Americans Hate Taxes

- 241 years ago, in 1775, Americans rebelled against the British, partly because Americans didn’t want to pay British taxes.

- Then in 1791, farmers rebelled when the US Federal Government tried to collect Whiskey Taxes.

- President George Washington sent the US Army to stop the tax 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 Americans 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 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.

- Is it better if the seller transfers the taxes to the government? Or better if the buyer does?

- *It doesn’t matter!!!* The effect of taxes is exactly the same.

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### A New Tax

Suppose you’re a shopper in the store when the government implements a new tax.

- If the seller just added the tax to the existing price, the quantity demanded would fall creating an excess supply.

- So if the seller doesn’t want to be stuck with goods on the shelf, she will lower her selling price before she adds the tax to it.

- The buying-price increase you face will be less than the total amount of the tax.

- The price increase you see is the share of the tax you pay.

- The seller’s price reduction is the share of the tax that the seller pays.
In equilibrium with an excise tax, …

- …the selling price (supply price) is less than the buying price (demand price)…
- …and the difference between them goes to the government.

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.

With a tax, supply price and demand price will adjust in equilibrium…

- to make quantity supplied = quantity demanded,

- but the equilibrium quantity WITH a tax < equilibrium quantity WITHOUT a tax

- There’s no excess supply or demand in equilibrium; otherwise, prices would continue to adjust.
Clicker Question
Suppose a tax is imposed on cigarettes. Then, in equilibrium,

a. the quantity demanded is greater than the quantity supplied.
b. the quantity supplied is greater than the quantity demanded.
c. the price the seller receives is less than the price the buyer pays.
d. the result depends on whether the government collects the tax from the buyer or the seller.

Graph of Market Equilibrium with Taxes
- The demand curve is graphed using the demand-price. Price buyer pays
- The supply curve is graphed using the supply-price. Price seller gets
- 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 demand, supply, and the tax, are given by:
  - Demand: \( Q_D = 10 - P_D \) and \( Q_S = P_S \)
  - Tax: \( T = 2 \)

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

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

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

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.

- If the government uses tax money productively to provide public services and increase equity, Taxes Collected will not be a DWL.
**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.

![Graph showing supply and demand curves with a tax imposition](image)

**Clicker Question**

Suppose an excise tax is imposed on sugar. Then,

a. there will be a shortage of sugar in equilibrium.
b. there will be a surplus of sugar in equilibrium.
c. producer surplus will increase.
d. **NONE of the above**

![Clicker Question](image)
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.
Tax Incidence with Elastic Demand

- 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.
- Why does the red-shaded area represent taxes from the buyer? the yellow-shaded area, taxes from the seller?
- Why are taxes from the buyer small compared with the taxes from the seller?
- The buyers will run away if you tax them too much!

Tax Incidence with Elastic Supply

- Here we have a very elastic supply curve,…
- and an ordinary demand curve.
- After a tax is imposed,…
- the equilibrium quantity, demand price and supply price all change.
- The taxes from the seller…
- are small compared with the taxes from the buyer.
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…

Taxes from the buyer
Taxes from the seller
Can you prove this equation?
Ok, I’ll do it for you on the next page

Taxes Incidence Ratio

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

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

Tax Incidence

Can you prove this equation? Ok, I’ll do it for you on the next page

\[
\frac{\text{Taxes from Buyer}}{\text{Taxes from Seller}} = \frac{\varepsilon_S}{\varepsilon_D}
\]
Calculations

\[ \varepsilon_D = \frac{\Delta Q/Q^*}{\Delta P_D/P^*} \]

\[ \varepsilon_S = \frac{\Delta Q/Q^*}{\Delta P_S/P^*} \]

\[ \varepsilon_S/\varepsilon_D = \frac{\Delta Q/Q^*}{\Delta P_S/P^*} = \frac{\Delta P_D}{\Delta P_S} \]

(everything else cancels out)

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 **Total Surplus =** $CS_b + PS_b - Subsidy$

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**Clicker Question**

Taxes on a good normally reduce social surplus, because

a. taxes reduce the quantity sold in the market.

b. government revenues are a deadweight loss.

c. consumers pay for all tax revenues.

d. producers pay for all tax revenues.
End of Lecture 12