ECON 3003 Advanced Public Economics
Fall 2022 – Prof. Dario Tortarolo

Tutorial 3

Incidence of Commodity Taxation

Consider the following model for the market of frozen shrimps in Nottingham. Suppose the aggregate demand for shrimps in Nottingham is given by $Q^D = 9 - P/2$ where P denotes the price and Q denotes the quantity of shrimps in terms of thousands of 1kg bags demanded. The aggregate supply for shrimps in Nottingham is given by $Q^S = P/4$.

(a) Compute the shrimps market equilibrium. What are the equilibrium price and quantities?

Equating Supply and Demand:

$$P/4 = 9 - P/2$$
$$P^* = 12 \ , \ Q^* = 3$$

(b) Now suppose a tax of $t = \$6$ is imposed on each 1kg bag of shrimps purchased. Compute the market equilibrium with the tax. What are the equilibrium price and quantity?

Remember that it does not matter who bears the statutory incidence of the tax. We add the tax on the demand side and therefore find the before tax price (faced by the supplier).

$$P/4 = 9 - (P + 6)/2$$
$$3P/4 = 6$$
$$P^S = 8, \ Q^* = 2$$
$$P^D = 8 + 6 = 14$$

The quantity exchanged in the market fell to 2k bags, the price producers face is now \$8 and the price consumers face is now \$14.

(c) Compute and graphically depict the deadweight loss due to the tax.

Deadweight loss (DWB) is represented by the 'Harberger triangle'. Its height is the tax of \$6 and its base is the distortion in the quantity exchanged: $3 - 2 = 1$ thousand units.

$$DWB = (1 \times 6)/2 = \$3$$

(d) What is the incidence of the tax (i.e., how is the burden split between consumers and producers)? Explain the intuition for the key factors that determine the incidence.

Out of the \$6 tax, \$2 are borne by consumers and \$4 by producers, therefore 33% is on the demand and 66% on the supply. The more inelastic side bears the largest incidence. In this case, you can see from the relative slopes, that supply is more inelastic than demand.

Now suppose that consumers are inattentive to the tax and demand is given by

$$Q^D = 9 - (P + \theta t)/2$$

where $\theta = 2/3$. Again, suppose that a tax of $t = \$6$ is imposed on shrimps.

(e) How can we interpret θ?

$1 - \theta$ represents the inattentiveness of consumers. As Chetty et al. (2009) paper shows, consumers don't fully internalize sales tax. The 2/3 coefficient implies that 1/3 of consumers are inattentive to the sales tax.

(f) What are the new equilibrium price and quantities?

$$P/4 = 9 - [P + 6 \times 2/3]/2$$
$$3P/4 = 7$$
$$P^S = 9.33,\ Q^* = 2.33$$
$$P^D = 9.33 + 6 = 15.33$$

(g) Compute and graphically depict the deadweight loss arising from the tax. How does your answer compare to your answer from part (c)? What's the incidence of the tax now? Explain.

The height of the triangle is \$4 but the base is reduced in $3 - 2.33 = 0.67$ thousand units.

$$DWB = (0.67 \times 4)/2 \approx \$1.34$$

With a 1/3 of inattentive consumers the demand curve faced by the supply is not as elastic as before. Therefore, the deadweight loss is smaller, as less distortion in terms of quantity exchanged has happened.

Notice also that the incidence of the tax has changed, consumers now bear a larger share of the incidence ($3.33/6 = 55.5\%$) than producers ($2.67/6 = 44.5\%$). So, 55.5% is on the demand and 44.5% on the supply.

Income Tax Reform

Chancellor Hunt announced in the recent Autumn Statement that the threshold for the top income tax bracket will be lowered from £150,000 to £125,000 starting in April 2023. For

simplicity, assume that this is the only feature changing, and consider an individual not entitled to any type of transfers or benefits.

(a) Draw the budget constraint before and after the reform.

See the recording.

(b) Explain how this reform would—in theory—affect the incentives of taxpayers located in the highest bracket (those earning more than £150,000). Does the evidence support your prediction?

Individuals above 150k will face a pure income effect that, in theory, pushes them to work more hours. Note that those above 150k face the same MTR of 45% before and after the reform and, thus, there is no substitution effect (the incentives or returns for the marginal hour worked don't change). But because the government lowers the last kink, there is a portion of their (infra-marginal) income that was previously taxed at 40% and is now taxed at 45%. So, their tax liability increases, the take-home pay decreases, making them poorer and, therefore, they might decide to work more to compensate for that and earn more before-tax income.

In practice and in light of the evidence discussed in lecture, however, it's unlikely to see large response. Income effect are usually rather small (e.g., Cesarini et al, 2017). We also saw evidence of very little bunching at the 150k kink. Nonetheless, we saw some evidence that UK owner-managers are quite responsive to taxes (Adams et al, 2020). So, they may find (legal) ways to reduced their tax liability (e.g., by increasing their private pension contributions).