Lecture 12: Taxes

Office Hours changed this week:

Office Hours Canceled F 10:00-12:00
Office Hour: R 3:30-4:30
Office Hour: F 11:10-12:10

Clicker Question
Americans Hate Taxes

▪ 241 years ago, in 1775, Americans rebelled against the British, partly because Americans didn’t want to pay British taxes.
  - “Although more than one American pointed out that the taxation of the colonists by a body in which they were unrepresented violated a long-standing right of British subjects, most Americans who protested concentrated their attention on how the new policies cut into their purses.”

▪ Then in 1791, farmers rebelled when the US Federal Government tried to collect Whiskey Taxes. Historians call it the Whiskey Rebellion.

▪ Most American voters are still opposed to taxes—they prefer other kinds of government intervention.

▪ When Americans were asked, “What is the best way to increase the energy-efficiency of cars?” this is how they responded.

▪ The current American view of taxes is undoubtedly the result of bad teaching by economics professors like me.
The Purpose of Taxes

Governments tax goods and services for a number of reasons:

- to finance government activities,
- to discourage the consumption of certain goods and services,
- to increase equity,
- or to correct for negative externalities [more on that later…]

The Effect of Taxes on Markets

An *excise tax* is a tax of a fixed size applied to each unit of a good sold, e.g.

- a tax of $2 on each pack of cigarettes
- a tax of $.60 on each gallon of gasoline

We will analyze how excise taxes affect markets.
Excise Taxes

- Suppose there is a $2 excise tax per pack of cigarettes,…

- …and you buy a pack for $5.
  - The seller (the merchant of death) hands you the pack.
  - You hand the seller 5 dollar bills.
  - But just then, the government reaches out and snatches 2 of the bills away.
  - The seller receives only 3 dollar bills.

- **IMPORTANT:** The buyer pays $2 more than the seller receives.
  - The price paid by the **buyer** ($5) is called the **demand-price**.
  - The price received by the **seller** ($3) is called the **supply-price**.

- Suppose the tax collector isn’t at the store.

- Then, who transfers the required taxes to the government, the seller or the buyer?

- *It doesn’t matter!!!* The effect is exactly the same.
A New Tax

- Suppose you’re a shopper in the store when the government implements a new tax.
  - If the seller just adds the tax to the existing price,…
  - …quantity demanded would fall and there would be excess supply.
  - So, in equilibrium, the seller will first lower his price, and then add the tax to his new lower price.
  - The tax coming from you is less than the total amount of the tax.
  - The seller’s price reduction means that the seller is also paying part of the tax.

- Because the seller is paying part of the tax and getting a lower price for her goods,…
- … the seller supplies a smaller quantity.
- Because the buyer is paying part of the tax and paying a higher price for his goods,…
- …the buyer demands a smaller quantity.

- In the equilibrium with a tax, the demand price and supply price will adjust
  - to make the quantity supplied equal the quantity demanded,
  - but that quantity will be less that the equilibrium quantity without a tax.
Clicker Question

Taxes and Market Equilibrium

- The demand curve is graphed using demand-price.
- The supply curve is graphed using supply-price.
- Suppose there is a $2 tax.
- Let $P_D$ be the equilibrium demand price.
- Let $P_S$ be the equilibrium supply price.
- Then $P_D - P_S = $2
- Let $Q_T$ be the equilibrium quantity.
- In equilibrium there is no excess demand, $Q_T = Q_S = Q_D$.
- How do we find $Q_T$, $P_D$, $P_S$?
- After sliding the “tax wedge,” $Q_T$, $P_D$ and $P_S$ are determined.
Finding the Equilibrium with Algebra

- Suppose
  - \( Q_D = 10 - P_D \) and \( Q_S = P_S \)
  - Tax: \( T = 2 \)

- Then
  - \( Q_D = Q_S \) and \( P_D - P_S = T \)

- So
  - \( 10 - P_D = P_S \)
  - \( P_D - P_S = 2 \)

- Solution:
  - \( P_D = 6, \ P_S = 4, \ Q_D = Q_S = 4 \)

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Tax and No-Tax Comparisons

- As compared with the no-tax price \( P^* \),
- the tax creates a higher \( P_D \), and lower \( P_S \),
- which pushes \( Q_T \) below the surplus-maximizing level \( Q^* \).
- This creates a DWL,
- and reduces consumer and producer surplus.
- The remaining surplus takes the form of taxes collected.
- Although taxes create DWL, the government may use tax revenues to provide public services and increase equity.
Taxes and the Size of the DWL

- If supply (or demand) is very inelastic,…
- then when a tax is imposed,…
- the quantity transacted doesn’t change much.
- Therefore, the dead-weight loss will be small.

\[ P^* \]

\[ Q^*_T \]

\[ Q^* \]
Can taxes increase social surplus?

- Although taxes reduce social surplus in most markets,…

- …taxes on goods with negative externalities (which impose costs on other people) can increase total surplus in the economy.
  
  **Example:** Gasoline has externalities (congestion and environmental damage),…

  - and so do cigarettes,…

  - so taxes on gasoline or cigarettes would increase total economic surplus [*explained in a future lecture*].

Tax Incidence

- The *tax incidence* is the relative amount of the taxes that originate from the buyer and from the seller.

- The tax incidence depends on the elasticities of supply and of demand.

- If the elasticity of demand is very large, the sellers will have to absorb the tax,…

  - because if they try to pass it on to buyers, they will lose many of their customers.

- The opposite happens if the elasticity of supply is very large.

- Tax incidence is *unrelated* to whether the *seller* or the *buyer* hands the money to the government.
Here we have a very elastic demand curve,...

and an ordinary supply curve.

After a tax is imposed,...

the equilibrium quantity, demand price and supply price all change.

The taxes from the buyer...

are small compared with the taxes from the seller.

Why does the red shaded area represent taxes from the buyer? the yellow, taxes from the seller?
Tax Incidence in General

- In general, the larger the elasticity of demand,
  - the greater the share of taxes that comes from the seller,
  - and the smaller the share from the buyer.

- The larger the elasticity of supply,
  - the greater the share of taxes that comes from the buyer,
  - and the smaller the share from the seller.

- Here’s why…

Tax Incidence Ratio

Note: In these calculations all quantities are taken as positive.

\[
\begin{align*}
\text{Taxes from the buyer} & = Q_T \Delta P_D \\
\text{Taxes from the seller} & = Q_T \Delta P_S \\
\text{Ratio} & = \frac{Q_T \Delta P_D}{Q_T \Delta P_S} = \frac{1/\varepsilon_D}{1/\varepsilon_S} \\
& = \frac{\Delta P_D}{\Delta P_S}
\end{align*}
\]

Can you prove this equation from the definition of elasticity?
Taxes on Goods and Services

- Like other kinds of government intervention in markets for goods and services, taxes tend to reduce social surplus.

- But in general, economists prefer taxes to other kinds of intervention,…

- …because in the presence of taxes, supply-price and demand-price adjust until the market clears (no excess supply or demand),…

- …so taxes do not lead to nonprice rationing.

- Therefore people with lower WTP do not get the goods and DWL is small.

Why are taxes useful?

- Although taxes normally reduce surplus, they have very important uses.

  - Taxes allow government to supply public goods, like police protection and clean streets—not easily supplied by private markets. [To be explained later]

  - When there are negative externalities (social costs not included in the price—e.g. gasoline), taxes can increase surplus. [To be explained later]

  - And taxes can increase equity, important to many societies.

- Many US politicians argue that US taxes are too high…
But some policy makers believe that US taxes are too low.

Taxes in most other wealthy countries are higher than in the United States.

Consider a subsidy of \( b \) per unit. The government pays \( b \) each time a unit is sold.

Subsidies are the opposite of taxes.

Buyer pays less than seller receives, ...

so in equilibrium, \( P_S - P_D = b \)

The quantity produced \( Q_b > Q^* \).

But \( \text{Total Surplus} = CS_b + PS_b - \text{Subsidy} = CS^* + PS^* - \text{DWL} \)
Clicker Question

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