Back to the pizza case

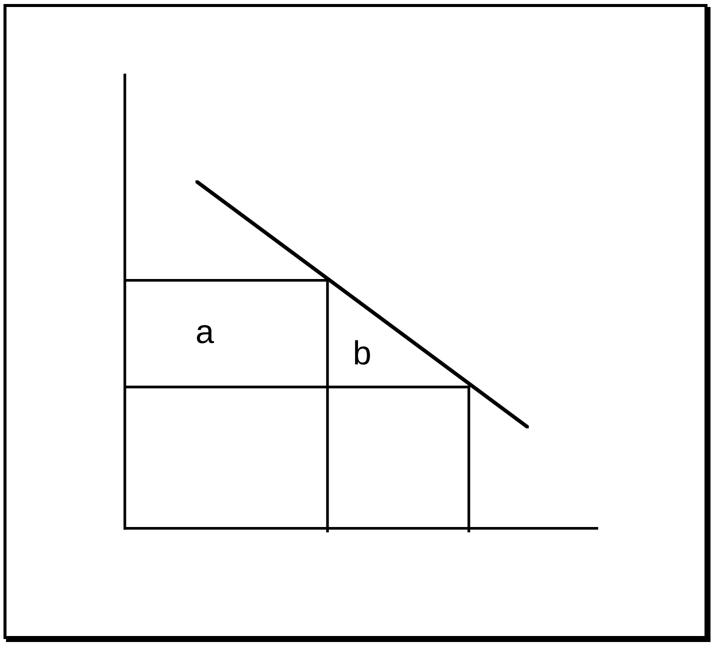
Question: do those paying the tax lose more, less, or the same amount that SPP receives?

Data: $2 tax on pizza, with proceeds going to SPP

price = $10

initial quantity = 1000 pizzas/day

new quantity = 600 pizzas/day (note that this piece of info may be unknown or hard to find).



$\Delta CS = a + b$

a = $2*600 - $1200 = tax revenue

b = 0.5*$2*(1000-600)

= 0.5*$2*400

= $400

ΔCS = $1600

Since the tax revenue is less than the total loss by the area of triangle b, this policy is a loser from the consumer's point of view. triangle b = deadweight loss (DWL).

formulas for consumer surplus:

$$\textbf{(1)} \quad \Delta CS = -\Delta P Q_1 + 0.5(\Delta P)(-\Delta Q)$$

This formula won't be generally useful because you normally won't know both Q_0 and Q_1. You're more likely to have information about elasticity.

It's more plausible that A^2 consumers will respond to a percentage change in price with a percentage reduction in consumption that is similar in percentages (but not in gross numbers) with other communities. Also, using elasticity eliminates the problem of differing units, since it's a unit-free pure number. Therefore, using elasticity in calculations of change is useful because it allows more principled cross-community comparisons.

$$(2) \quad E = -(\Delta Q/Q)/(\Delta P/P)$$

Note that we don't calculate elasticity from data in the current market (generally speaking, since we don't know all the parts of Q that we'd need. Elasticity would be found from other sources (studies done of similar communities, for example) and applied in the new situation.

SEE THE HANDOUT ON ELASTICITIES GIVEN OUT ON 2/11.

By using calculus, you might be able to avoid doing some of this, but you have to assume a shape of the function. You also have to use integral calculus as well as differential calculus. With calculus you get a more accurate answer if your assumptions about the curve is right. But you never know that, so this method is better suited to the information you have.

Where do we get the information we need?

P_1Q_1: get this empirically—ask or observe.

$\Delta P/P_1$: get this by assumptions (small market with external price source, or constant marginal cost—latter is most common). Easier to get this term. Note that $\Delta P/P_1$ is % of observable price rather than an average price!

E: get this in a couple of ways described below.

Getting elasticity

Method 1: estimating from 2 data points on both price and quantity. If we've observed a market bouncing between prices, we have those data points. Ideally we're doing the estimation between known points, but usually we're not. (observed 10-12 but testing 8-10). Have to make 2 assumptions.

1. assumptions about the shape of the demand curve. Two choices: linear (which isn't useful because linear demand functions have changing elasticity) or constant-elasticity (which is better for us). This is not a very good method: why might you not want to estimate all this stuff from two data points? There might be an interaction between pizza and another good like hamburgers. If so, the move between the two points isn't a shift along the demand curve, but a shift from one

demand curve to another. This second assumption, that nothing else that mattered changed the position of the demand curve, is highly suspect. Think about this: assuming through two points may lead you to assume an upward sloping demand curve, which generally makes no sense (and for our purposes makes no sense at all).

Why might one prefer assumption of constant elasticity to linear? The intercept with the axis implies that there's a P above which no Q is demanded. Most goods aren't like that.

<u>Method 2</u>: Estimate with lots of data and econometrics. Get more points! You'll get a cluster—use econometric methods to estimate a demand curve <u>of the assumed shape</u> that best fits the data. This helps account for shifts in demand.

How do you go about this estimation?

Write down a regression equation in this form:

Q = a+bPizza + cHamburgers (but this is linear. Use logs!)

lnQ = a+blnPizza + clnHamburgers (this is constant elasticity.)

this is -E

<u>Method 3</u>: Use estimates of elasticity found in other trustworthy studies with similar characteristics to yours.

<u>Method 4</u>: Use elasticities in a similar market (maybe a complementary good) for which you have sufficient data.

<u>Method 5</u>: Experiment!

<u>Method 6</u>: Make a best guess (assume an elasticity) and then do a sensitivity analysis around it. This is the most common technique.

Your guesses are limited because you tend to know something about what elasticities look like: tend to range between -1 and 1.