

Problem Set 11

Due Lecture 13 in class on paper

1. Gruber Chapter 19, Question 4, 2nd Edition

The demand for football tickets is $Q = 360 - 10P$ and the supply of football tickets is $Q = 20P$. Calculate the gross price paid by consumers after a per-ticket tax of \$4. Calculate the after-tax price received by ticket sellers.

Before the tax, the market equilibrium sets demand equal to supply, or

$$\begin{aligned}360 - 10P &= 20P \\360 &= 30P \\P &= 36/3 = 12\end{aligned}$$

After the tax, the new supply has an additional four dollars per ticket. Actually, as we learned in class, the problem is the same no matter who bears the statutory burden. You can do this problem changing the demand curve to verify for yourself.

We can re-write the original supply in terms of Q as $P = Q/20$. The new supply curve with the ticket tax is therefore $P = Q/20 + 4$. Re-writing in terms of P , this is $P_n - 4 = Q_n/20$, or $Q_n = 20P_n - 80$.

We find the after-tax equilibrium price by setting the new supply equal to demand, or

$$\begin{aligned}360 - 10P_n &= 20P_n - 80 \\440 &= 30P_n \\3P_n &= 44 \\P_n &= 44/3 = 14\frac{2}{3}\end{aligned}$$

Producers (ticket sellers) receive \$14 $\frac{2}{3}$ (after tax price), but they really only net $14\frac{2}{3} - 4 = 10\frac{2}{3}$ per ticket (base price), since they have to pay \$4 in tax to the government.

Consumers pay \$14 $\frac{2}{3}$, which is more than the \$12 they used to pay.

2. Gruber Chapter 19, Question 12, 2nd Edition

The government of Byngia has introduced a new tax on airline travel. Byngia has two types of travelers: business travelers and leisure travelers. Business travelers in Byngia have an elasticity of -1.2, while Byngia leisure travelers have an elasticity of -3.0. Airlines can price-discriminate between these two groups; that is, they can charge different prices to the different types of fliers in the market. Which type of travel will bear the larger burden of the tax? Explain.

We know that, in general, inelastic factors bear the burden of taxation. In this particular problem, business travelers are less elastic (use the absolute value!) than leisure travelers.

Why might this be? In general, we think that leisure travelers may be more flexible on dates or times of travel, and they may also be more willing to switch to alternative modes (such as driving or the bus) when flights are too expensive.

Thus, we expect business travelers to bear the greater burden of this tax. The lone exception to this is if the supply of airline travel is entirely inelastic. If carriers have no ability to change supply in response to price – that is, if they supply flights inelastically – the airline carriers will bear the burden of the tax.

3. Yoga

Last year, Washington, D.C. passed a tax on yoga. Although this tax was an ad valorem tax, for purposes of this problem set, we will pretend it was a \$4/class tax. Also, unlike the real world, we will assume that those taking yoga classes bear the statutory incidence of the class.

Suppose that the pre-tax demand for yoga classes is $Q = 2000 - 100P$, and that the pre-tax supply of yoga classes is $Q = 300P - 200$.

(a) What are the original price and quantity?

Find the original equilibrium P_o and Q_o by setting demand equal to supply.

$$2000 - 100P = 300P - 200$$

$$2200 = 400P$$

$$22 = 4P$$

$$P_o = 11/2 = 5.5$$

Now find the original quantity, Q_o :

$$\begin{aligned}2000 - 100P &= Q \\Q &= 2000 - 100(11/2) \\Q_o &= 2000 - 550 = 1450\end{aligned}$$

(b) What is the demand with the new tax?

The new demand curve should be lower than the old demand curve, crossing the vertical axis four units lower than the previous curve. Re-write the demand curve in terms of Q to do this:

$$\begin{aligned}Q &= 2000 - 100P \\100P &= 2000 - Q \\P &= 20 - Q/100\end{aligned}$$

Now we shift the demand curve down by 4.

$$\begin{aligned}P_n &= 20 - Q_n/100 - 4 \\P_n &= 16 - Q_n/100\end{aligned}$$

Re-write in terms of Q_n :

$$\begin{aligned}P_n &= 16 - Q_n/100 \\P_n - 16 &= -Q_n/100 \\Q_n &= 1600 - 100P_n\end{aligned}$$

(c) What is the new equilibrium price and quantity?

Find the new equilibrium price and quantity P_n and Q_n :

$$\begin{aligned}1600 - 100P_n &= 300P_n - 200 \\1800 &= 400P_n \\18 &= 4P_n \\P_n &= 18/4 = 9/2 = 4.5\end{aligned}$$

(d) What is the tax burden on yoga consumers? yoga producers?

The producer burden is the decrease in price: $5.5 - 4.5 = 1$.

The consumer burden is the tax, minus the decrease in price: $4 - (5.5 - 4.5) = 4 - 1 = 3$.

Note that these sum to the amount of the tax.

4. Corporate Income Tax

The incidence of the corporate income tax is one of the most heavily debated issues in economics. Discuss which parties could possibly bear the burden of this tax. Don't discuss how the burden of the tax is shared – just identify who could possibly bear the burden of the tax.

The incidence of the corporate income tax could fall on shareholders, workers at the firm, or landowners of the land on which the firm operates. We expect the least elastic factor to bear the burden of the tax; this may differ by firm.