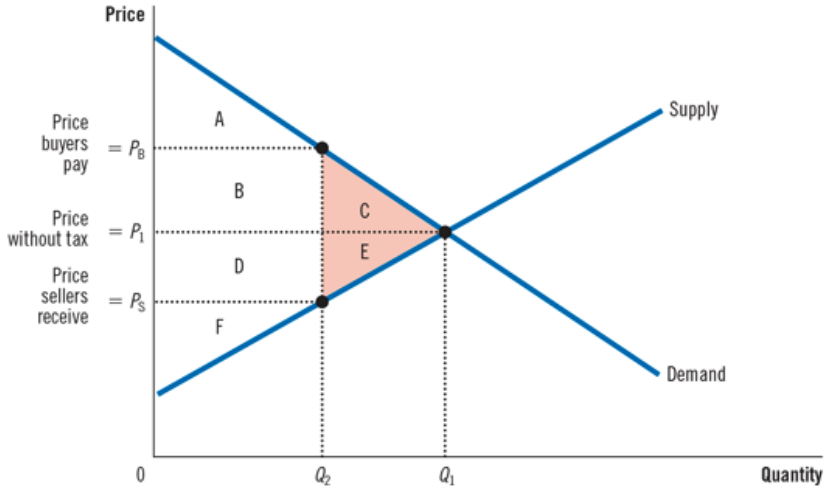
Welfare analysis of a tax

Figure 3 **How a Tax Affects Welfare**

A tax on a good reduces consumer surplus (by the area $B + C$) and producer surplus (by the area $D + E$). Because the fall in producer and consumer surplus exceeds tax revenue (area $B + D$), the tax is said to impose a deadweight loss (area $C + E$).

	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.



Deadweight Losses and the Gains from Trade

Deadweight loss

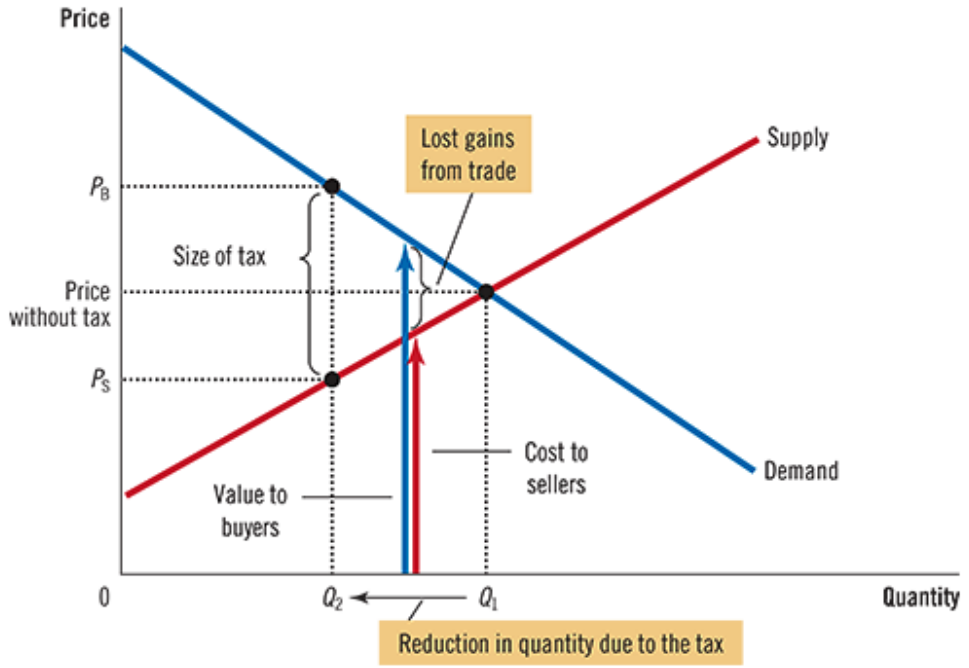
Consider the following example

- Say Malik cleans Mei's house for $100
- Malik's opportunity cost is $80
- Mei values her clean house at $120
- Mei's consumer surplus is $20
- Malik's producer surplus is $20
- The government introduced a $50 tax on cleaning services
- With the new tax, neither Malik nor mei will enter the transaction
- The max Mei would pay is $120
- Malik ends up with $70 after tax
- For mei to cover Malik's opportunity cost, she has to pay $130
- Malik loses income and Mei doesn't have a clean house

Deadweight loss

Figure 4 **The Source of a Deadweight Loss**

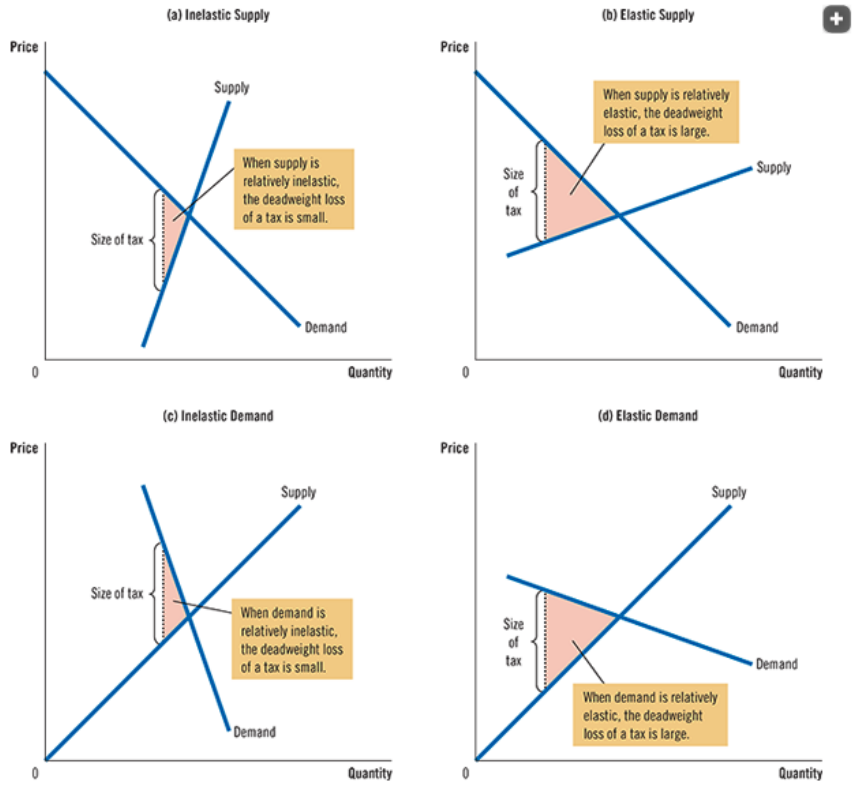
When the government imposes a tax on a good, the quantity sold falls from Q_1 to Q_2. At every quantity between Q_1 and Q_2, the potential gains from trade among buyers and sellers are not realized. These lost gains from trade create the deadweight loss.



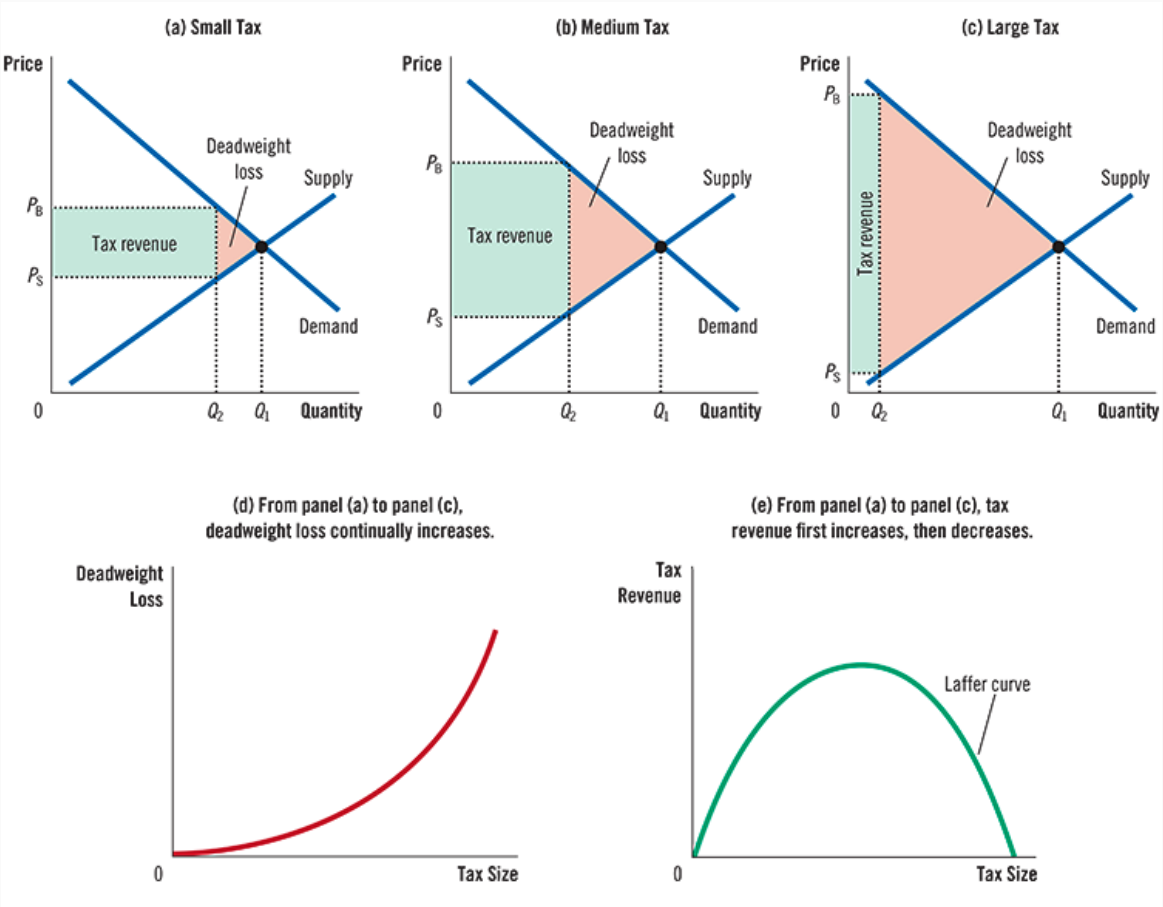
Elasticity and DWL

Figure 5 **Tax Distortions and Elasticities**

In panels (a) and (b), the demand curve and the size of the tax are the same, but the price elasticity of supply is different. Notice that the more elastic the supply curve, the larger the deadweight loss of the tax. In panels (c) and (d), the supply curve and the size of the tax are the same, but the price elasticity of demand is different. Notice that the more elastic the demand curve, the larger the deadweight loss of the tax.



DWL and Tax Revenues

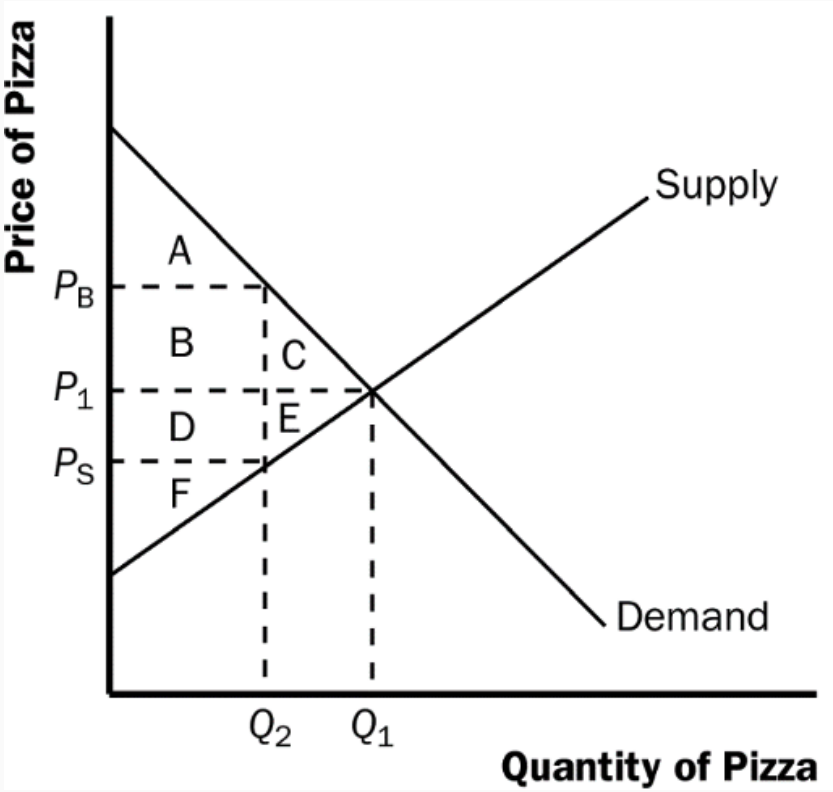


Problems and Applications

Question 1

The market for pizza is characterized by a downward-sloping demand curve and an upward-sloping supply curve.

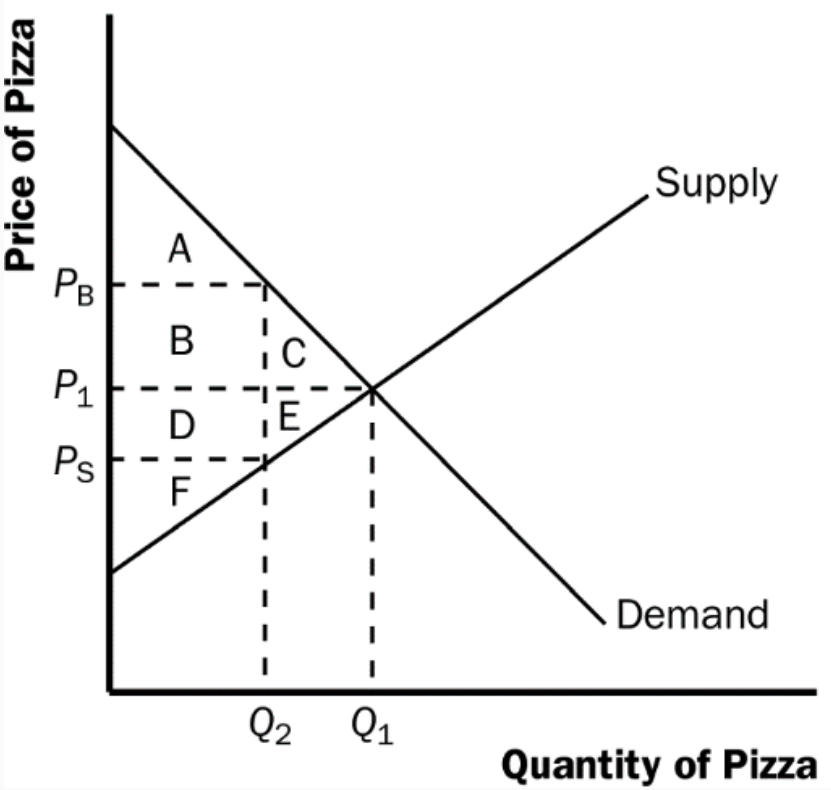
Draw the competitive market equilibrium. Label the price, quantity, consumer surplus, and producer surplus. Is there any deadweight loss? Explain.



Question 1

The market for pizza is characterized by a downward-sloping demand curve and an upward-sloping supply curve.

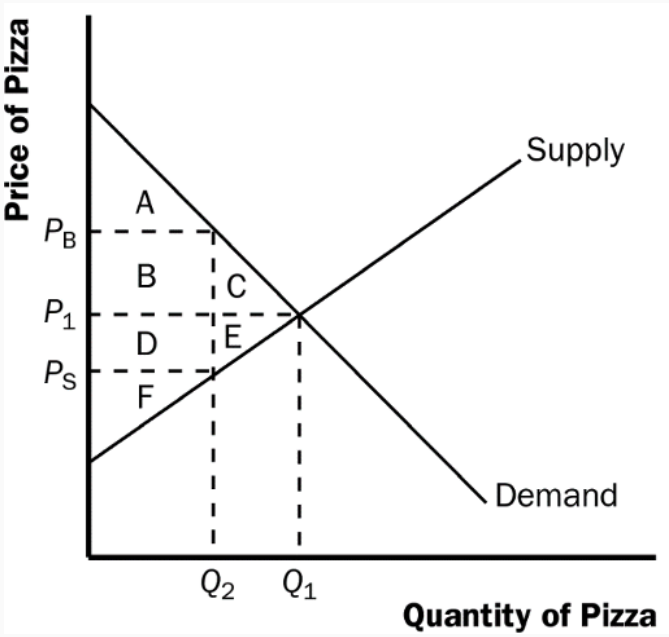
Suppose that the government forces each pizzeria to pay a $1 tax on each pizza sold. Illustrate the effect of this tax on the pizza market, being sure to label the consumer surplus, producer surplus, government revenue, and deadweight loss. How does each area compare to the pre-tax case?



Question 1

The market for pizza is characterized by a downward-sloping demand curve and an upward-sloping supply curve.

If the tax were removed, pizza eaters and sellers would be better off, but the government would lose tax revenue. Suppose that consumers and producers voluntarily transferred some of their gains to the government. Could all parties (including the government) be better off than they were with a tax? Explain using the labeled areas in your graph.



Question 2

Evaluate the following two statements. Do you agree? Why or why not?

“A tax that has no deadweight loss cannot raise any revenue for the government.”

False. When supply/demand is perfecyly inelastic, the tax does not affect quanity $\Rightarrow$ no deadweight loss, but the tax generates revenue

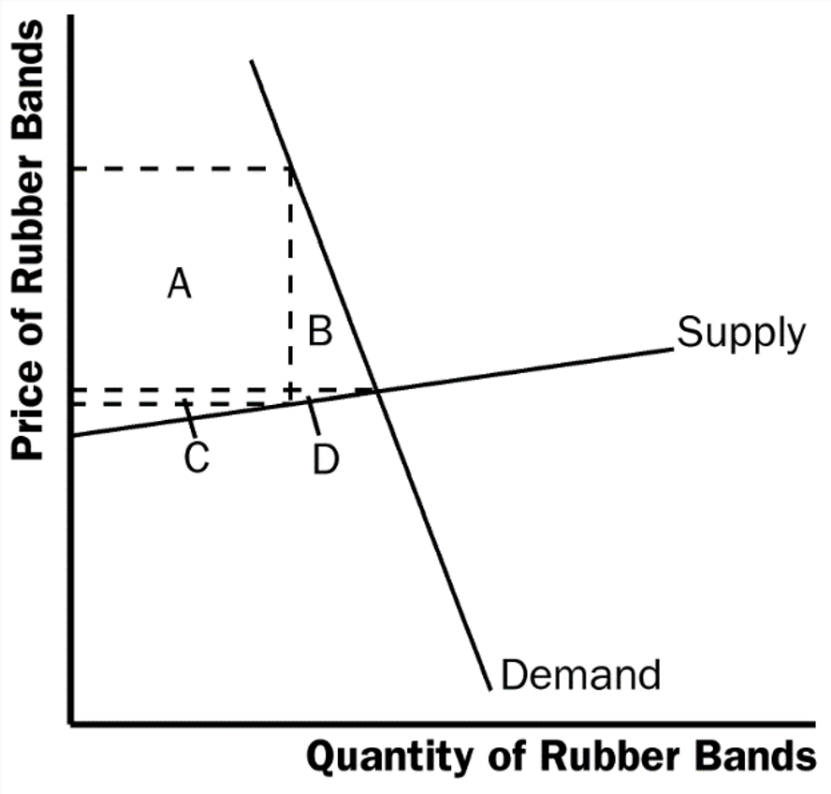
“A tax that raises no revenue for the government cannot have any deadweight loss.”

False. When sellers are taxed a 100%, sellers will not supply the good $\Rightarrow$ the tax will generate zero revenue but will have deadweight loss

Question 3

Consider the market for rubber bands.

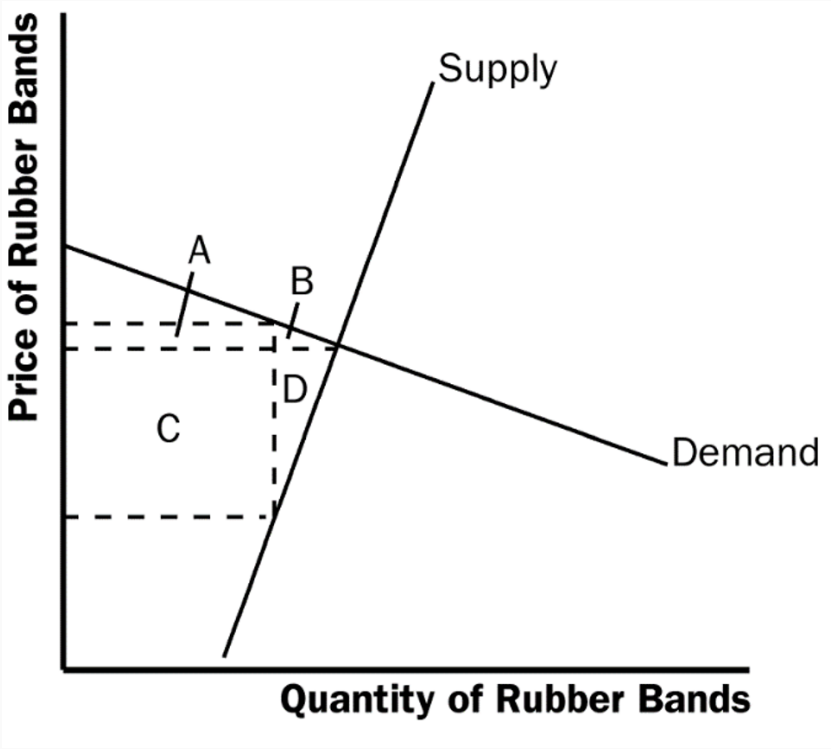
If this market has very elastic supply and very inelastic demand, how would the burden of a tax on rubber bands be shared between consumers and producers? Use the tools of consumer surplus and producer surplus in your answer.



Question 3

Consider the market for rubber bands.

If this market has very inelastic supply and very elastic demand, how would the burden of a tax on rubber bands be shared between consumers and producers? Contrast your answer with your answer to part (a).



Question 4

Suppose that the government imposes a tax on heating oil.

Would the deadweight loss from this tax likely be greater in the first year after it is imposed or in the fifth year? Explain.

The deadweight loss from a tax on heating oil is likely to be greater in the fifth year after it is imposed rather than the first year. In the first year, the demand for heating oil is relatively inelastic, as people who own oil heaters are not likely to get rid of them right away. But over time they may switch to other energy sources and people buying new heaters for their homes will more likely choose gas or electric, so the tax will have a greater impact on quantity. Thus, the deadweight loss of the tax will get larger over time.

Would the revenue collected from this tax likely be greater in the first year after it is imposed or in the fifth year? Explain.

The tax revenue is likely to be higher in the first year after it is imposed than in the fifth year. In the first year, demand is more inelastic, so the quantity does not decline as much and tax revenue is relatively high. As time passes and more people substitute away from oil, the quantity sold declines, as does tax revenue.

Question 5

After economics class one day, your friend suggests that taxing food would be a good way to raise revenue because the demand for food is quite inelastic. In what sense is taxing food a “good” way to raise revenue? In what sense is it not a “good” way to raise revenue?

Because the demand for food is inelastic, a tax on food is a good way to raise revenue because it leads to a small deadweight loss; thus taxing food is less inefficient than taxing other things. But it is not a good way to raise revenue from an equity point of view, because poorer people spend a higher proportion of their income on food. The tax would affect them more than it would affect wealthier people.

Question 6

Daniel Patrick Moynihan, the late senator from New York, once introduced a bill that would levy a 10,000 percent tax on certain hollow-tipped bullets.

Do you expect that this tax would raise much revenue? Why or why not?

This tax has such a high rate that it is not likely to raise much revenue. Because of the high tax rate, the equilibrium quantity in the market is likely to be at or near zero.

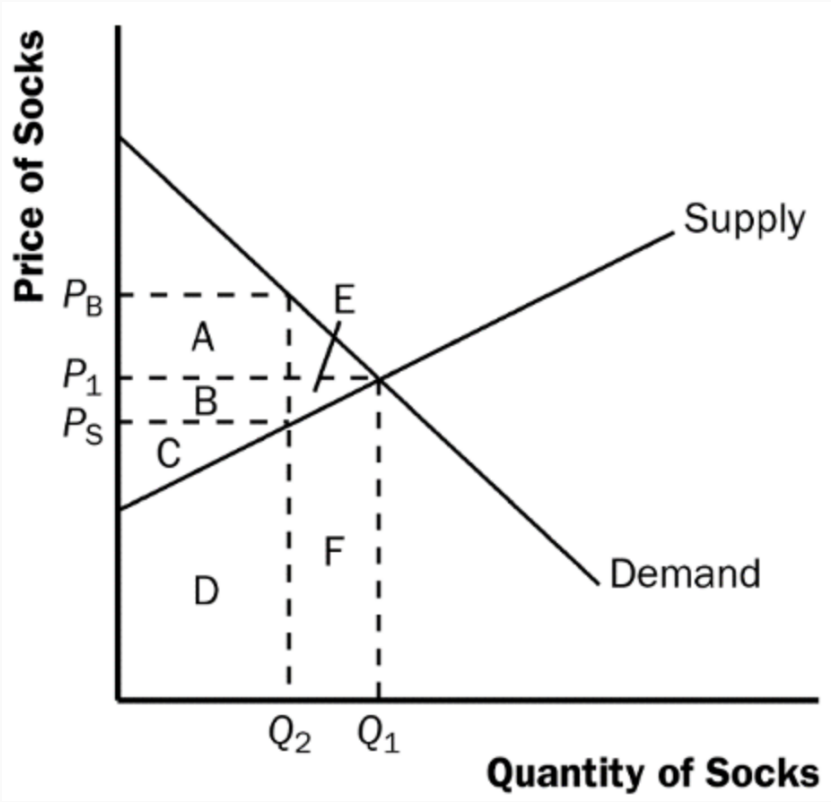
Even if the tax would raise no revenue, why might Senator Moynihan have proposed it?

Senator Moynihan's goal was probably to ban the use of hollow-tipped bullets. In this case, the tax could be as effective as an outright ban.

Question 7

The government places a tax on the purchase of socks.

Illustrate the effect of this tax on equilibrium price and quantity in the sock market. Identify the following areas both before and after the imposition of the tax: total spending by consumers, total revenue for producers, and government tax revenue.



Question 7

The government places a tax on the purchase of socks.

Does the price received by producers rise or fall? Can you tell whether total receipts for producers rise or fall? Explain.

Unless supply is perfectly elastic or demand is perfectly inelastic, the price received by producers falls because of the tax. Total receipts for producers fall, because producers lose revenue equal to area B + E + F.

Does the price paid by consumers rise or fall? Can you tell whether total spending by consumers rises or falls? Explain carefully. (Hint: Think about elasticity.) If total consumer spending falls, does consumer surplus rise? Explain.

The price paid by consumers rises, unless demand is perfectly elastic or supply is perfectly inelastic. Whether total spending by consumers rises or falls depends on the price elasticity of demand. If demand is elastic, the percentage decline in quantity exceeds the percentage increase in price, so total spending declines. If demand is inelastic, the percentage decline in quantity is less than the percentage increase in price, so total spending rises. Whether total consumer spending falls or rises, consumer surplus declines because of the increase in price and reduction in quantity.