14.01SC Principles of Microeconomics, Fall 2011
Transcript – Lecture 3: Elasticity

PROFESSOR: So today what we're going to do is continue our discussion of supply and demand. This is sort of introduction week, if you will. We've kind of talked about supply and demand, and you guys, rightly, immediately were on to where do those curves come from. And that's what we'll start next week. But what I want to do today is talk some more about what determines the shapes of supply and demand curves and just think about an overview of how we think about supply and demand interacting in a market and what determines how responsive individuals and firms are to prices.

And, once again, remember everyone should have a handout that you should have picked up in the back on your way in. So everyone should have a handout. What we talked about last time was the sort of qualitative effects, the qualitative version of the supply and demand model. We talked about what happens when a supply curve shifts, what happens when a demand curve shifts. We talked about how either a supply shock or a demand shock could lead to the price being increased. But they could have very different effects on quantity, et cetera.

What we didn't talk about is how big these effects are. I made up some numbers. I threw them on the graphs. But I didn't talk about where the size of those effects come from. And where they come from is the shapes of the supply and demand curve. And that's what we'll talk about today is what determines the shapes of supply and demand curves. And that will be the focus of today's lecture. I'll talk both theoretically about what determines these shapes and empirically about how economists go about figuring out the shapes of supply and demand curves.

So, to think about this, let's start with Figure 3-1, which is a standard market diagram we had last time. With an initial equilibrium at point E1, with an initial price P1 and a quantity Q1. That's the equilibrium that's stable. Because at that price P1, consumers demand Q1 units, and suppliers are willing to provide Q1 units. So that's a stable equilibrium.

Now we have some supply shift. Last time we talked about somehow a pork-specific drought. That leads the supply to shift inward. So the supply curve rises to S2. At that new price, initially, you would have excess demand. But quickly the price increases to shut off that excess demand. And you end up with a new equilibrium with a higher price, P2, and a lower quantity Q2, and new equilibrium point E2. OK? And we talked that through last time.

What I want to talk about this time is well, what determines the size of that shift from Q1 to Q2 and that price increase from P1 to P2? What's going to determine it is the elasticity of supply and demand. The elasticity of supply and demand is how much do supply and demand respond? Do the quantities supplied and the quantities demanded respond when the price changes?

When we say, how elastic is demand, what we mean is how sensitive to price is the quantity demanded. Or, alternatively, what is the slope of that demand curve? So the slope of the demand curve will be the sensitivity of quantity demanded to the price consumers face. And that will determine the market responsiveness.

In economics, it's always true that the best way to think about things is to go to extremes. You have to remember that extremes don't exist in the real world. But it's a useful teaching device to think about extremes.

So let's think about one extreme case in Figure 3-2. Let's think about the case of perfectly inelastic demand. Perfectly inelastic demand, that's where there's no elasticity of demand. What that means is that demand for a good is unchanged regardless of the price. So perfectly inelastic demand is a case where demand for the good is unchanged regardless of the price. That would lead you to have a vertical demand curve at a given quantity. What this says is regardless of the price, people always demand Q.

Can anyone tell me what would cause demand to be perfectly inelastic? In what types of situations would demand be-- it's never perfectly inelastic-- would demand be relatively inelastic? Yeah?

AUDIENCE: [INAUDIBLE PHRASE].

PROFESSOR: It's all about substitutes. When there's no substitutes, when there's nowhere to go, it doesn't matter what the price is. When there's no substitutes, demand will be perfectly inelastic, because you have to have Q. It doesn't matter what the price is. Because there's no substitute for that good. So if you wanted amount Q of that good for any reason, you're always going to want that amount Q no matter the price.

So a perfectly inelastic good would have no substitutes. So you'd always want Q no matter what. Can anyone think of an example? There's no perfectly inelastic good in the world. But what sorts of goods? Yeah?

AUDIENCE: Medicines.

PROFESSOR: Medicines. Now, not necessarily all medicines. So give me an example of a medicine which would be more or less inelastic. So I don't even need a medical name. What sort of treatments?

AUDIENCE: Like heart attack maybe?

PROFESSOR: Yeah, something which is sort of lifesaving. The best thing that we often use is insulin for diabetics. Diabetics without getting that insulin to manage their diabetes will die. That seems like that's something where there's not a whole lot of substitutes. The substitute is dying. So basically that's where demand is relatively inelastic. Or a heart transplant, when you get a heart transplant or any kind of transplant, you have medicine you take so you don't reject the transplanted organ. That sort of medicine demand should be very inelastic.

Elastic drug, well, our favorite example is always Viagra. It's something where you'd think that you can probably survive without it. And people would want less Viagra if you charged a lot more for it than if you charged less for it. So elasticity is going to be about substitutability. And that's going to determine inelastic demand.

Now, what happens with inelastic demand when there's a supply shock? When supply increases, what happens? Well, in that case, there can never be excess demand, because demand doesn't change. So all that happens is price just increases. If there's inelastic demand, and there's a supply shock, then all that happens is an increase in price and no change in quantity. So with inelastic demand, quantity doesn't change for a price increase. Price just goes up. From a supply shock, prices just goes up.

Now, let's consider the opposite. Let's look at Figure 3-3 and think about perfectly elastic demand. Perfectly elastic demand is demand where consumers, essentially, don't care about the quantity. They just care about the price. That is, there are infinitely good substitutes. A perfectly elastically demanded good would be one where there are, essentially, perfect substitutes. An inelastic good is where there's no substitute. A perfectly elastic good would be where there's perfect substitutes.

Technically, if a good is perfectly elastically demanded, then you are completely indifferent between that good and a substitute. Well, if you're completely indifferent, then if the price changed at all, you would immediately switch. And so the price can't change.

What's an example? Once again, there's no good example of a perfectly elastic good. Yeah?

AUDIENCE: Candy.

PROFESSOR: What?

AUDIENCE: Candy.

PROFESSOR: Candy. OK. So you've got your Wrigley's gum. I like the sugar-free, minty gum. You've got Orbit and Eclipse. And I go to the store, and they're all pretty much the same price. If Orbit was more than Eclipse, I just buy Eclipse. They're the same. They're minty gum. It doesn't make a difference. So basically the price is the same.

If there's a supply shock, I don't know, they're made with the same shit. But let's say that Eclipse has some magic ingredient. And let's say the Eclipse magic ingredient got more expensive, so the supply curve shifted up. Well, Eclipse could not respond by raising its price. Because I just switched to Orbit.

Or we often think of McDonald's and Burger King. Now, they're less perfect substitutes, but pretty perfect. If McDonald's started charging $10 for a hamburger, you wouldn't go there anymore. You'd go to Burger King.

So if there's a supply shock to a provider that's facing a perfectly elastic demand curve, they cannot raise their price, because people will just switch. So quantity will fall a lot. Because if I'm supplying Eclipse gum, and it suddenly costs a lot more to produce Eclipse gum, but I can't raise my price, because I will lose all my business to Orbit, I'm just going to produce a lot less Eclipse. Because I'm losing money now.

So with perfectly inelastic demand, the quantity didn't change. With perfectly elastic demand, we saw a big quantity change. So, more generally, what determines the quantity change in response to a price change is the elasticity. More generally, we're between these two cases of perfectly elastic and perfectly inelastic. And what's going to determine the price change is going to be the price elasticity of demand epsilon which is going to be the percentage change in quantity for each percentage change in price or, in calculus terms, dQ/dP. So it's, basically, the percentage change in quantity for the percentage change in price.

So, for example, if for every 1% increase in price quantity falls 2%, that is a price elasticity of demand of minus 2. The price elasticity of demand is the percentage change in quantity for the percentage change in price.

So inelastic demand is an epsilon of 0. There is no change in quantity when price changes. Perfectly elastic demand is an epsilon of negative infinity. Any epsilon change in price leads to a negative infinite change in quantity. Immediately, the quantity goes to 0 if you try to raise your price.

So the price elasticity of demand will typically be between 0 and negative infinity. And the larger it is the more quantity will change when prices change. Questions about that? Yeah?

AUDIENCE: So that formula, shouldn't it be dQ/dP times P/Q because dQ/dP just refers to the change of the quantity with respect to price, not necessarily the percent change.

PROFESSOR: Yeah, you're right. I was trying to get too fancy with my calculus. You're right. Let's just stick with the non-calculus formula. I never should deviate from my notes. So let's just stick with the non-calculus formula. OK, other questions about this? OK. So, basically, that's the elasticity. That's going to be the elasticity.

Now, an interesting point about elasticity is now, we're not going to get into producer theory for a couple of lectures. But as a little peek ahead about producer theory, let's think about how elasticity determines the money that producers make from selling their goods.

Well, if a producer sells Q goods at a price P, they make revenues R. Revenues are the price times the quantity. The amount of money a producer makes when it sells goods, its revenues, this isn't its profits. We're not having profits. It's just the amount of money it makes, not the amount of money it takes home at the end of the day. I'm ignoring the cost of making the goods. The amount of total revenues it makes is price times quantity.

Well, we can then say that the change in revenues with respect to price is what? It's Q plus dQ, plus delta Q-- let me put it this way to make my math clearer-- plus P times delta Q over delta P. That's how revenues change with respect to price. Or, in other words, plugging in from the elasticity formula, delta R over delta P equals Q times 1 plus epsilon.

So, in other words, what this says is that if you're a producer, and you're trying to decide whether to raise your price, whether that will increase revenues, it all depends on the elasticity. If the elasticity is between 0 and minus 1, then raising prices will raise revenues. If the elasticity is greater than minus 1, then raising prices will lower revenues.

We're often faced with the issue of why did they charge this much for this good, or should they raise their prices or not raise their price. Well, that's all about the elasticity of demand. The elasticity of demand will determine whether they're going to make more money by raising their price or lose money by raising their price.

For Eclipse gum, their elasticity of demand is well above minus 1 in absolute value, so they're going to lose money by raising their price. If they take the current level of Eclipse, for every penny they raise, they'll lose money. For insulin, for every penny they raise, they'll make money.

And then you might say well, then how come the price of insulin isn't infinity and the price of Eclipse gum isn't zero? Well, that's what we'll talk about in a few weeks. Because it also depends on the costs of producing it. But at the end of the day, that's what's going to determine the money that's made by producers when they change their prices. Questions about that?

OK. So now, that's how we think about the shape of supply and demand. The shape of supply and demand is determined by these elasticities. So now we have to get into OK, well, where do we get these elasticities from? And that is the main topic of empirical economics which is estimating these kinds of elasticities, estimating these types of elasticities.

So one of the first distinctions I drew in the lectures is between theoretical economics and empirical economics. Theoretical economics can tell us this is what a graph looks like and supply and demand. Theoretical economics can't really tell us how big, for example, an elasticity is going to be. It can tell us, there's more substitutes or less substitutes so we can rank them. We know the elasticity for Eclipse gum has got to be higher than the elasticity for insulin.

But from the theoretical model, we can't say what the elasticity actually is. To say what an elasticity actually is, we need to go to an empirical model. We actually need to bring data to bear on the question.

And this is very difficult. Because here we face the fundamental conundrum facing the empirical economist which is distinguishing causation from correlation. And the whole guts of empirical economics is all about this question, distinguishing causation from correlation.

The classic story that illustrates this, it's due to my colleague, Frank Fisher, from a textbook many years ago, was the story of in ancient Russia there was a cholera outbreak, and many people were dying. So the government decided to send doctors out to try to solve the problem. And where there were more people sick, they sent more doctors.

Well, the peasants said, wait a second. We observe that where there's more doctors, more people are dying from cholera. So the doctors must be causing the cholera. So they rose up and killed the doctors.

The peasants confused causation with correlation. They thought that the fact that you saw more people dying where there's more doctors meant that doctors were causing the disease. Clearly that's wrong. That's why they were peasants. But it's not just peasants that make this mistake.

For example, in 1988, Harvard University, our illustrious neighbor to the south, I guess, west, east, I don't know. Which way is Harvard? I don't know directions, down the street. A Harvard University dean conducted an interview with a set of freshmen. And they found that those that had taken SAT preparation courses-- now, you all took SAT preparation courses. But in 1988, not everyone did. Those who'd taken SAT preparation courses scored an average of 63 points lower-- this was back when the SAT was 1600 points-- 63 points lower on their SATs then those that had not taken preparation courses.

The dean concluded that preparation courses were unhelpful, and that the testing industry was preying on the insecurities of students to provide a useless service. Why was the dean confusing causation with correlation? What did the dean get wrong in drawing that conclusion? Yeah?

AUDIENCE: What had probably happened is the students who got worse scores realized that they wanted to try and improve their scores by taking an SAT prep class. So that's why there is a lower average score for the people who had taken the class.

PROFESSOR: Generally, the people who needed the help the most took the most courses. And so they had an underlying lower score. So, in fact, you can't tell anything from the fact that the people who took the prep course scored worse. It's just another excellent example of confusing causation with correlation. And that's another example.

Another example I like quite a lot is studies of breastfeeding. There are numbers of studies of breastfeeding, especially in developing countries, where they found that the longer children were breastfed the sicker they were. So they concluded that breastfeeding was bad for kids. Well, that's not the truth. The truth is the sicker kids need to be breastfed more, because breastfeeding is actually good for kids. And they just confused the causation with the correlation.

Now, these are all fun examples. But the truth is this is a common mistake made by citizens, policy makers, everyone in the real world. It's taking two things that move together and assuming one causes the other. And this is the fundamental conundrum facing empirical economics in trying to address these kinds of things like measuring elasticities.

So to understand that, let's think about the issue of trying to estimate the elasticity of demand for pork. Let's say you have the exciting job of estimating the elasticity of demand for pork. That's your assignment. Well, you say, wait a second. What we learned in class, as shown in Figure 3-4, is that the price of pork can rise for very different reasons.

Figure 3-4, we start at an initial equilibrium like E1 with a quantity like Q1 and a price P1. Now, imagine that there was a shift in demand, because the price of beef rose, remember? The price of beef rose. That shifted demand from D1 to D2. What did that lead to? A higher price and a higher quantity.

So if you took that diagram-- forget the supply shift for a minute, just imagine that's the change-- and you said, aha. I can measure the elasticity. I see here there's a change in price. I can then look at how quantity changed. And I'll get the elasticity right after all. It's delta Q over Q or delta P over P.

So I just look, and I take Q2 prime minus Q1 over Q1. That's the percentage change in Q. I take P2 over P1 over P1. That's the percentage change in price. And what do I get? A wrong signed elasticity is what I get. I get a positive elasticity, because Q is going up and P is going up. Why? Because I'm confusing causation with correlation.

It's not the price change that caused quantity to change. In fact, it's the opposite. It's a taste shift, which caused quantity to increase which drove up the price. It was a demand increase which caused the quantity demanded to increase which drove up the price. So it's the quantity driving the price, not the price driving the quantity.

So if you looked at that simple example, as many people in the real world do, they'd say, hey, look. Higher prices cause higher quantities. You're getting the wrong answer. Because you're confusing correlation which is the higher price is correlated with the higher quantity. Because there was a common factor causing both of them which is the demand shift and not causation. The higher price did not cause the higher quantity.

What do we need to do? We need to distinguish why the price increased. We need to distinguish why the price increased to measure this. If, instead, we looked at a shift in supply such as the case that's shifting from S1 to S2 and moving the equilibrium from E1 to E2, then you would get the right answer. Because then you'd say, look. Something independent to consumers shifted up the price. Some shock to the supply of pork shifted up the price. And we saw that their quantity fell as a result.

What's the key? The key is that to measure an elasticity of demand, you're measuring the slope of the demand curve. So you need to shift along a demand curve, not shift the demand curve itself.

So if you look at this figure, what's the concept we want? We want the slope of the demand curve. Well, you get that by shifting from E1 to E2, because you shift along the demand curve. So by looking at what happens to quantity as price rises from E1 to E2, you get the slope of the demand curve. You get that delta Q over delta P you want.

But from E1 to E2 prime, you're not shifting along the demand curve. You're actually measuring the elasticity of supply. You're measuring the elasticity of supply. You're shifting along a supply curve. So you're actually answering a different question, a relevant question, but a different one. That question is, what's the elasticity of supply? How willing are pork producers to supply pork as the price goes up?

So it's the same delta Q over delta P. But here we did the elasticity of demand. There's a corresponding elasticity of supply which is measured the same way. It's delta Q over delta P, but it's for a different kind of shock. It's what you get from moving along the supply curve.

So if we went from E1 to E2 prime, we can use that to measure the elasticity of supply or the slope of the supply curve. And we do that if something shifts demand to move us along the supply curve. From E1 to E2, we measure the elasticity of demand as something shifts supply and moves us along the demand curve.

So what we need to measure the elasticity of demand is something which shifts supply but does not, itself, affect demand. And the best example of this that we use in economics, a great example, is government policy which comes along and changes the supply conditions for a good.

So, for example, let's think about a tax on pork. So if you go to Figure 3-5, imagine the government came along and taxed pork. The government comes along and taxes pork. Let's think about what a tax on pork does.

The government comes along, and let's say the pork market is initially in equilibrium at $3.30 with 220 million kilograms of pork sold. Now the government comes along and says that it's going to charge $1.05 in tax for every kilogram of pork. So it's going to impose a tax of $1.05 per kilogram on producers. So it's saying to producers of pork, for every kilogram of pork you sell, you have to send a check to the government for $1.05. For every kilogram of pork you sell, you have to send a check to the government for $1.05.

Now, somebody talk me through how a supplier thinks through that. How does a supplier react to that? What do they think? They're initially happy at E1 selling 220 million kilograms at $3.30. What happens when the government comes in and says you have to pay $1.05 for every kilogram of pork you sell? What happens? Yeah.

AUDIENCE: The producer decides that the current amount of money they have will not be able to buy as much inputs to create their products. So they can produce less.

PROFESSOR: Exactly. So, in other words, the cost of producing just rose. So what do they do? So, in other words, what they say is look, effectively, if I was happy before selling 220 million kilograms at $3.30, to keep me equally happy selling 220 million kilograms, I'm going to have to raise the price. We should add this to graph, actually.

If you draw a vertical line up for me, one to the S2 curve. Draw a little dashed line up from the E1 to the S2 curve and then over. That price intersection will be $4.35. So in other words, if you want me to keep producing 220 million kilograms of pork, I'm going to have to get $4.35 a kilogram. And you might say, what gives you the right to get that? And it's not about rights. It's about what producers are willing to do.

That same mathematics, that same supply curve that tells us they're willing to sell 220 million kilograms at $3.30 says, if you want them to keep selling 220 million kilograms but also pay $1.05 to the government, they're going to have to get $4.35 a kilogram.

So what happens is that's a supply shift. And with the same reaction we saw last time with the drought, the price goes up, consumers demand less, and you reach a new equilibrium at the price E2. You reach a new equilibrium where you sell 206 million kilograms for a price of $4.00.

So someone tell me how I use this example to find elasticity of demand. Yeah.

AUDIENCE: I guess you need to know that the change in price traveled along the demand curve. So you know that it's not [INAUDIBLE PHRASE].

PROFESSOR: OK, so tell me. You don't have to do the math in your head. But how would I compute it?

AUDIENCE: You would take E1 and E2, and then you would do the price over the quantity change.

PROFESSOR: Right, exactly. So the quantity change delta Q over Q, is what? It's minus 14 over 220. It fell by 14 million kilograms over 220. The price change, delta P over P, the price rose from $3.30 to $4.00. So the price change is $0.70 over $3.30.

And using those, you end up with a price elasticity of minus 0.3. Or, in other words, there's a 6.4% change in quantity. This is minus 6.4% for a 21% change in price. So quantity falls by 6.4% when price goes up by 21%. That's a price elasticity of minus 0.3. Or that's a relatively inelastic demand. It's not perfectly inelastic, but it's relatively inelastic. In other words, at that point, pork producers could make money by raising the price.

Now, you might say well, why didn't they? That's something we'll discuss in a couple weeks. But at that point, demand is relatively inelastic. And you've got a convincing estimate, because you moved along that demand curve. You used the supply shift.

Now, we're going to talk about taxation much, much later in the semester. Let me just talk for one minute about what we learned from this graph. What happens? Well, the shaded area is the money the government raises from its tax. The government has a tax of $1.05 at 206 million kilograms. So it raises $1.05 times 206 million kilograms which is that shaded area.

There are two points to note the we'll come back to later in the semester. The first point to note is the amount of money the government raises will depend directly on the elasticity of demand. Can anyone tell me how much money the government would raise if you had a perfectly inelastic demand? Yeah.

AUDIENCE: [INAUDIBLE PHRASE].

PROFESSOR: Right. If we think about this demand curve being perfectly flat, if we think about this demand curve being perfectly flat, then basically the producer can't charge any more for their good. So it's going to depend on whether the producer is willing to sell at $1.05 less and how much less they're willing to sell. If they're willing to sell a lot less, they're going to make a lot less money.

It's going to be where that second supply curve intersects a flat demand curve. So that quantity is going to be a lot smaller. We don't have it on the diagram. But you see where that dashed line at $3.30 intersects S2, that's way to the left. Quantity is going to fall a ton in this market. When quantity falls, the government is going to raise a lot less money. Because the government raises $1.05 on every unit sold at the end.

So if the government taxes very elastically demanded goods, it's going to raise less money. If it taxes inelastically demanded goods like insulin, it's going to raise more money, because the quantity doesn't change. Yeah.

AUDIENCE: So cigarettes are relatively inelastic.

PROFESSOR: Yes, exactly. Cigarettes are relatively inelastic. The elasticity is around minus 0.5. So the government will actually raise money by raising the cigarette tax.

Those of us, as good liberals, think we should tax yachts. Let's tax yachts. Only rich guy have yachts. The problem is yachts are incredibly elastically demanded. So you raise a lot less money taxing yachts than you think. Because guys buy fewer yachts, and you don't raise as much money as you think you would. You still raise some, and it still may be worth it. But you raise less than you think. So that's one sort of observation about this. It's basically how much money you'll raise will be a function of how elastic the demand is.

The other important observation to make is why it's actually hard for governments to figure out how much money they're going to raise for a tax. Because, to figure it out, they need to know these elasticities. That is, the naive thing to do would have been to say what? Well, we're selling 220 million kilograms of pork. That's $1.05. We're going to tax each kilogram. So that's 220 million times $1.05. And that's how much money we raise. Well, that's wrong, we know, because that assumes inelastic demand. If demand's elastic, they'll raise less than that.

Well, if we want to figure out how much a government is going to raise from a tax, they've got to know what these elasticities are. And those are actually pretty hard things to know. So that's why there's uncertainty. That's why when politicians will say, this tax will raise x and you'll hear the New York Times report, the tax will raise x, that is a guess. Those are guesses, because they depend on our best estimate of the key elasticities that determine how people respond. Yeah.

AUDIENCE: But in Washington you have tax cuts that raise money.

PROFESSOR: Well, some claim you do. You don't actually. But some claim you have tax cuts that raise money. That's because they think the elasticity is very large. If the elasticity is large enough, a tax cut can raise money. So, basically, that's all about that some people think that elasticities are large enough that tax cuts can raise money. Those people are wrong. But that's what they claim. Yeah.

AUDIENCE: [INAUDIBLE PHRASE].

PROFESSOR: Yes. Excellent point. You'll go through that in section on Friday. So what I've done is I've done an example of a constant elasticity curve. Actually, I've done something here which is logically inconsistent. This curve is linear which means it can't be constant elasticity. If it's constant elasticity, it would have to curve.

So what I've estimated here is a local elasticity. I have estimated the elasticity around that price change. But the elasticity, if this curve is true, would be different at different points on this curve. If the elasticity is going to be constant all over the curve, and you're going to do a constant elasticity of demand, that's going to be a curve that bends, not a linear curve. So a linear demand curve is not constant elasticity of demand.

We will typically ignore that issue and focus on local elasticities. But that is an important issue. We'll discuss that in section on Friday, the difference between constant elasticity of demand curves and linear demand curves. But, typically, we're think about local changes. So if it's local enough, it doesn't really matter. But, for a broad change, it will matter what the shape of the curve is. Good point. Other questions?

OK. Let me then turn to another problem we face in empirical economics. So this is an example of a problem we're facing in empirical economics. Let me turn to an example of another problem we face in empirical economics estimating elasticities. It is that individuals often choose the price they face. Individuals, typically, often don't just face a price that's given to them. And then you can say, OK, they're given a price, and we see how they respond. They often choose the price they face.

Let me explain what I mean by that. A classic example of an elasticity that matters a lot for policies is the elasticity of demand for medical care, the elasticity of demand for medical care. That is how much less medical care will you use if you have to pay for it?

So, for example, most of us have insurance through MIT or maybe through our parents. And the way health insurance works is you pay a certain amount per month or your parents do, and, in return, that health insurance covers the cost of your medical care, most of it. But, typically, you have to pay some of it.

So how many people have gone to the doctor in the last six months? Did you have to pay something? How much did you pay? Did you pay a copayment? No? None of you? Yeah. How much did you pay?

AUDIENCE: I think like $20.

PROFESSOR: $20, $10, $5, that's what's called the copayment, or $0. Most insurance these days has what's called copayments. A copayment is what you pay when you go to the doctor. Insurance picks up the rest. You don't know. You didn't know how much the whole doctor visit cost. You just went, you gave them your card. They said your copayment is $20. You gave them $20. You don't know. The visit might have cost $100, $200, $500, $1,000. You don't know. Your insurer picks up the rest. You pay the copayment.

Copayments are rapidly on the rise in health insurance. There's a rapid rise in copayments. Increasingly, insurers are saying, look, health care costs are out of control. One way we're going to combat them is by making people bear more of the cost that they use.

I could go on forever about how I'm a health care economist. I could go on about health care forever. But just to fix ideas on why this is an issue, in 1950, the US economy spent 5% of our gross domestic product, 5% of our size of the economy went to health care. Today it's 17%. By 2075, it's projected to be 40%. That is of every dollar that's made in America, $0.40 will go to medical care. By 100 years later, it's about 100%. Literally, if we do nothing, the entire economy will be health care.

Obviously, that can't happen. We've got to deal with this. And one way that insurers and some policy makers are saying we need to deal with this is we need to make consumers bear more of the costs of their medical care. We need to make consumers pay more when they go to the doctor, so that they understand the consequences of their decision.

Well, if we're going to do that, a key question we need to know is well, does it affect their behavior? If we make consumers pay more, and it doesn't at all affect their demand for medical care-- it's just a tax on them, essentially-- then that's different than if it causes them to use less medical care. It may be good, may be bad. We'll come back to that.

But the key empirical question is what is the elasticity of demand for medical care? If you pay $20 and you pay $0, how much less like are you to use the doctor when you pay $20 versus when you pay $0. Well, we can all introspect this and think about it. But, in fact, to answer this we have to go to the data and ask, well, what's the difference?

So people, for many years, went to the data. And they said, look, there's all sorts of differences out there across people and what they pay for their copayments. Some people have insurance where they pay nothing, some where they have $20. Some people have what they call high-deductible plans. A deductible plan is where you pay the full cost of your visits until you reach some limit. So a $2000 deductible plan will be one where you pay all of your medical costs until you've spent $2,000. It's a big copayment.

So we look across those people, and people did. And they found, look, the people that have plans where they spend more for health care, where they have a high copayment, use a lot less health care than where they don't have to spend anything. The elasticity of demand looks very, very high. What is wrong with those studies? What is wrong with the conclusion those people drew? They drew it by comparing people who had plans where they paid a lot to go to the doctor, and therefore use a lot less care to people who didn't pay anything when they went to the doctor and used a lot more care. I pick the $20 person, because I picked on you already.

AUDIENCE: Probably they chose to have a high-deductible plan, because they don't often go to the doctor already.

PROFESSOR: The rational choice, if you're young and healthy, for almost everyone in this room, is going to be a very high-deductible, high copayment plan. Because it will cost you less money, because the insurer is shifting the money to you. But you don't use the doctor anyway. So who cares?

So the healthier people are going to choose the plans where they pay more. So, of course, you're going to find in the plans where people pay more they use less medical care. But is it because they're paying more, or is it because healthy guys choose those plans? It's causation versus correlation. We don't know.

Well, how can we figure that out? Well, if we were doctors, what we'd do-- real doctors, not a doctor like me, a real doctor, a medical doctor-- what we'd do is we'd run a randomized trial. So if doctors want to figure out whether a drug works or not, they don't just look at guys who take the drug versus guys who don't. They run a randomized trial. They randomly assign some people to take the drug and some people not.

Now, when you run a randomized trial, by definition, you get a causal effect. Well, this room isn't quite big enough. We all know the law of large numbers. But imagine there were four times as many people in this room or five times as many people in this room. OK? And I had you come up to the front. I flipped a coin and said half of you are going to take the drug, and half of you are not, randomly by the flip of a coin.

Then, by definition, any statistically noticeable differences I get between the group the takes the drug and the group that doesn't is caused by the drug. And how do I know that? Because I know the groups are otherwise identical by the law of large numbers. By the law of large numbers, I know that as long as I have enough people, they're identical.

So if the only difference between them is that one's taking the drug and one's not, that's a randomized trial. That would be how I could solve the causation versus correlation problem. In medicine, thousands of randomized trials every day are being run. In fact, the FDA, before it will approve a drug, will typically require a randomized trial.

Well, in the social sciences, it's harder to run randomized trials. Because we're actually trying to understand things like people's demand for medical care, not whether a drug works or not. But, in fact, one of the most famous social randomized trials in history was called the RAND Health Insurance Experiment run in the 1970s. This is where some innovative health economists who understood this problem that we laid out about the fact that you can't just compare more or less generous health insurance policies, actually randomized health insurance policies across people.

They recruited volunteers, and they literally said, we're going to randomize. Some people are going to have policies where the health care is free, and some people are going to have policies where they have to pay, essentially, all the costs of health care.

So they, essentially, randomized across these different groups. And, therefore, they can assess what the price elasticity was. Because they knew the price difference between groups. For one, the price was zero. For one, the price was one. They actually had a range of prices they varied it across.

They could look at the quantity response, and they knew that was a quantity response to the price, because people weren't choosing their prices. The prices were being assigned to them. What did they find? Well, they found that medical demand is elastic, although not as elastic as the previous study. It's somewhat elastic. It's not as elastic as the previous studies found. They found that the elasticity of demand for medical care is around minus 0.2. So when the price goes up, people use less medical care but not that much less.

Now, let's be clear. Remember what elasticity is. That delta Q over Q. The same study showed that if you take someone who paid nothing and make them pay almost everything, their utilization of medical care falls by 45%. That's consistent with that small elasticity. Because that's a huge delta P, percent delta P. So, basically, that's comes to the question about local versus global elasticities.

So it's not saying that prices don't matter. But it's not a very, very elastically demanded good. So that's how they measure that price of elasticity of demand. That experiment, which was run over 35 years ago now, that result drives much of what we do in health policy.

So a lot of the estimates that we saw for the recently passed health reform bill derived from how do we get that estimate. We'll have to figure out how people are going to respond with their medical care when we give them health insurance. The recently passed health care bill just gave 32 million people health insurance.

Well, how are they going to respond to having health insurance? We go back to the RAND estimates and say, well, we have this elasticity of demand. We know what we're doing to the price. We figure out how much medical care is going to go up.

But here's the other thing. Here's the question in the lecture that that we'll close with. Is that a good thing or a bad thing that medical care fell when the price went up? And how would we tell whether it's a good thing or a bad thing? So we know when we raise the price, people use less medical care. How can we tell if that's a good thing or a bad thing? In the same experiment, how could we tell? What could we do? Yeah.

AUDIENCE: Maybe you'll get death rates or like--

PROFESSOR: You look at their health. You say, look, the same trial can answer a different question. We know that when you charge someone for health care, they use less. Well, are they sicker? The answer, not at all. People use less health and were no sicker. Why? Because we waste a huge amount of health care in the US. A huge amount of health care is wasted.

So, in fact, we could cut back quite a lot on health care, and we'd be no sicker. And that's what the RAND experiment showed, that we can charge people to use medical providers. And they'll use less medical care, and they won't be sicker as a result. Which suggests that, actually, as we try to think about getting our health care costs under control in America, making people pay something to go to the doctor is not a crazy thing to be thinking about.

How much? Well that depends on efficiency versus equity. We can't make someone who has no income pay $1,000 to go to the doctor. That, clearly, is a mistake. But we can take a rich guy like me and make me pay $50 to go to the doctor. There's no reason not to do that. So, basically, that's a lesson of how you can use elasticity of demand to help inform the kind of policies we need to make.

OK, let me stop there. By the way, if you at all find this stuff interesting, and you haven't yet read Freakonomics-- how many of you have read Freakonomics? That's amazing. OK. If you haven't read Freakonomics, you should. It's a great book. If you're lazy, the movie is coming out. And Freakonomics the movie is premiering on Friday the 30th at LSC. So if you're interested in learning more about empirical tools in economics, you can watch Freakonomics the movie on Friday the 30th.