[SQUEAKING]

[RUSTLING]

[CLICKING]

JON GRUBER: Today, we're going to continue with discussion of chapter 7. So you remember chapter 7, we started with basically defining public goods, which are goods that are non-rival and non-excludable. We then talked about how basically, the optimal provision of public goods would be determined differently than optimal provision of private goods.

Then when you solve the optimal provision of private goods, you're equating each individual's marginal rate of substitution with the marginal rate of transformation or in this case, just marginal cost. But when you do public goods, you care about the sum of marginal rates of substitution, because when you have a public good, everyone gets it. So you care about everyone's happiness, not just one person's happiness.

So that's the key difference between the two. And that key difference drives the answer to the first question in public finance, which is when should the government intervene. And the answer is that the government needs to intervene.

Or let me say it again. The market will fail if there is-- the private market will fail to provide other goods, because the classic free rider problem. Reminder-- the free rider problem is whenever someone's actions have a private cost, but a public benefit, they will underprovide that action because they will not see all the benefit.

So to see that, I have an example in the text, but let's go to the example in the appendix, because the appendix here is for MIT students. The text is for others-- MIT students too. But the appendix is more what you want to see and can handle.

So let's take two individuals, Ben and Jerry. Ben and Jerry live by themselves, far away from others. They have a private good x with a price of $1. So P sub x equals 1. That's the numerator good.

They consume two things-- the private good, x with P sub x is 1 and fireworks which is a pure public good. And we're also going to assume P sub f equals 1.

Once again, no harm in doing this. It just avoids us carrying around a bunch of extra P terms. It doesn't change the math at all. It just makes it simpler to see.

So they can consume a private good x. Think of this as a composite of everything else they consume-- or fireworks, which is a pure public good.

They each have an income of $100. So yB equals yj equals 100. They each have an income of $100. And because fireworks are a public good, they care about the total amount of fireworks, which is fireworks provided by Ben plus fireworks provided by Jerry.

What they care about is the total amount of fireworks. In particular, each individual i has utility of the following form. U-- we're going to assume their utility.

Obviously, utility functions are assumed. Their utility function is 2 times log x sub i where I denotes b and j-- that's each individual, plus log f, which is the total amount of fireworks.

Here's the key thing. This is what's going to make the math work here, which is that they only care about the total amount of fireworks. They don't care about the amount they set off. It's just what's in the sky.

We'll come back later to when they get utility from actually setting it off, but we're going to ignore that for now. We're just going to assume they're indifferent who sets the fireworks off. They just care how many fireworks are in the sky.

And their budget constraint is that x sub i plus f sub i equals 100. So that's their maximization problem. And the reason it's just quantities rather than amounts is because we assume prices are equal to 1, so our budget constraint, which is expressed in terms of quantities.

Now, imagine that each individual is deciding on their own how many fireworks to set up. Now, here we go back to a classic game theoretic prisoner's dilemma type problem of the type we saw in 14.01, which is that basically, we have an issue where each individual's actions affect the other. So they're going to have to have some game theoretic solution to the situation.

And we're going to, as in 14.01, assume that there's a Nash bargaining context. And remember, the way the Nash bargaining context works is that each individual optimizes their behavior, taking the other individual's behavior as given. And then a Nash equilibrium is one where both are satisfied where, when I do what's best for me, given your behavior, and you do what's best for you, given my behavior, we get to the same equilibrium point.

Then we're at a Nash equilibrium. And so it's just going to be the same kind of math we did when we did Nash equilibrium, Cournot equilibria in 14.01. Basically, we're going to simply say-- we can do a trick here. We can just insert the budget constraint directly into the utility function to make our math a little easier. We can just say their goal is to maximize utility, which is equal to 2 times log 100 minus fi plus log fi plus fj.

So I've now written their utility solely as a function of fireworks. So let's make this utility of Jerry. Let me write this right-- utility of Ben, so it's 2 times 100 minus how many fireworks Ben sets off, plus the fireworks set by Ben and the fireworks set by Jerry. That is their utility function. Just plug the budget constraint in.

If we differentiate this with respect to f sub B, you get minus 2 over 100 minus f sub B plus 1 over f sub B plus f sub j equals 0. That's what happens when we differentiate that equation. And therefore from that, we can generate the conclusion-- just going to work upwards here.

We'll generate the conclusion that f sub B is equal to 100 minus 2 f sub J over 3. F sub B equals 100 minus 2 f sub j over 3. So once again, taking f sub J is fixed, Ben solves and gets that outcome.

Similarly, by symmetry, we get that f sub j equals 100 minus 2 f sub B over 3. You can solve that out. Or you can just know by symmetry that's going to be true in this case. So that's two equations and two unknowns.

Solve them, and you get that f sub B star, or f sub B the private equilibrium, is 20 and f sub j equals 20, that they each provide 20 fireworks for a total f of 40. Questions about that? So once again, they've each maximized their firework use, taking the other person's behavior as given.

Now, what is the optimal level of fireworks? Well, the optimal level of fireworks we know from last lecture is where the sum of the marginal rates of substitution equals the marginal rate of transformation. So that is the sum of what's the marginal rate of substitution of Ben. It's going to be the it's going to be the ratio of their marginal utility of fireworks to their marginal utility of private goods. So the marginal rate of substitution for Ben equals the ratio of the marginal utility of fireworks to Ben over the marginal utility of private goods for Ben.

So if we differentiate the utility function to get this we're going to get that for Ben. We're going to get that 100 minus f sub j. I'm sorry, minus f sub B. That's differentiating this utility function with respect to fireworks over 2 times f sub B plus f sub j is going to be his marginal rate of substitution. That's going to be Ben's rate of marginal rate of substitution.

And what do we know from optimal provision of public goods? That you want to set the sum of marginal rates of substitution equal to the marginal rate of transformation. So when I said that, we want to do the same thing for Jerry, which by symmetry, now all look the same. It will be 100 minus f sub j over 2 times fB plus fj. That's going to be Jerry's marginal rate of substitution.

We want to set that sum equal to the ratio of marginal cost of fireworks over marginal cost of x, which is equal to 1 by assumption here. Because we're in a competitive market, price equals marginal cost. I did skip one step here. Notice I wrote that prices were 1 here. I said marginal costs are 1.

Why can I skip that step? Because in a competitive market, price equals marginal cost. OK, sorry, that's a-- be very clear that when I assume price equals 1, I also assume marginal cost equals 1 because I'm in a competitive market. It's just a step I've skipped here.

So this is the equation we solve for optimal provision of public goods. And if you solve that, you get that fB equals fj equals 30. The optimal provision is that they each provide 30-- I'm sorry 33.3, my bad-- 33.3, so that f equals 66.6 or 66.7666. That is the optimal provision. That is much higher than the private provision.

This is the key of all this math. The key conclusion is that when individuals privately optimize, taken the other person's behavior as given, they will end up providing fewer fireworks in total-- 40 fireworks, rather than 66.66666 fireworks.

Why? What's the intuition for that? Someone raise their hand and tell me. Why does a private provision yield less than the optimal amount they should be providing? Hint-- I've already given the answer in this lecture. Yeah, Enoch.

AUDIENCE: They both benefit from the other's purchase of fireworks.

JON GRUBER: So it's an example of what? Free rider problem. Raise your hand-- free rider problem. It's an example of free rider problem. Basically, this is the key intuition here.

It's tricky, but we have in this class what I call our light bulb moments where things are hard until they're suddenly not. You just got to get the light bulb moment on this, which is that basically, when my actions benefit other people, it's the intuition from positive externalities. A public good is the ultimate positive externality. When my actions benefit others, I do too little of it.

This is the perfect case. I'm doing two little fireworks because my actions are benefiting my neighbor. So privately, I'm shooting off too few fireworks relative to what's socially optimal.

So by the Samuelson condition, which we proved last time-- which says that the optimal provision of public goods relies on the sum of marginal rate of substitution, while the private provision of public goods is going to rely on each individual's marginal rate of substitution, we end up providing too few public goods in the private market. The private market will fail to provide public goods. Not fail to provide them-- fail to provide the optimal quantity. And this will come back.

We have to remember to avoid black and white thinking in this class. It's not either the private market completely fails or completely succeeds. Failure is defined as non-optimality.

It is not defined as the market being destroyed. It's defined as not optimal. The market still works.

We get 40 fireworks. The sky is lit up. It's just not as lit up as it would be if there was a social planner optimizing social welfare. Questions about that? Yeah.

AUDIENCE: Do you mind explaining the math behind the 100 minus f [INAUDIBLE] of x-- or the m--

JON GRUBER: Oh, the marginal utility-- I just differentiated this function with respect to fireworks, f sub B.

AUDIENCE: [INAUDIBLE] data.

JON GRUBER: Yes, exactly, that utility function. Other questions? So this is the mathematical illustration of the free rider problem. In practice, the free rider problem is everywhere. So they have some fun examples in the book.

For example, the state of Victoria in Australia used to pay for fire protection by a tax on homeowner insurance policies. So you bought your homeowner insurance, there was an extra tax. And that paid for fire services.

So that meant if you didn't insure your home, you didn't pay for fire services. But the fire company still came and saved your home because they had to because they had to because other homes had burned down. So people stopped buying insurance because they were like, I'm going to get it anyway. And so then the state of Victoria switched to financing it through a property tax, rather than through insurance.

Do we have any New York Citiers here? No New York Citiers here. Any of you guys been the Met in New York City, the museum there? So the Met in New York City, since 1970, has had a recommended donation instead of an admissions fee.

You don't have to pay to get into this incredibly famous museum. There's a recommended donation. For years, to try to get-- now, that's a clear free rider problem.

I cannot pay and get the same thing as you get by paying. So how did they try to solve it? "Recommended" was in tiny letters relative to the sign.

Well, actually a lawsuit in 2013 said they could no longer do that. They had to make it the same size, and the share of people donating fell from 50% to 10%. That's another example of free rider problem. And of course, we all probably, every day, see examples of this with our online usage. Take Dropbox, which you can use for free until a certain level. People don't pay.

Streaming services-- can there's certain options. And what do they do? They try to fight it. Spotify is free.

If it's free, you got to pay ads. Dropbox, it's better if it's not free, et cetera That's how they're trying to fight this free rider problem. So that's the free rider problem in practice.

The question is, can-- now the fact, the private market doesn't deliver optimality does not by itself say the government should be involved. In fact, once again, our friend Coase spoke up and said, wait a second, the private market can solve public good problems. And he pointed to a famous example of lighthouses.

He said, a lighthouse seems to fit the classic definition of a pure public good. You can't exclude someone from seeing the beacon. And if the beacon is out there and I'm using, it doesn't deter your use of it. So lighthouses are a pretty pure public good.

And yet for much of history, lighthouses were privately provided. There was no government provision of lighthouses. They were privately provided.

How did they do it? When your boat landed, they wouldn't let you take the cargo off the boat until you paid a fee that offset the cost of running the lighthouse. So since they had a property right to docking, they could essentially, in a Coasean way, solve the public goods problem. So once again, in theory, the same theoretical Coasean argument, which says that externalities can be internalized, says public goods problems can be solved, as long as there's property rights.

And indeed, a famous example of this occurring is something called business improvement districts. Once again, we don't have New Yorkers here, but how many of you guys have been to Times Square?

OK, most of you. Times square, when I was a kid, was a nightmare. I mean, I can't believe my parents let me go there.

It was just prostitutes and gambling and drugs. It was awful. Now it's just Disney characters and M&M stores.

What happened? What happened was the government was failing to provide it. And New York had a law, which is called a Business Improvement District law. And the way this law worked was that basically, the law said that if you have an organization of businesses and 60% of them agree, you can levy a charge on every business for private purposes.

So the businesses in Times Square got together and said, as long as 60% of us agree, we can force every business in Times Square to pay a charge that will go to private sanitation and private enforcement. And they did, and they privately cleaned up Times Square. The Times Square Business Improvement District's one of most successful examples in the country, where basically the budget of the Times Square Alliance is about $23 million, about 200 employees. And they keep the place clean and safe. So that's a Coasean solution.

And these business improvement districts are all over the country. Almost every state has a law with business improvement districts. And they've grown. There's a big one in Los Angeles, which provided crime reductions et cetera

Probably the state with the fewest BIDs, and the least successful, is Massachusetts. Now, why is that? Well, think about the key way the Massachusetts law differs from other laws, which is that if the vote passes in your area, within 30 days, you can opt out of paying the tax. So if the district in Waltham, which is a suburb of Boston, 60% of the businesses vote to tax themselves. The other 40% could just say, no thanks, we're not going to pay.

Well, what does that do? Reintroduce the free rider problem, because they know once [INAUDIBLE] ride, they'll benefit. So why should they pay? So subsets, you need more than a property right to make the Coasean solution work.

For business improvement districts, you need correct legislation to enforce the absence of the free rider problem. It was the fact that in Times Square, when 60% approved, everyone had to pay, make it work. In Massachusetts, when 60% approve, if people can drop out, then the whole thing falls apart. Yeah.

AUDIENCE: Do the idea is that don't have that opt-out clause. It's like legal challenges where if someone owns a storefront that they operate [INAUDIBLE], who are the other business? Like, what legal authority--

JON GRUBER: It's a legal authority. It's a great question. I don't know enough of the legality. I don't know what lawsuits they face. They've certainly withstood any lawsuits they faced.

But basically, the state has given a legal authority for businesses to essentially create one of these business improvement districts. And I presume the charges are nominal. If they were phenomenal, presumably people would sue a lot.

But maybe they're nominal if it's not worth paying the lawyers to sue. But it's a good question. I don't know the legality of it, how it's been challenged.

So in some sense, private provision has a case here. There's the lighthouse example. There's the business improvement districts. So the question is, when is private provision likely to actually work in providing public goods and when is it not? What are the conditions under which it will work, under which it will not?

And in some sense, a key example, a key point, is private provision will work best when there's heterogeneity among the parties involved. The more heterogeneity in either income or tastes, the better private provision of public goods might work. Why is that?

Imagine Ben and Jerry in their two-person economy, but Ben is very much richer than Jerry. In that case, we will get closer to the optimal provision of fireworks than if they have the same incomes. Why? And for an intuition, think about the extreme case. Imagine

Ben has all the money, Jerry has no money. We still won't get to the optimal. We'll get closer. Why is that?

Why does that heterogeneity-- or if you like, think about heterogeneity in taste. Imagine Ben likes fireworks a ton more than Jerry. You'll also get closer to the optimum.

Well, think of it this way. Does Robinson Crusoe face a public goods problem when he's trapped alone in his island? You guys know Robinson Crusoe?

You guys don't even know who he is. It's an old story. He got trapped alone in an island. That's all you need to know.

He doesn't have a public good problem. Why? He has a free rider problem because it's just him. As most of the resources and most of the taste for public goods get coordinated into one person, it gets closer to Robinson Crusoe. So you get closer to the optimum.

So let's see that mathematically, once again from the appendix. Imagine that Ben now has an income of $125, and Jerry's income is only $75.

So now yb is 125 and yj equals 75. We've redistributed income a little bit, so now Ben has more money but the utilities are still the same. Now Ben has a demand for fireworks.

So if you do the same math, f sub B, Ben's demand for fireworks is going to be 125 minus f sub J over 3. And Jerry's is going to be 75 minus f sub B over 3. Sorry-- minus 2 f sub j. There's a 2 here.

Do I have the 2 there? Did I screw that up? I might have screwed that up. Hold on.

Yeah, there should be 2's here. That's my bad. There should be 2's here. This makes the math work.

OK, I'm sorry. It's all in the appendix. But if you go back to your notes, there should be 2's in front of those.

Yeah, I got it right up there. But I didn't get it right here. This should be 2's here. Even when I'm reading out of the textbook, I can't get it right. You guys see that?

OK, so basically, it's 125 minus 2 fj over 75 minus 2 fB over 3. When you solve those two equations jointly, you're going to get that f sub B equals 45 and f sub j equals minus 5. That's what you're going to get when you solve those equations f sub B equals 45 and f sub j equals minus 5.

Now, you can't provide negative fireworks. So f sub j becomes 0. So the total amount of fireworks provided becomes 45.

Yeah, and the total amount of fireworks becomes 45. This is higher than what they get when-- no, actually, it doesn't become 45, because once this is 0, you re-solve for Ben. And once that's re-solved for Ben, you actually get that f, which is f sub B equals 41.66.

Because once this is 0, you got to re-plug this into Ben's condition. And you're going to get that the total amount of fireworks fired is 41.66. So if you solve it, you get a solution that can't be right, which is Jerry can't provide negative fireworks. Jerry provides 0. You plug 0 back in here, and you get that Ben's fireworks-- Ben's the only person provide fireworks, is 41.66.

Take this to the extreme. If Ben has all the money and Jerry has none of the money, you're going to get very, very close to the optimal level. You'll never get there.

The way I like to think is the following. Imagine you have a giant mansion and a tiny crappy shack that share a driveway. Maybe there's a little extra bit that goes off to each. There should technically be a free rider problem in plowing that driveway, but the mansion is just going to fricking plow the driveway. They're not going to not plow it because the shack won't kick in.

Now, maybe they won't do quite as good a job as they'd do if the shack was paying. They certainly won't do the little bit that goes off to the shack. But they're going to pretty much plow the driveway. The point is, the more one party really has all the stake in the decision, the more you move away from the free rider problem towards essentially the Robinson Crusoe solution, which is they just do the right thing. Yeah.

AUDIENCE: When introducing heterogeneity, does the distribution of resources and tastes have to be positively correlated? So say, for example, one party has all the resources but none of the taste.

JON GRUBER: Yes, that's right. That's a good point. That could be offsetting heterogeneity. That's a great point.

I've assumed that there's no correlation here. They both like fireworks the same. But if there's offsetting homogeneity, that would undo it. Great point. Other comments or questions? So that's one-- yeah.

AUDIENCE: Among [INAUDIBLE] since we're talking about heterogeneity, is there a hard line between heterogeneity and just overall concentration of resources?

JON GRUBER: Yeah, concentration is really going to make the difference. So that's one reason. So we're talking about, when is the private sector going to be closer to getting it right? One is when there's this concentration. That's a better term than heterogeneity, actually. When this is "concentration."

The second is when there's altruism. Altruism is defined as the fact that my utility includes your utility. An altruistic utility function is a function of my own consumption plus your utility. That's an altruistic utility function.

If individuals are altruistic, then that helps solve the free rider problem, because they're incorporating the fact that the other person would be happier with more fireworks. Once again, it doesn't fully solve it except under certain conditions. But it will move us closer to the optimum.

Now, it turns out that, much to the chagrin of economists, people are pretty altruistic. It's not in our standard models we teach. But it turns out people are pretty altruistic. And the best way to see this is to look at the dictator game.

Any of you guys ever been to the science museum in Boston? You probably didn't go there, but there's a room where there's computers that can play a game where you trade cookies back and forth. Any you guys ever play that? I used to play with my kids. OK, it's more of a kids thing anyway.

So basically, imagine the following experiment. It's a typical experiment, run hundreds of times at universities all over the country. You have five students who are going to play 10 rounds of a game. And the way the game is going to work is, in each round, students are given $1. And they have the option of keeping that dollar or putting it in the public fund, which is in the middle.

If they could choose-- after all students decide whether to contribute, the amount in the public fund is then split up equally and distributed back to everyone. So everyone gets $1. These five guys get $1.

They have a choice, keep that dollar or put it in a public fund. If they put it in the public fund, it gets doubled and distributed equally back to everyone. So in a perfectly coordinated cooperative equilibrium, what's the optimal thing to do for these guys? Yeah.

AUDIENCE: Everyone puts in their dollar.

JON GRUBER: Puts in their dollar and they all end up with $2. In a Nash equilibrium, what should each person do? Someone else. What should each person do?

What's privately optimal? Socially optimal if you each put in $1. What's privately optimal? Let's get some other folks. Yeah.

AUDIENCE: Keeping their money.

JON GRUBER: Keeping their money, because every dollar you put in, you get $0.40 back. So why would you put in your dollar? So there's a free rider problem. In practice, you put in $1, but you only get $0.40 back of that dollar. So why would you put it in?

Well, in fact, when you run these games, when you run these experiments in practice, you find that roughly half of participants put in their dollar. Even though there is no private incentive, roughly half put in the dollar, which is consistent with altruism, consistent with the notion that basically-- now, altruism could arrive through social appropriation, like I feel like a jerk if I don't put in my dollar. It could arise through true loving your fellow person.

However it arises, it effectively acts as if you care about your fellow person. It operationalizes itself in the same way. It's an interesting question about where it comes through, but that's irrelevant to the reduced form outcome, which sort of operationalizes itself as people being altruistic. Yeah.

AUDIENCE: This might be slightly off topic, but would this be different than a lottery example because there's uncertainty in how many others contribute $1 when you-- if I should contribute $1 or not.

JON GRUBER: Different from a lottery example? What do you mean?

AUDIENCE: [INAUDIBLE]. So for example, the most optimal thing for me, if I could coordinate everyone else's behavior, is for me to keep my $1, but everyone else to contribute $1.

JON GRUBER: No, the most optimal thing is you all put in your dollar. A lottery is not the same. There's only one winner.

And as we learned in 14.01 actually, the lottery is the reverse. For every dollar you put in, you keep about $0.50. Because there's this multiplier, it's optimal for them all-- socially optimal for them all put their money in. And they're just making me pay more money. Privately, they don't do that.

Now, it's quite interesting that there's that much-- there's some interesting lessons from that. First of all, you might say, well, gee, maybe people didn't understand it. How would you test whether it's about learning versus about altruism? How would you test that empirically?

Someone tell me what you think. You're running these experiments. I say, yeah, you ran it, but maybe this don't understand it. What would you do? Someone raise their hand and tell me. Yeah.

AUDIENCE: [INAUDIBLE] you could stop and explain [INAUDIBLE].

JON GRUBER: Or you could just play it again and again and again. That's the way we think economic intuition's developed. It turns out, if you played it again and again, people become a little less altruistic.

But even after 10 rounds, people are very altruistic. So it's not a learning thing. Now, I don't know if they've tried explaining like, hey, you should be selfish. But they've had people play it again and again, and it doesn't make altruism go away.

Now, of course, that's just a laboratory experiment. The question is, does altruism exist in the real world? And there's one great paper-- it's an older paper, but a great paper, which looked at contributions to public radio.

It basically looked at people's giving, which is once again, a classic example of public good free rider problem-- you don't have to contribute to public radio. They make you feel guilty. But they don't come to your house or anything, or they don't twist your arm. You don't have to give to public radio.

And what a typical economic model would say is, if I enjoy public radio, then as the number of listeners grows, I should be less likely to give, because basically, it's a fixed amount. Presuming the cost of running public radio is roughly the same as the number of listeners grows. It's just, you're sending the transmission out. In other words, as this grows, then basically there's more and more of a free rider problem.

So think of it this way. Think of yourself, when you're coming out of the subway and there's no one else around, there's the guy begging, you feel more likely to get money than if there's 20 people walking by. It's just human nature.

Likewise, it would say that people should give less to public radio as the listener base goes up. And in fact, they don't, which is consistent with the fact that there's some altruistic preferences going on. So that's one example of a real world test of this. There's lots more.

Now, the problem is, then you ask the question of, well, where does altruism come from? Why are people altruistic? Is this just inherent in our nature? And it turns out altruism is not purely inherent, but can be influenced. And the main thing that influences altruism is the degree of social capital.

This is the notion. Social capital is an abstract concept. But it's roughly the idea of how much you feel connected to your fellow people, how much you trust them, how much you feel integrated with them.

And it turns out, if you run experiments in more connected societies, they're more altruistic. When you're playing with friends, you're more altruistic. So clearly, part of what drives altruism is actually knowing people. But even when you don't know people, there's still a lot of altruism.

So that is another reason. We're talking about reasons why the private market might get closer to the public optimum. The private market can never, except in some extremely limited case, achieve the social optimum. But it might get closer if there's concentration. It might get closer if there is altruism.

And the third thing that might drive it closer is what we call the warm glow model of giving. Now, this is like altruism. It has the same net result, but an important modeling difference. The warm glow model is, not that I care about you, but that I get utility from contributing.

So in the fireworks, literally, I get jollies from lighting them off. It's literally a warm glow. It's not where it then comes from.

But literally, if I get some utility was setting them off, then in my utility function is your fireworks because of that utility. Or more generally, if I get utility-- this is why churches and temples are filled with plaques and everybody's name is everywhere. People give partly because they want to see their name on a plaque.

If I give, because I want to see my name on a plaque, that is not altruism. I literally get utility of giving. And that's the warm glow model.

Now, it ends up with similar outcomes, but it's a very different model. The altruistic utility function is one where your utilities and my utility function. The warm glow utility function, is where my giving is in my utility function. Very different-- I get utility from my giving. It's similar effects but different models.

So that's basically the bottom line on private provision. Private provision will never achieve the first best. But in certain conditions, it can get close Questions about that? Yeah, Enoch.

AUDIENCE: How similar in this context is altruism from having an information, I guess, asymmetry, in the sense that if I know what my neighbor's utility function is, I guess, right?

JON GRUBER: No, but if I'm not altruistic, I would exploit that. That wouldn't solve the problem. That would make it worse at one level. But no, that's actually is here.

So here, I do know my neighbor's utility function. So imagine I didn't know. Well, that would just introduce uncertainty to this model. I'd be guessing, then, in which way-- I don't know which way I'm biased.

That would affect it. But it wouldn't change the fundamental underprovision. Good question. Other questions about this?

OK, so if the private market is not going to get us to the optimum, then we go to the next question on public finance, which is what should the government do? Or how should the government intervene? Well, before I get to that, what we're going to do-- here's the way that this sequence of lectures is going to work, which this is an overview of public goods. And then the next three lectures will be applications of public goods.

So this overview, I'm going to talk about the three fundamental challenges facing public provision of public goods. In the next three lectures we'll talk about those challenges. So in other words, what I'm going to say is-- this is the key lesson from this class, lest we be too liberal.

Market failure means that government has the potential to fix things, but not that government necessarily will. And what I talk about here, so far, government has been the good guy. We have an externality, someone comes in and fixes it. Yay.

But in fact, that's not always true. And so we're going to talk about here is reasons why public provision may fail to get us to the optimum. And there's three reasons why public provision may fail.

The first is the problem of crowd out. The first is the problem of crowd out, which is when the government comes in, part of what it will do is just displace what people are already doing, rather than actually increasing the amount of the public good. So to see that, let's make three assumptions in the firework example.

First of all, let's assume there's no warm glow or altruism. Ben and Jerry just care about total f. They don't care who contributes, no warm glow of altruism.

Second of all, let's say that in this symmetric example, the government will charge Ben and Jerry equal amounts. So there'll be equal financing. Just because they're individuals, identical, we'll have equal financing. Finally, we're going to assume the government provides fewer fireworks than were provided individually. The government is going to provide fewer fireworks than the private optimum-- less than 40.

Under those three conditions, I will now show you mathematically that government provision does nothing. Let's see that mathematically.

So under those conditions, remember that basically-- we said in the original example, total fireworks under-provided by 26.6. It's covered up now. But I said the social optimum is 66.6, private is 40. So 26.6 is the underprovision.

So imagine the government says, well, I know how to solve this problem. I'm going to charge Ben and Jerry each 13.3 and have public fireworks. So they'll provide their 40 privately.

I'll provide my 26 extra. And I'll pay for it by charging them. I'll force them to contribute. So what I do is set up a tax on each of them of 13.33.

Now their utility functions become u equals 2 times log x 2 times log x plus log fB plus fj plus 26.6, because they're getting 26.6 extra fireworks from the government. But subject to the budget constraint that x plus x sub i plus f sub i-- these are all i's. x sub i plus f sub i equals 100 minus 13.3

So here's the new problem. We're taxing 13.3. That comes out of the budget constraint. And we're giving an extra 26.6 fireworks.

People understand that setup? If you solve this, you will find that each individual chooses to provide 20, and the total remains at 40. That is, we will get what we call full crowd out, full displacement of the public expenditure by reduced private contributions. Why? Why will government intervention in this case make no difference? Yeah.

AUDIENCE: [INAUDIBLE] Ben and Jerry are purchasing the 13.3, it's just, they're not directly. They're going through the government. So now they'll just subtract that off [INAUDIBLE].

JON GRUBER: Right. Remember, economic equilibria are fundamentally robust. And if the government intervenes in a way that can be undone, it will be undone. Government interventions only matter if they can't be perfectly undone.

And literally, you can perfectly undo the government intervention here. There's no distortion, nothing else. You just literally say, fine, I'll provide 13.3 less myself. I'll be back where I was.

And remember, that's where I want to be. I already showed you my optimum. I can get back to that same optimum by just lowering my contributions from 20 to 6.66. And boom, I'm back to the optimum.

People, we already know where they're happiest. If the government intervention allows them to get exactly back to where they're happiest, they'll do so. So under these assumptions I made, there will be full crowd out. That is, government intervention will not actually increase the level of provision.

Questions about that? Folks look confused. So please ask. Yeah, Enoch.

AUDIENCE: For example, if you think about government donating to charity, like in the sense of we pay taxes, instead of us giving to charity, government gives to charity. Would that be an example of--

JON GRUBER: That's an example. Now, this full credit will almost never happen. In your example, why would it not lead to full crowd out?

AUDIENCE: People still have utility from giving.

JON GRUBER: Let's take that out of it. Yeah.

AUDIENCE: The government's probably paying for the taxes for someone who wasn't going to donate.

JON GRUBER: Exactly. The key thing is in my example, I set it up so the people were taxed in proportion to their contributions. Imagine a world where the government comes in and the government actually taxes some people who weren't contributing before. Well, then the total will go up.

Remember, the key assumption I made is that each individual is taxed by less than what they were contributing before. Once everyone is taxed by more than contributing before, then you'll get more. So crowding out is unlikely to ever be full.

Credit's unlikely to ever be full. But it almost certainly will always be partial because there will always be some view that, if the government is contributing, I can contribute less. And it's like my example, leaving the subway and seeing the homeless guy. You're being crowded out by the fact that other people are there giving.

Now, there's a lot of studies of crowd out. Most of them are in lab settings. And they find very strong evidence for the existence of crowd out. They find very strong evidence for the existence of crowd out.

Anyway, I can't find it. But there's a lot of examples of basically where they do laboratory studies where they essentially operationalize crowd out, where they basically have the government come in and substitute in for your contributions. In those lab studies, they find a lot of crowd out. In real-world empirical studies, the crowd out, people find, is much smaller. So I would say lab studies suggests that crowd out can be close to full.

Real world says crowd out is less than 50% in many contexts. But it's hugely context-dependent, and this is a term we'll use a ton throughout the course. Basically, it's going to come back to crowd out, which is to what extent does government contribution displace private contribution?

Here, it's a [INAUDIBLE] financial contribution. In health insurance, we'll talk about private health insurance versus a public health insurance. And unemployment insurance-- we'll talk about your savings versus the unemployment insurance benefit.

But it's all the same thing. It's the notion that you can contribute privately. So the government rolls in and contributes. That will offset your private contributions. And the extent to which it will is an empirical question. Yeah.

AUDIENCE: As long as the government's efficient, it doesn't matter if there's crowd out, necessarily?

JON GRUBER: Well, that's a great question, which is what's the welfare consequence of crowd out? If the government has free money, then there's no welfare consequences. But in fact, money isn't free when money's raised by taxation. Now, in this case, it is free money because I don't have a distortion margin here. But if I had Ben and Jerry working and they could lower the tax burden by working less, that would be a distortion and make life worse than if the government didn't do it.

AUDIENCE: But it could also be that they could produce fireworks cheaper. So the cost to the government [INAUDIBLE].

JON GRUBER: Right, so what if the government's cheaper producing them? So you're absolutely right. In the real world, that would depend on a lot of factors.

One is the crowd out would depend on the efficiency of producing. Like maybe the government is better producing health insurers than the private sector. So even if it crowds it out, that's still a good thing. It will also depend a lot on how bad crowd out is. Sometimes we crowd out things that people are doing, which we wish they weren't doing.

So for example, talking about unemployment insurance, one way people react to being unemployed is by their spouses going to work, even if the spouses would prefer not to work. Well, in that case, if unemployment insurance allows the spouse to stay home and take care of the kids, maybe that's not such a bad thing. But we call it crowd out. So

The welfare consequences crowd are very much dependent on the efficiency of the government versus the private provision. It's a great point. In this case, I assume they were equally efficient, so there's not really any welfare consequences. Great question. Other questions?

So that's the first problem that we have. The first problem is crowd out. The second problem with public provision is the problem of measurement.

I've written down the Samuelson formula, which is the sum of MRS equals the MRT. Well, that does you no good if you're trying to decide whether to build a bridge or not. We don't know people-- people don't have MRSs. And we sort of have MRTs, we know relative marginal costs. We certainly don't have MRSs.

So we have to figure out how to actually measure costs and benefits in reality. We can't just use-- that's the theoretical concept. And that leads to the entire field of what we call cost-benefit analysis.

We will discuss this next time in chapter 8, or we may start today. This is probably the most single thing that-- if you look at all economists around the world, in the real world, probably the single thing they spend the most time on is doing some or another version of cost-benefit analysis, which is actually quantifying costs and benefits that will lead to-- so you can actually decide if it's a decision worth making or not. So chapter 8 will be about how do we literally translate this theoretical construct into real measurement.

The third problem is, let's say we know what's optimal. We know how much crowd out there is. We know how to measure it. We know how to measure the cost of benefits. The question is, how do we measure preferences?

And here, in other words, how do we-- we're a society of 360 million people. How do we decide whether or not to do a public good? Because in fact, we don't have just one dictatorial public planner. We have a democracy. And that raises three critical problems.

The first problem is preference revelation, which is we need to know people's preferences. And if we ask us to tell them, they may not be honest. The second problem is the problem of preference knowledge, which is people may not even know their preferences. I mean, do you know what a missile is worth to you in terms of cookies?

You have no fucking idea, so you might not even know your preferences. He's saying seven cookies. OK, you may not even know your preferences, so this knowledge.

The final problem is aggregation. Let's say that you know your preferences and you're honest. How do I collect all those preferences in a way that effectively aggregates them? That turns out to be hard to do for reasons we'll talk about when we do chapter 9. This all leads to the field of political economy in chapter 9-- political econ in chapter 9.

So this is really the key. The key insights of chapter 7 are the following. A-- optimal provision of public goods is where the sum of the MRS equals the MRT. B-- the private sector is unlikely to achieve that optimum due to the free rider problem.

C-- or was it A, B, C or 1, 2, 3? Whatever the third thing is on my list. The public sector itself faces challenges also in solving this problem. And those challenges are what we'll turn to next.

Now, I want to cover one last thing for chapter 7. I won't give it as much time because I want to get to chapter 8. But there's an awesome box in chapter 7 about the fundamental challenge the government faces in deciding whether to provide things publicly or privately. And this is the problem we call contracting out, which is, let's say the government knows there's too little of something.

There's fundamentally two ways it can address that. It can address that by providing it or by-- let's say the government wants there to be more of something. There's two ways it can-- and not the only two ways, but two ways it can address that is by providing it or by hiring other private parties to provide it. So should the government directly provide something or contract out? And it turns out contracting out raises a host of fascinating issues around how do you write private contracts to get the outcome you want?

And there's great examples of all sorts of shenanigans when the government tries. There's an example of good contracting out, but that's no fun to talk about. Let's talk about the shenanigans.

The shenanigans are that basically, what we find is a number of studies which show that when the government contracts out social services, it gets low-quality outcomes. When it contracts out ambulances, prisons-- private prisons have 10% more deaths than public prisons. Halfway houses-- horror stories about halfway houses, which are places people go when they're trying to get clean. There's horrible stories of halfway houses being run by for-profit private enterprises that basically, the government--

Now, on the other hand, there's a long, long literature that privatization of many sectors, that the government traditionally provided back in the day-- and in many places in the world, governments often provided things like steel, airplanes, banks. Those were all public. Those were all publicly provided. And in many countries like the US, those became privately provided. There's a lot of evidence that when you're providing goods, there's efficiencies from the private sector taking it over.

But when you're providing services, they get worse when the private sector takes it over. And the fundamental reason is one Coase would have us focus on, which is essentially observability of quality, which is, I can really observe easily if it's a good piece of steel or not. It's hard to observe it's a good prison or good halfway house. So when you have less observable quality, which you have with services, the private sector contracting out can have costs.

Now, they can try to combat those costs with monitoring. So for example, Rikers Island jail facility in New York City had a spate of violence in 2014. So they paid McKinsey Company-- they're bad guys in all these stories, $27.5 million to create a plan to curtail violence in the faculty. Three years later, McKinsey reported that their $27.5 million plan had succeeded and that violence in the facility had fallen by 70%. It turns out McKinsey rigged the results and violence went up by 50%

That's not even the worst case. The worst case involves one of my favorite names for a company, the Wackenhut Corporation. The Wackenhut Corporation is in charge of ensuring that our nuclear facilities are safe from military attack. So they are in charge of essentially probing and testing whether nuclear facilities are safe from military attack. And they're supposed to do this with simulated attacks.

It turned out that the Wackenhut Corporation would warn these nuclear facilities that the attacks were coming and get paid for those warnings. And they all looked super-safe when they, in fact, weren't. So the problem is, when you're trying to contract out, you get potential efficiencies.

But the monitoring difficulties can be very, very high. And that's a real challenge in of contracting out world. Anyway, it's a long box in the book, but it's kind of fun to read. And there's a lot of fun examples.

And in some sense, sometimes the government has no choice, or faced difficulties, which is like during COVID. During COVID, we suddenly needed a shitload of masks and respirators. So we contracted out.

We got a lot. We got a ton of fraud. A ton of companies, which weren't really capable, got big contracts and bombed out.

We also got a lot of masks and respirators. That's why a lot of people were in favor of, instead of contracting that out, actually invoking something called the Defense Production Act, which grants the president authority to literally tell firms what to do. That's scary.

But the idea is, if you do that, then you get the firms to do it. If you contract out, you might get firms that don't exist. Or when they're trying to cover Hurricane Maria in Puerto Rico, they hired some firm which turned out to be, like, two guys in Montana who happened to be buddies of the president at the time, who ended up not doing anything for Hurricane Maria.

So there's an interesting trade-off here that is worth thinking more about. I wish I had more time on that, but that's all I can say about that. So that's chapter 7. Any other questions about that?

OK, let's go on to chapter 8. And let's start thinking about this second problem-- measurement and the issue of cost-benefit analysis. And we're going to do this through an example.

We're going have an example that's going to run through this chapter. We'll start it today. We'll finish it next time.

[? An ?] example is going to run through this chapter of a government's decision to build a highway. And we're going to assume that building this highway, if you look at table 8-1, will require the following inputs-- a million bags of asphalt, million hours of labor, and $10 million a year of maintenance. But by building this-- let's say it's expanding a highway. Through this project, we'll save 500,000 hours per year in driving time because we have better highway. And it will save five lives a year because it'll be safer.

So we have here the costs. We have the benefits. We know we want to sum those benefits equal to the costs. But we just have words. We don't have numbers.

This is MIT. We need numbers. So how do we translate these words into numbers? And that is the field of cost-benefit analysis.

Let's start with the easier side of this, which is the cost side. And let's think about how we measure the costs of things like asphalt and labor. And here, we're going to rag on our friends the accountants.

The way accountants would do this is they would say, well, whatever you pay for the labor of the asphalt is its cost. And economists would say that's not true, because what matters is not the cash costs. It's the opportunity costs. It's the best alternative use of those resources in society. And those are not always equal.

In a perfectly competitive market, they are by definition equal. In a perfectly competitive market, the price of a good is equal to its opportunity cost. Think about our perfectly competitive market and demand and supply equilibrating. They equilibrate the point where the value of the next bag of asphalt equals the cost of producing the next bag of asphalt. So the opportunity cost, which is producing one less bag of asphalt, is equal to the price, so cash accounting works.

But now imagine the market is imperfect. And let's actually think about the labor market to start. Imagine that you have a world where construction workers, as they do in many cities in America, have a higher minimum wage for public projects than the statewide minimum wage. So let's imagine the statewide market wage is $10 an hour, that the state on average people earn $10 an hour. But there's a minimum wage for public construction projects of $20 an hour.

So let's imagine that the government is going to hire these 500,000 workers. And it's going to end up paying $20 million, because it's $20 an hour for this million hours of labor. What is the opportunity cost of that labor?

Well, it's the next best use of that labor. And the next best use is another project where they'd be paid $10 an hour. And assuming labor markets are perfect, that's their marginal product.

Their marginal product is what they get paid in an alternative job, which is $10 an hour. So while the cash cost of these workers is $20 million, the opportunity cost is only $10 million. You're only extracting $10 million worth of marginal product out of society, because that's what they'd earn in other jobs, even though you're paying them $20 million.

Well, then what's the magic? Where's the other $10 million go? I mean, the accountants are right, we're spending $20 million. What happens to the other $10 million? If the cash cost is $20 million, but the opportunity cost in terms of the marginal product we're using is $10 million, what's the other $10 million? Yeah,

AUDIENCE: [INAUDIBLE] workers.

JON GRUBER: Yeah, the other $10 million is what we call economic rents. Those workers, by getting these jobs, have gotten a transfer from the government. The government has transferred $10 an hour to workers by giving them these better jobs. It's not better in terms of higher marginal product, better in terms of higher pay. That has no efficiency cost.

If I give you $1-- I just give you the dollar, there's no efficiency cost to that. So there's the opportunity cost, the efficiency cost to society, is the lost marginal product by building this road. It's what the workers could have done instead. If they weren't building the road, they would have been doing something with the marginal product of $10 an hour.

And how do we know that? Because their wage is $10 an hour, and wage equals marginal product in a labor market equilibrium. Once again, let me say it again. In a labor market equilibrium, in a perfectly functioning labor market, wage equals marginal product. We solved for that in 14.01.

Therefore the value of their time is the $10 marginal product we're losing by having them build this road. That's the opportunity cost. The other $10 million is literally just a transfer from the government to the lucky set of workers who happen to get these jobs. It's a hard concept. Questions about that? Yeah.

AUDIENCE: How is that margin [INAUDIBLE]?

JON GRUBER: How's what?

AUDIENCE: The margin between $20 and $10 set by the government outside of, maybe, [INAUDIBLE]?

JON GRUBER: You mean where does that arise from in reality? Just political economy. They just decide they're going to-- the construction workers lobby, the union lobbies. And they get a higher wage for that. That leads us to this point, which is why do we do what we do?

Now, can anyone tell me why this same logic might apply, and why the opportunity cost, or the efficiency cost of asphalt, under what condition might the opportunity cost of asphalt be below its cash cost? Remember, I said a few minutes ago, under what condition they were equal. So that tells you under what condition they're not equal. Yeah.

AUDIENCE: Imperfect competition.

JON GRUBER: Imperfect competition. Under perfect competition, opportunity costs, cash costs are the same. But imagine the asphalt is produced by a monopoly asphalt producer. In that case, the monopolist, the marginal cost, the monopolist is below the price they're paying.

Remember, for monopolists, price above marginal cost, we call it the markup. So the price you pay the monopolist, minus the marginal cost of the bag of asphalt, is a transfer to the monopolist. It's just like the better union job is a transfer to the worker. The difference between the price of asphalt and the marginal cost of asphalt is a transfer to the monopolist. So you would also have an efficiency cost different from the cash cost in that case. Yeah.

AUDIENCE: Sorry. Can you explain that one more time, the [INAUDIBLE] monopolists?

JON GRUBER: Well, what is the efficiency cost of a bag of asphalt? Here's the key intuition. I should say it this way. The efficiency cost is that I'm pulling that bag of asphalt out of its next best use in the economy.

What is the value of its next best use? Well, it's the marginal cost of producing a bag of asphalt. What do we pay for it? We pay the price.

In a perfectly competitive market, those are equal. In a perfectly competitive market, they're not. And the gap is a transfer given to the monopolist. Good clarifying question. Yeah.

AUDIENCE: Is the next best benefit to society of that bag of asphalt equal the marginal cost even in the case where it's a monopolist who-- even if they're not selling to the government, they're still charging more?

JON GRUBER: That's a great question, which is, what if the whole industry's monopolized? Then things get more difficult. You're right. So I'm assuming there is an efficient market in which it could otherwise be used. Yeah.

AUDIENCE: I have a question about the imperfect competition. What if, instead of there only being one manufacturer, there's only one purchaser, like a monopsony?

JON GRUBER: Well, I mean, then you get into this question asked here, which is there's only one purchaser for these projects. Why do they pay him $20 an hour instead of $10 an hour? You'd think in that case they'd pay below.

But they can't necessarily. They might not necessarily. This actually goes back to last lecture, these examples talk about contracting out. Part of the reason the public sector often pays too much for goods is because they have non-compete contracts.

Now, you think of a non-compete contract for a good if I'm a monopsony buyer of a missile. No one else is buying missiles. I should be able to pay much less. But in fact, by non-compete, I often end up paying more because I don't really know what the right price is. So when they compete, they reveal the right price to me.

When there's a non-compete, I just have to go with what they tell me. And I've got no idea what the right answer is. All right, other questions? So that's one-- yeah.

AUDIENCE: Is this non-competes in terms of, I don't know, McKinsey-- or not McKinsey, sorry, Lockheed?

JON GRUBER: Yeah, exactly. So basically, I'm buying a missile. What I can do is say, look, anybody who produces a missile bid on this missile with this specs. And unlike with prisons, the specs can be really pretty precise.

Build a missile to these specs. I'll get the bids, and I'll pick the lowest one. That's the way you'd think we'd do it.

That is less than half of all contracts the government does. And more than half all contracts just say, hey, I like you. You produce the missile, which has the problem that there's no competitive pressure and there's no information revelation.

Competition, remember, is beautiful in that it solves the information revelation problem, because competition reveals what marginal cost is. If you don't have competition, how do you reveal what the true marginal cost is? You don't. And that's the problem with the non-compete contracts. Why? Chapter 9.

That's the first challenge. So costs, you would think, would be pretty straightforward. The first challenge is imperfect markets.

The second challenge is discounting, the fact that not all costs come at the same time. Now, we haven't covered chapter 4 yet. But I'm going to assume you remember the concept of present discounted value from 14.01, which is that dollars in the future are less valuable than dollars today. It's a fundamental concept of discounted value.

So if you want to express the cost of something, you have to express it in today's dollars, discounting future dollars because they're worth less. Why? They're worth less, because you had them today, you could invest them and they'd be more tomorrow. Once again, we'll cover this in chapter 4 to review. But that was in 14.01.

So basically, the problem is that some of these costs come in the future, like the maintenance costs. That's $10 per year. So we can't-- $10 million a year. We can't just add that because it's happening in the future, so it's worth less.

We have to discount it and get a PDV of costs. The asphalt and the laborers, we hire today. So there's no PDV issues. The maintenance, we do over time. And so we have to discount it.

So then we know how to do discounts. We know how to PDV calculations. We've done those.

But the question is, what's the right discount rate to use? Because now it's a government having to pick a discount rate, not a private market [INAUDIBLE] discount rate. Now, you might say what would be a natural starting point for the right discount rate to use for a government deciding on whether to do a project. Yeah.

AUDIENCE: The inflation rate?

JON GRUBER: Well, no, because the opportunity cost of money is not just about inflation. It's about the fact that money could be worth more tomorrow. Even with zero inflation, it's still a discount rate. Yeah.

AUDIENCE: Cost of borrowing.

JON GRUBER: The private sector discount rate-- a natural point to say, look, the private sector is a cost of capital. It's what it costs. Now, they don't just borrow. They issue debt and equity.

We have an aggregate cost of capital. It's about 7%. It's an historical estimate. So for a typical firm needing to raise capital through equity or debt or other means, in aggregate, it's about a 7% cost of capital. You have to pay about a 7% rate of return to get your money.

So a natural starting point is to say, look-- and this is why the starting point makes sense. If I take that money to build this highway, what's the alternative use of the money? The private sector could have had it. So if I'm spending money in the future, I should use the private sector discount rate.

But there's one big difference, which is subtle but important. 7% is the pre-tax historical rate of return on capital. But if you save in the bank, you get taxed on that.

Post-tax, it's more like 5% or whatever it is. So the rate of return on capital used by the private sector is the post-tax rate of return. Should that be the rate used by the government? Why or why not? Should the government follow the private sector using the post-tax rate of return? Yeah.

AUDIENCE: No, because they're not taxing themselves.

JON GRUBER: They keep the money. They get the tax revenue, so they should use-- the right answer is that the federal government should discount its future costs and future benefits by the pre-tax private cost of capital. Because the alternative is, private sector has the money, and that's their discount rate that they use.

Now, the government uses a variety of different discount rates, but they're centered around 7%. So let's use 7% Let's now go to table 8.2 and let's look at the costs.

We have a million bags of asphalt. Let's assume that the price of asphalt is $100. Let's assume that's a perfectly competitive market.

So the opportunity cost is the cash cost. It's $100 a bag. That's $100 million.

We have a million of hours of labor. But we're going to use the opportunity cost of labor, which is the market wage of $10. So that's $10 million. We have maintenance of $10 million a year forever, but there's a 7% discount rate.

You all remember the formula that, if you have an infinite sum, the value of something is the amount you're paying out, F, over the interest rate. So $10 million over 0.07 is $143 million. That is the three costs. So the total cost of this effort in today's dollars is $253 million. Questions about that?

Now we're going to go to the harder part, which is the benefits. Let me just introduce this, then we'll stop and get into it next time. The benefits are harder because they value things like time and lives. These are things without market prices.

We can talk about the flaws in the market prices for asphalt and labor. But at least there are market prices. Time and lives do not have market prices.

Now time, you might say, has a market price, which is the wage. And that would be a natural starting point valuing time. It would be to say, look, we should value the time you save by your wage. And that would be what we call a market-based solution. A market-based solution to valuing time would be to use your wage.

Now suppose I said to you, well, you can't use a wage to value time because people don't work all the time. And you responded to me, in fact, the wage times 24 hours is, in a perfectly competitive labor market, the proper way to value time, even if as with most people they only work about a quarter of the time of their hours. Why is that? Yeah.

AUDIENCE: Because the not working is the value of leisure.

JON GRUBER: Right. In equilibrium, people set the wage equal to the marginal value of leisure. We solved that in 14.01. And think about the intuition. In a perfectly competitive labor market, if working is worth less to you than not working, what would you do? Work less.

If work was worth more to you than not working, what would you do? You'd work more. So you will work until the point where the wage equals a marginal value of leisure.

So it doesn't matter if the time you're saving by driving faster comes from your kid's soccer game or work. Either way, you value it at your wage. The problem of-- questions? People understand that?

The problem, of course with that is, we don't have a perfect labor market. And as a result, the wage can actually be very different than the marginal value of leisure. So what's an example of why the wage could be less than the marginal value of leisure? What would that mean for the wage to be less than marginal value solution? Why could that arise?

Let's get some other folks involved. What would it mean for your wage to be less than your marginal value of leisure? And why might that arise? Take a stab, I don't bite. Yeah.

AUDIENCE: You could have passive income.

JON GRUBER: Yeah. Well, a passive income, it's marginal. So passive income is a fixed other thing. But let's extend that. Let's not think of passive income. What else comes with jobs beside wages?

AUDIENCE: Benefits.

JON GRUBER: Benefits. And basically, some of those benefits would be linked to how hard you work. In fact, the marginal value of work is not the wage. It's your total compensation. So you really should be setting compensation equal to the marginal value of leisure, not wage. So you should be choosing a higher marginal value of leisure.

Actually, it's a backward example. That would say you'd want to work less. This is an opposite example of what I suggested. So we'll do the flip next.

You'd want to work less. Why? Because a higher marginal value of leisure means less leisure. Remember, margin's the opposite way we think. Higher marginal utility means less consumption.

Higher marginal value of leisure means less leisure. So if you consider benefits, that's an example where actually, the wage is going to understate the value of leisure. What would be an example the wage might overstate the value of leisure. Yeah.

AUDIENCE: You might want to work more.

JON GRUBER: You might want to work more. But why couldn't you?

AUDIENCE: Not enough employment opportunities.

JON GRUBER: Or there's overtime loss. You set W equals MBL, or MBL at 43.5 hours a week, and your employer just won't let you have more than 40. Well, then you're not working hard enough.

Your wage is then above your marginal value of leisure. But you can't get to the point where they're equal. So for reasons like these, wage is an imperfect measure of the marginal value of leisure.

Let me stop there. We'll come back. Paul, we should start next time with table 8-2. And it will do 8-2, 8-3, 8-4, and then the table in Chapter 9. So we'll finish up chapter 8 and get into chapter 9.