Tax Incidence

Questions
1. What are the effects that a sale tax has on equilibrium price and equilibrium quantity?
2. Who is paying for the entire tax?
3. Do the equilibrium price and quantity depend on whether the tax is assessed on consumers or on producers?

Two types of sales tax
1. Sales tax/ad valorem tax: a rate on the sales price, i.e., government collect tax for every dollar you spent. (we use \( \alpha \))
   
   Example: a tax rate 0.08 on a 50 purchase is 4. (%alpha = 0.08)

   We call 50 + 50 * 0.08 = 54 as the market price. This is different from what we see in the market. In stores, they only mark the price as "what they receive", but when you actually purchase the good, you are paying the marked price plus the tax. In our example, consumers are paying 54, while producers are receiving 50, and 4 is collected by government.

2. Unit tax/specific tax: a dollar amount on each unit sold (we use \( \tau \)).

   Example: Government charges 18.4 cents for each gallon of gas. So, when the gas station charges you 1.49 dollars per gallon, the market price is 1.49. 1.49 includes the tax already.

Who is paying more of the tax?
Judge it by demand elasticity and supply elasticity.

Formula:

\[
dp = \frac{\epsilon_s}{\epsilon_s - \epsilon} d\tau
\]

where \( \epsilon \) is the demand elasticity, \( \epsilon_s \) is the supply elasticity.

Facts: 1. If \(|\epsilon|\) larger, then price increase less.
Tax incidence falls less on consumers (more on producers).

2. If \( \epsilon_s \) larger, then price increase more.

Tax incidence falls more on consumers (less on producers).

**Do the equilibrium price and quantity depend on whether the tax is assessed on consumers or on producers?**

Two cases:

Government collects tax from producers? and Government collects tax from consumers?

1. Collect tax from producers:

This basically says that producers pay tax after he receives money from consumers. So if \( p^c \) is the price that consumers pay, \( p^c \) is the price that producers receive before the tax is collected. After the tax is collected, what producers actually get is \( p^c - \tau \). And producers are going to decide how much he is going to supply by this price that he actually receives. So, instead of \( Q_s(p) \), the new supply curve is \( Q_s(p - \tau) \), if we denote \( p \) as \( p^c \), the market price.

Example: \( Q_s = 88 + 40p, Q_d = 286 - 20p \)

What is the new supply curve?

\[
Q_s = 88 + 40(p - \tau) = 88 + 40(p - 1.05) = 46 + 40p
\]

Then we solve out the new equilibrium:

\[
Q_s = Q_d
\]

\[
46 + 40p^* = 286 - 20p^*
\]

\[
p^* = 4
\]

This is the equilibrium market price, what the consumers pay. Producers receive

\[
p^* - \tau = 4 - 1.05 = 2.95
\]
So, consumers pay 4, producers receive 2.95 and government gets 1.05. And consumers pay 70 cents of the tax, while producers pay 35 cents for the tax. Consumers bear more of the tax burden.

2. Collect tax from consumers:
This says that after consumers pay price to firms/producers, consumers still have to pay tax to government. So what consumers actually spend is \( p + \tau \), where \( p \) is the market price. And producers receive \( p \).

Using the same example above, now the change in supply and demand curve only happens with demand curve. Consumers are paying \( p + \tau \) now, so they will decide how much they are going to buy based on price \( p + \tau \).

What is the new demand curve?

\[
Q_d = 286 - 20(p + \tau) = 286 - 20(p + 1.05) = 265 - 20p
\]

So, the new equilibrium is

\[
88 + 40p = 265 - 20p
\]

\[
p^* = 2.95
\]

This is what consumers pay to producers.

So, consumers pay 2.95 + 1.05 = 4 to get a good. Producers receive 2.95, while government takes away 1.05.

Summary:

We can see from the above example that collecting tax either from consumers or from producers give the same result. Tax revenue also stays the same: \( 1.05 \times 206 = 216.3 \), which is the rectangle area in the graph Figure 3.06.
How about the ad valorem tax

1. How does the ad valorem tax change the demand curve?

Before tax, consumer pays \( p \) to buy a good. Now after the tax, consumers have to pay \( p + \alpha p \) to buy it. \( \alpha p \) is the tax paid to government. **Figure 3.2**

The new demand curve is

\[
Q_d = 286 - 20(1 + \alpha)p
\]  

The slope of demand curve changes from 20 to 20\((1 + \alpha)\), i.e., the demand curve shrink to the left. The equilibrium price and quantity change in the same way as before when there is a sale tax. But how much exactly might be different.