In the last in-class exercise we looked at the impact of taxes on the market equilibrium. One of the conclusions we drew is that it doesn’t matter whether or not the producers are forced to pay the tax or the consumers are forced to pay the tax, the effects on equilibrium quantity, the price the consumers actually pay, and the price the producers actually receive are the same, as are the resulting consumer surplus, producer surplus, tax revenue, and deadweight loss. Presumably, the government doesn’t just create deadweight loss – we’ll assume it does something useful that the market can’t provide. Given that, the government needs to regularly fund its activities and so it must tax something. The big picture questions we are thinking about are what should be taxed in order to minimize deadweight loss, and how should those things be taxed?

1. To help answering these questions, recall that price elasticity of demand is

\[ E_D = \frac{\partial Q_D}{\partial P} \frac{P}{Q_D} \]

and price elasticity of supply is

\[ E_S = \frac{\partial Q_S}{\partial P} \frac{P}{Q_S} \]

Then no matter who is taxed, the share of the tax paid by consumers is

\[ \frac{E_S}{E_S + |E_D|} \]

while the share paid by the producers is

\[ \frac{|E_D|}{E_S + |E_D|} \]

(remember \( E_D \) is negative, so taking the absolute value just ensures that our percentages are positive). So the more elastic the demand curve is, the less of the tax the consumers pay and the more the producers pay while the more elastic the supply curve is, the more of the tax the consumers pay and the less of the tax the consumers pay.

(a) Suppose the government wants to favor consumers over producers so that producers end up paying most of the tax in any given market. What should the elasticities look like in the sorts of markets they should be taxing?

\[ |E_D| > E_S \]

The larger the difference the better, since then producers will pay an even larger share.

(b) Give a couple examples of goods that the government should tax in this case.

Any good that has many readily available substitutes or where marginal cost is close to constant. Apps in the Apple store and Google play store that give you a nice calculator on your phone, for example. The marginal cost of letting another person download that app is almost 0 and doesn’t change as more people buy it, so price elasticity of supply should be low. On the other hand, there are tons of calculator apps in these stores, and you could just buy a $10 calculator in real life, so there are tons of substitutes. This means price elasticity of demand should be high.

2. The main reason that taxes create deadweight loss is that they cause both producers and consumers to change their behavior in response how the tax changes their respective prices. Recall that a high elasticity (in magnitude, i.e. a large \( |E| \)) of any sort means that quantity demanded or supplied changes a lot whenever the price changes, while a low elasticity means that the change in quantity is low.

(a) Suppose that the government doesn’t care who pays the tax burden, but instead that the government just wants to minimize deadweight loss while obtaining the necessary revenue. What should the price elasticities of supply and demand look like in the sort of market that the government should tax in order to minimize deadweight loss?
3. One assumption we've made is that it costs nothing for the government to collect taxes. In reality this isn't true — the government has to pay someone to figure out how much everyone owes in taxes and collect them, and sometimes it may only be able to obtain an imprecise estimate of how much a company or individual owes in taxes. Some of these costs are imposed on either the consumers or the producers as well, depending on how the taxes are collected. This doesn't necessarily increase deadweight loss since those costs are paid to someone so someone benefits. However, it does reduce government revenue from the tax and thus requires higher taxes to achieve a target revenue, which in turn must increase deadweight loss.

(a) Taking into account how costly it is to collect taxes, do you think it's better to tax consumers or producers?

Typically in a given market, it's easier to tax producers since there are less of them and they already have to be in contact with the government in order to do business, so it's easier and cheaper to compute how much they should be paying. However, in the labor market the companies are the consumers and the individuals are the producers, so this logic is flipped — it's easier to collect the tax from your employer. This is probably why income taxes are deducted directly from your paycheck — it's easier to have your employer take care of this than to have you pay the taxes in full at the end of the year or perhaps every month. Of course, income taxes are frightfully complicated so the government typically takes too much and makes you tell them precisely how much they should have taken before they give you back what they owe you.

(b) One common tax is an income tax. List some pros and cons of taxing income, based on 1) cost of collection and 2) elasticities of supply and demand. (Note: this includes both corporate and individual income. If you think the two should be treated differently, tell me why).

The cost of collecting income taxes is probably high even in the world where we assume that they are nice and simple because of the sheer number of people and companies from which taxes need to be collected. It's not clear to me if the elasticities are high or low here, but it is clear that as long as income comes from productive activity, discouraging it through taxation is probably not a good thing. In reality, companies usually pay taxes on profits and not income, which is a little different, and more complicated because now the government has to compute revenues and costs for a company, and there are stronger incentives to lie about these things because if profit is negative, the companies don't have to pay taxes.

(c) Another common tax is a sales tax — a general tax on all retail sales. List some pros and cons based on 1) cost of collection and 2) elasticities of supply and demand.

The cost of collecting sales taxes is probably a bit lower since companies are already so well equipped to deal with it — modern cash registers, for example, make computing sales tax a breeze. On the other hand, these registers might not exist in their current form if sales taxes hadn't existed to incentivize their creation. Depending on the good, elasticities vary widely on retail goods. However, given that the tax is on all retail goods, the only substitutes are not spending money at all or using something that is untaxed (like when you buy an Xbox from your friend). Similarly, if businesses want to sell retail goods they're stuck — their only options are to sell wholesale goods, cheat and avoid the tax, or stop selling. So the elasticities are actually likely to be quite modest. So a general sales tax, while not the greatest, isn't the worst and many economists favor this tax as a primary means of generating government revenue.

There is one annoying problem with this tax — it's particularly punishing for poor people when they purchase necessities — milk, eggs, meat, bread, diapers, etc. As a result, a commonly proposed tweak on a general sales tax is to exempt necessities or combine it with a simple social welfare scheme to help pay for the necessities.

(d) A tax that many economists love is a tax on the value of land (but not improvements on the land). Why do you think economists love it? (Hint: why is the tax on the value of land but not improvements?) What is one big problem with the tax?

The reason that economists love this tax is that, assuming you can accurately determine how much of the value of the land is due to it just being a piece of land of a certain size at a certain location and how much is due to improvements — like buildings, fences, etc, then the tax isn't distortionary at all. The amount of land is perfectly fixed — supply is perfectly inelastic, so taxes can't distort the “quantity produced.” As a result, there is no deadweight loss! (Draw a vertical supply curve and diagram the tax like in our previous exercises in order to see this.) This isn't completely accurate since lakes and oceans can be filled in on the edges to create more land, but it's rare and very expensive.

The big problem with this tax is that it's so hard to figure out how much of the value of a piece of property comes from the improvements made by the owner and how much comes from the land itself. If we accidentally tax improvements, we'll get less fences built and buildings constructed, which gets us deadweight loss.