

Weeks 4-5: Taxation, Redistribution, and Cost-Benefit Analysis

- I. The Concept of Incidence
 - A. If market conditions change, who is most affected? Least affected? Economists call these questions of *incidence*.
 - B. People tend to totally ignore incidence questions, treating them as obvious. In fact, though, determining incidence is an extremely difficult and subtle question.
 1. Ex: Air Travelers' Bill of Rights
 - C. A standard incidence question: Who ultimately pays a given tax?
 - D. People often just look at the law.
 - E. For example, some sales taxes just add 5% onto consumers' bill. People tend to think that consumers pay these. Other sales taxes are "included in the price." Do consumers indirectly wind up paying these too?
 - F. If the income taxes go up, does that make employers give you a raise?
 - G. Another example: shoplifting. Most people seem to believe that the real victims of shoplifting are not store-owners, but consumers, who pay a higher price for the goods they purchase.
 - H. On the other hand, if a storeowner decides to smash up his own store (and doesn't have insurance), few people would blithely say "He can just raise his prices."
 - I. What are the general principles of incidence? We are going to explore these with a focus on the incidence of taxation, then try to generalize from there.
- II. Two Viewpoints on Taxation: Suppliers' and Demanders'
 - A. Suppose the government imposes a \$1/unit tax.
 - B. From the sellers' viewpoint, this just looks like a fall in demand. For any given price the *sellers* offer, customers buy less.
 - C. But: From the demanders' viewpoint, this looks like a fall in *supply*. For any given price the *buyers* offer, suppliers sell less!
 - D. From the sellers' viewpoint, then, price falls and quantity falls. But from buyers' viewpoint, price rises and quantity falls.
 - E. So which group is correct? Both! Amazingly, *as long as you keep your definitions clear*, both viewpoints yield identical answers.
 - F. Diagrammatic explanation, using tax wedges.
 - G. Algebraic version:
 1. P =observed price tag
 2. P^S =price paid to suppliers
 3. P^D =price paid by demanders
 4. t =per-unit tax

- H. Assume:
1. S: $Q = a + bP^S$
 2. D: $Q = c - dP^D$
- III. Taxation Analyzed from the Suppliers' Versus Demanders' Viewpoint
- A. Suppose the law says that "sellers have to pay the government a tax of t per unit sold." The tax is thus "included in the price."
- B. Then:
1. $P^D = P$
 2. $P^S = P - t$
- C. Substitute in for P^S and P^D to get two equations in 2 unknowns:
1. S: $Q = a + b(P - t)$
 2. D: $Q = c - dP$
- D. Solve for P : $P = [-a + c + bt] / [b + d]$
- E. Suppose instead that the law says that "consumers have to pay the government a tax of t per unit sold." The tax is thus "added onto the price."
- F. Then:
1. $P^D = P + t$
 2. $P^S = P$
- G. Substitute in for P^S and P^D to get two equations in 2 unknowns:
1. S: $Q = a + bP$
 2. D: $Q = c - d(P + t)$
- H. Solve for P : $P = [-a + c - dt] / [b + d]$
- I. And what is $(P + t)$? $P + t = [-a + c - dt] / [b + d] + t = [-a + c + bt] / [b + d]$
- IV. What These Equations Mean, I
- A. Notice: the price tag when sellers pay the tax exactly equals the price tag plus the tax when buyers pay the tax!
- B. It only takes a little more work (not shown) to prove that Q is the same no matter who legally pays the tax.
- C. Conclusion: *It is not tax law, but economic law that determines who pays a tax.*
- D. Looking more closely, what do these equations tell us?
- E. Suppose that supply is perfectly inelastic; i.e., $b = 0$. *Then the full burden of taxation falls on suppliers.*
1. If suppliers legally pay tax, then observed price tag $P = [-a + c] / d$; i.e., no matter what taxes are, the price tag says the same thing. In other words, sellers absorb 100% of the tax.
 2. The same holds if demanders legally pay tax. Then observed price tag $P = [-a + c - dt] / d$. I.e., the coefficient on t is -1 , indicating again that sellers absorb 100% of the tax. If the sales tax rises by \$1, the pre-tax price falls by exactly \$1.
- F. Suppose instead that supply is perfectly elastic; i.e., $b = \infty$. (That may be a little too scary, so I'll just put in $b = 1,000,000$). *Then the full burden of taxation falls on demanders.*
1. If suppliers legally pay tax, then observed price tag $P = [-a + c + 1,000,000t] / [1,000,000 + d]$. I.e., the coefficient on t is

approximately equal to +1. Raise the tax by \$1, the price tag rises by \$1, leaving suppliers' earnings unchanged.

2. The same holds if demanders legally pay tax. Then observed price tag $P = [-a + c - dt] / [1,000,000 + d]$. I.e., the coefficient on t is approximately 0. Thus, raising the tax by \$1 raises $(P + t)$ by \$1, indicating that buyers pay 100% of the tax.

G. General principle: The more elastic supply gets, the smaller suppliers' tax share becomes. Tax share ranges from 0% for perfectly elastic supply curves to 100% for perfectly inelastic supply curves.

H. Intuition: Mobile resources are elastically supplied. Thus, if you raise taxes on them, they flee into other activities. In contrast, immobile resources are inelastically supplied. If you raise taxes on them, resource owners just "grin and bear it."

I. More intuition: The narrower a tax is, the more untaxed alternatives there are. To avoid a tax, a resource has to be not just mobile, but mobile *between the taxed and the untaxed sectors*.

J. Examples:

1. Income taxation on all workers
2. Extra income taxes on lawyers
3. Tax on ski equipment
4. Tax on land
5. Tax on oranges sold in California
6. Tax on oranges sold in the U.S.
7. Picasso paintings

V. What These Equations Mean, II

A. Next, consider demand. Suppose that demand is perfectly inelastic; i.e., $d = 0$. *Then the full burden of taxation falls on demanders.*

1. If suppliers legally pay tax, then observed price tag $P = [-a + c + bt] / [b + d]$. The coefficient on $t = 1$, indicating that the price tag rises by \$1 if the tax rises by \$1.

B. Suppose instead that demand is perfectly elastic; i.e., $d = \infty$. (Again, I'll just approximate this by setting $d = 1,000,000$). *Then the full burden of taxation falls on suppliers.*

1. If suppliers legally pay tax, then observed price tag $P = [-a + c + bt] / [b + 1,000,000]$. I.e., the coefficient on t is approximately equal to 0. Raise the tax by \$1, the price tag stays the same; demander pays none of the tax.

C. General principle: The more elastic demand gets, the smaller demanders' tax share becomes. Tax share ranges from 0% for perfectly elastic demand curves to 100% for perfectly inelastic demand curves.

D. Intuition: Products with good substitutes (and products that consumers are very willing to simply "do without") are elastically

demand. Thus, if you raise taxes on them, consumers switch to other products or do without. In contrast, products without good substitutes are inelastically demanded. If you raise taxes on them, demanders just endure the higher price.

E. More intuition: The narrower a tax is, the more good substitutes there are. To avoid a tax, consumers need good *untaxed* substitutes.

F. Examples:

1. Soap
2. Electricity
3. Perfume
4. Movies
5. Gas
6. Residence in California
7. Residence in Virginia

VI. More on Incidence

A. In the real world, all markets are interconnected, which complicates the analysis of incidence. But the principles stay the same: No matter what the tax laws say, taxes are actually paid by immobile resources and avoided by mobile resources.

B. For example, if you tax airline tickets, some producers are highly mobile (investors), while others are much less mobile (pilots). So the incidence of this tax might be borne evenly by passengers and pilots, while investors escape.

C. Everything said about taxes applies just as well to all other government policies.

1. Ex: If landlords have to give tenants 3 months' notice before eviction, who pays?

2. Ex: If car owners have to install air bags, who pays?

D. In fact, everything said about government policies also holds for ALL market fluctuations.

1. Ex: If Picasso suddenly becomes more popular, who benefits?

2. Ex: If I suddenly strike new oil, who benefits?

3. Ex: If you relax copyright protection, who benefits?

E. Exercise: Name any change in market conditions. Then let's analyze the incidence of this change.

VII. Transfers Versus Deadweight Losses

A. Landsburg on "Why Taxes Are Bad": suppose I am willing to pay \$20 for a shirt that sells for \$18 untaxed. Raise the tax from \$0 to \$1 - and you transfer \$1 from me to the government. Raise the tax from \$0 to \$1.99 and you transfer \$1.99 from me to the government. But raise the tax from \$0 to \$2.01, and you take \$2.00 from me *without doing anything for the government*. You raise no revenue because I didn't buy. But I am nevertheless worse off due to my loss of consumers' surplus.

- B. Two lessons about taxation:
 - 1. Obvious lesson: Taxes make some people poorer and other people richer.
 - 2. Non-obvious lesson: Taxes make some people poorer without making *anyone* richer.
 - C. Economists call the obvious effects "transfers," and the inobvious ones "deadweight losses."
 - D. Diagrammatic explanation, showing CS, PS, revenue, and DW loss.
 - E. Now: how much revenue does the government raise from a sales tax? Mathematically, tQ .
 - F. So you might think that lost (consumers' surplus + producers' surplus) would add up to tQ .
 - G. Wrong! The total loss to consumers and producers is always MORE than tQ .
 - H. Why? Recall that total gains to trade are greatest at the intersection of the (untaxed) S and D curves. Call that quantity Q^* .
 - I. Taxes reduce the equilibrium quantity to Q^* . This means that the gains to trade for all of the units from Q^* to Q are lost, *without raising any revenue for the government*.
 - J. The rectangle tQ^* is a transfer to the government. The triangle between Q^* and Q is a deadweight loss.
 - K. The more elastic both supply and demand are, the worse deadweight losses get. (Remember further that elasticity usually increases in the long-run, so the consequences of bad policies intensify over time).
 - L. Other examples:
 - 1. The leaky bucket
 - 2. Piracy
 - 3. Theft
- VIII. Deadweight Losses and Cost-Benefit Analysis
- A. Non-economists tend to see everything as transfers, and to ignore the possibility of deadweight costs. So policy debates are just about "Which side are you on?" rather than "Which policy is better overall?"
 - B. Once you take deadweight losses seriously, however, you can ask, "How can we *minimize* deadweight losses?"
 - C. Or more positively, how can we *maximize* the sum of benefits minus costs. This is the core idea of Cost-Benefit Analysis, or CBA.
 - 1. Talk about "economic efficiency" is basically synonymous.
 - D. Every government policy has a long list of effects.
 - 1. Intended outcomes
 - 2. Unintended outcomes
 - 3. Direct costs
 - 4. Indirect costs
 - E. Question: Is government policy X worth doing?

- F. Cop-out answer: It's all a matter of opinion/depends on your values/there's no right or wrong answer here.
- G. The CBA alternative: Put a dollar value on (or "monetize") all costs and all benefits. Then sum up.
- H. How can you put a dollar value on something that no one buys or sells? By asking, "How much *would* people pay for this?" or "How much *would* people pay to avoid this?"
- I. How can you find out what people *would* pay if they don't actually pay?
 - 1. Ideally: telepathy.
 - 2. Or: asking them.
 - 3. Better: inferring from their behavior. E.g., how much extra do people pay to live in a neighborhood with 10% less crime?
- J. Actual governments very rarely use CBA. For fiscal years 2003-2013, the U.S. government passed 37,671 rules – and monetized costs *and* benefits for only 115 of these rules.
- K. Still, since CBA is the main approach in policy analysis, and a useful input from almost any other non-cop-out viewpoint, our class focuses on CBA.
- L. CBA is not the only alternative to the cop-out answer. See any good class in political philosophy.
- IX. The Many Margins of Tax Avoidance
 - A. When you first bring up supply and demand elasticities, people tend to think of them as small. (I.e., they think of curves as close to vertical).
 - 1. Ex: "Who is going to drive less just because the price of gas rises by a penny?"
 - B. Such quick dismissals often overlook innumerable ways people can alter their behavior to avoid taxation.
 - C. Example #1: Luxury Taxes.
 - D. You might think that people who buy luxuries are rich, they won't buy less just because you impose heavy luxury taxes.
 - E. However:
 - 1. Many purchasers of luxury products aren't rich; they are often middle- or low-income people who really like certain specialty products.
 - 2. Moreover, the rich don't "have to" spend their riches on luxuries. They could just buy larger *quantities* of untaxed products.
 - 3. In addition, most luxury taxes only apply to fairly obvious "luxuries." They will typically omit things like nice houses and travel.
 - 4. Less obviously, the rich could just consume the luxury of leisure instead.
 - F. Example #2: Income Taxation

- G. You might think: "Who is going to quit their job just because the tax rate rose from 36% to 39.6%?"
- H. However:
 - 1. There are numerous groups that just might do this:
 - a) Married women
 - b) People nearing retirement
 - c) Teens
 - d) Students
 - 2. Employees could work less overtime, devote less energy to their careers, and so on.
 - 3. Employers could switch from (taxed) monetary to (untaxed) non-monetary compensation - company cars, travel, free meals, health insurance...
 - 4. In the longer run, people could change their career plans, shifting from high-income, low-fun occupations (doctor?) to low-income, high-fun occupations (professor?). The income tax does not tax "fun," after all.
- I. If Q falls enough in response to taxation, it is quite possible for a tax authority to raise **less** revenue with **higher** taxes.
- J. This insight - as applied to income taxation - can be illustrated with a so-called "Laffer curve." If the income tax rate is 0%, the government raises no revenue. But if the income tax rate is 100%, no one will work, so again the government raises no revenue. Thus, the Laffer curve looks like an upside-down U.
- K. Partly as a result of this insight, many governments around the world have cut their highest tax rates since 1980.
- X. Redistribution and the Equity-Efficiency Trade-Off
 - A. Governments don't just take money from people. They also give them money, aka "redistribution."
 - B. For most purposes, you can think of redistribution as "negative taxation." So everything we've learned about taxation still applies.
 - 1. A subsidy for non-work has the same effects as a tax on work.
 - 2. A subsidy for failure to save has the same effects as a tax on saving.
 - C. Governments can redistribute cash or "in-kind." The deadweight losses of "in-kind" redistribution are especially severe, especially when the government gives expensive products away for free.
 - 1. Diagramming gratis pricing.
 - D. Assuming that government uses taxes and redistribution to make society "more fair," this implies an "equity-efficiency trade-off."
 - 1. Usual picture: The most "equitable" outcome is perfect equality, but this gives people terrible incentives. The free-market outcome, in contrast, is the most "efficient," but this is terribly unfair.

- E. SDB makes people reluctant to acknowledge the equity-efficiency trade-off, but economists mostly just debate its *severity*.
- F. Deeper SDB: Assuming government uses taxes and redistribution to make society more fair in the first place! It's clearly possible for government to take the free-market outcome and make it *less* equal or otherwise fair.
- G. Plenty of huge real-world policies plainly increase inequality.
- H. Clear-cut cases:
 - 1. Immigration regulation
 - 2. Housing regulation
 - 3. Energy regulation
- I. Likely cases:
 - 1. Universal redistribution, because the rich live longer.
 - 2. Education subsidies, because the children of the rich consume more education.