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JONATHAN GRUBER: Today and next lecture, we are going to turn to a topic that's, as I've highlighted previously, woefully missing from this class and from a lot of basic economics, which is we're going to start talking about equity. This class has been totally focused on efficiency.

We've come back and back again to ever since we did the lecture on consumer and producer surplus, we've talked about a particular normative perspective, which is the goal of society is to basically maximize total social surplus. The goal of society is really to maximize the pie, and we don't really care how it's distributed.

And this is illustrated, as I mentioned before, nowhere more starkly than the fact that two different market outcomes have the exact same welfare consequences. One is a perfectly competitive market and one is a perfectly price discriminating monopolist. Both of those market outcomes yield maximum social surplus, yet they feel very different. An outcome where consumers and producers split the pie feels to us innately very different than an outcome where producers get to keep it all. And that's because innately, we as humans care not just about efficiency, but fairness, about equity. And we actually care about not just how much stuff gets produced, but who gets it.

Now, in that particular example, you get two very different distributional outcomes with the same level of efficiency. But that's actually pretty unique. It turns out generally that different distributional outcomes, different levels of fairness come at different levels of efficiency. And that leads to what we fundamentally call the equity efficiency trade off. That basically to get more equitable outcomes often requires less efficient outcomes. And our goal as economists is to decide, is it worth it? How do we think about whether a potential sacrifice in efficiency is worth a gain in equity or fairness?

And the best way to think about this was posed by the economist Arthur Okun about 40 or 50 years ago. God, it must be 50 years ago now. Arthur Okun, O-K-U-N, posed the example of the leaky bucket, which is the best way to think about redistribution. He said, imagine a society with rich people and poor people. And imagine the way we redistributed from rich people to poor people was by literally the rich people putting money in a bucket. Then someone carries that bucket and dumps it out in front of the poor people. The simplest possible view of redistribution.

And so Arthur Okun's question was, imagine a simple world where a rich person puts in $1.00, someone carries it over and gives that dollar to a poor person. How many of us would favor that? Probably most of us. Probably most of us would think that the rich person would miss the dollar less than the poor person would value the dollar. So probably most of us would think that if you could take $1.00 from the rich and give it to the poor, that's a good thing to do.

Now Okun asked, but what if the bucket was leaky? What if along the way, some of the money leaked out? So the dollar you took from the rich became less than $1.00 by the time it got to the poor. What if it was $0.90, $0.70, $0.50, $0.30, $0.10, or nothing? At what point do you stop wanting to make that transfer?

Like I said, for most of us, if I said to you, you could take $1.00 from a very rich person, give it to a very poor person, you'd say, well, that seems like a good deal. What if I say you get a dollar for a very rich person and give $0.50 to a very poor person? Is that a good deal? That depends. That depends on how you feel about the relative value of money in the hands of the rich and the poor. It becomes a harder question.

And that is the equity efficiency tradeoff. If you can redistribute shares of the pie without shrinking the pie, we probably would be in favor of that. But once it involves shrinking the pie, maybe it's not such a good idea. Or maybe it is. Maybe even if the dollar from the rich becomes nothing to the poor, you'd still favor it because you think inherently there's a problem with inequality.

So ultimately, the question we want to think about is, what's the leak that you accept in your bucket? What's the leak that you're willing to accept to transfer money? And we're going to discuss that issue in four steps in the next two lectures.

The first step is we're going to ask about social valuation of transfers. How do we think the issue we've avoided through this whole course, how do we think within our basic economic framework about how society feels about taking money from A and giving it to B?

The second step we're going to ask is what is the actual inequality that exists in society? What are the facts on who has the dollars? What are the motivations for potentially addressing these distributional issues?

The third thing we're to ask is where does the leakage-- what are the sources of leakage? Where does the leakage come from? Where do the leaks in that leaky bucket come from? Why is it leaky?

And then finally, we're going to ask about transfer policy. How does government actually go about taking money from some people and giving it to others? Those are the four steps we're going to go through. We'll get through the first three today and focus on the last one on Monday.

So let's start with the first one, which is how do we think about social welfare of allocation? So far we've just thought about the social welfare of total efficiency. We haven't thought about allocation. Imagine a world with many different outcomes, different levels of efficiency, but also different levels of equity. A world with buckets that are different leakages and different amounts of money going to different people. How would we compare them?

Well, here we're going to use the same tool we started with in lecture two. How do we think about valuing any combination of goods from a consumer? Well, we say they have utility function. And we say how do those different combinations of good enter the utility?

Well, the thing about socially optimal allocation, we're going to think about a social utility function or what we're going to call a social welfare function. We're going to say, look, if we want to think about the value of goods in the hands of person A versus B, we have to write down a mathematical function for how society feels about the value of goods in the hands of person A or B.

That is loosely a utility function for society, essentially an aggregation of each individual's utility. So the function per utility one, utility two, all the way up to utility 350 million. So this is the social welfare function for the United States is literally some aggregation, some mathematical function of everyone's utility.

And you should be able to see for a given mathematical function, I can then evaluate how I feel about transfers. Because I can look at what those transfers do to each person's utility. I can use this function to translate into a new social allocation.

So to see that, let's look at figure 23-1. These draw what we call iso-welfare curves. Now in our two dimensional graph, the trade off is between goods to two people, Homer and Ned. We have Homer and Ned. Society consists of these two people. And we want to think about how do we feel about resources in the hand of Homer versus Ned? And we could say, for example, that we're indifferent between the allocations U1H, U1N, and U2H, U2N.

Say we're indifferent between Ned having a lot and Homer having a little or Homer having a lot and Ned having a little. Then they'd be on the same iso-welfare curve. But by the more's better principle, we're certainly happy as a society with both having more. Just like any indifference curve, the iso-welfare curves, the further out, the better off we are.

So basically this is essentially a mapping of a social welfare curve, of a social welfare function. Just like utility function gives us an indifference curve mapping, a social welfare function gives us an iso-welfare curve mapping.

So then we just simply have to ask, what does a social welfare function look like? We talked about what utility functions look like. We talked about their general properties. And that common example we used is the square root utility function. But we said basically, we can use a broad class of functions you've seen on problem sets and exams, broad class of utility functions.

What about social welfare function? Social welfare functions. Typically we work in economics with a couple of different forms of social welfare functions. The most common form of social welfare function is what we call utilitarian social welfare function. The utilitarian social welfare function simply poses that social welfare is simply the linear sum of utilities U1 plus U2 plus da, da, da, plus U 350 million. That is utilitarian. It's literally I don't know, I have no basis for caring any more about one person than anyone else. I'm just going to add the utilities.

The person who came up with this was a guy named Jeremy Bentham, a famous British philosopher. A couple of things to note about Jeremy Bentham. First of all, he also invented a modern design of prisons, which is quite interesting. He was a broad thinking philosopher. He also, when he died, his stuffed body with the head separated was on display at University College London until it turned out students would take the head out and play soccer with it. So they no longer do that.

So he's a famous philosopher who came up with the utilitarian social function. It's a natural starting point. And if you think about it, it's not really-- you wouldn't look at this as conservative or liberal. You wouldn't say, oh, that's a lefty or right. It's neutral. It's just saying, look, I care about everyone equally. That seems pretty neutral. And yet, this neutral social utility function has radical implications for distribution.

In particular, it says we should always transfer between any two people if the transfer makes person two happier than it makes person one sad. That means we're indifferent between one util to you and to Bill Gates. Now, that sounds kind of conservative. We're indifferent. You're poorer than Bill Gates. We should care more about you. But remember, I said, we're indifferent between one util between you and Bill Gates. That doesn't mean we're different between $1.00 between you and Bill Gates.

Indeed, who would we rather-- with this social function, who would we rather have the dollar? You or Bill Gates and why? Let's say there's a up for grabs. With the utilitarian social welfare function, would social welfare be higher if you got the dollar or Bill Gates got the dollar and why? Yeah.

STUDENT: That's because the marginal utility of the dollar is less to Bill?

JONATHAN GRUBER: The marginal dollar's higher to you and less to Bill Gates. What this says is if you maximize this, if you maximize this, this implies that you should set the marginal utility of all individuals equal. I'm putting 350 million because there's 350 million people in America. This implies you should put the marginal utility of every person equal. That's a pretty radical implication. That says literally, you should redistribute money until everybody values the next dollar the same. That says you should massively redistribute from the rich to the poor.

Because the rich value the next dollar way less than the poor. Bill Gates couldn't give a shit about the next dollar. Whereas some poor homeless guy, could mean the difference between a hot meal and not having a hot meal today on a cold day. So clearly, this is fairly-- this suggests that we diminish-- as long as there's diminishing marginal utility, you should have fairly strong preferences to redistribute from the rich to the poor.

Despite the fact that when I wrote this, you didn't look at it and say, wow, this is some lefty crazy utility function, it has lefty implications. It says we should redistribute strongly from the rich to the poor, and it makes sense. The rich care about the money less than the poor care about it. And that's your underlying intuition, why we all start with this notion that redistribution makes sense.

Indeed, this goes further. If individuals are all identical, if individuals are all-- this suggests we should have an equal distribution of income. A pretty radical concept that's never been achieved anywhere in history by any society. If individuals are all identical, this says we should have an equal distribution of income. Pretty radical for a pretty straightforward concept.

Now, in fact, to many people, this is actually a very conservative approach to thinking about income distribution. Indeed, typically conservatives often start with this point. Many people on the left start with an alternative approach, what's called a Rawlsian, R-A-W-L, Rawlsian social welfare function, named after philosopher John Rawls, famous philosopher at Harvard. Rawls said that the social welfare of society should be measured as the min of everyone's utility.

That is, society should be measured by the living standards of its worst off member. That as a society, we should care about those who are poorly off. And society should be measured by the utility of the worst off member. That has some appeal. We should care about these people. But it's incredibly extreme in its implications. Think about it for a second.

Let's say there's a society consists of everyone in the world. Everyone in the US has $40,000, except one guy has $1.00 billion, and one guy has $39,000. This says that we should be willing to take the billionaire all the way down to 40,000, just to get the 39,000 guy up to 40,000. That's pretty radical. It says that basically we don't care about anything people have above the minimum. We just care about making sure everybody gets to that minimum. So that is very-- that makes this look like a conservative fantasy. This is an incredibly radical approach, which says we should take everything from the rich just to make sure the poor have enough.

Clearly under utilitarian social functions, that makes us bad off. Clearly the guy who goes from 1 billion to 40,000 is made sadder than the guy goes from 39 to 40,000 is made happier. So clearly that would not be a proper thing to do under utilitarian social welfare function, but it would under Rawlsian.

Now, of course, on the right, the conservative right, there's a criticism of both of these approaches. And that view, there's a criticism which is that basically the conservative criticism says that basically, look, this whole discussion is misguided.

It says, look, let's say we started in society with everyone having the same amount of money. Let's say everyone, you and I have the same amount of money. And let's say that you were willing, as you should be willing, to pay $100 to hear me lecture. And so you come in every day and you give me $100 to hear me lecture. A bargain. At the end of the semester, I am richer or you are poorer. Is that unfair? What's unfair about that?

You paid for something you wanted. I had something you wanted, and I ended up richer. Yet under utilitarian social welfare function, we'd call that bad. We'd say, wait a second. John's richer, you're poor. John should give that money back to you. But why? You gave that money to me voluntarily. So conservative criticism says that, look, as long as everyone has equal opportunity, we shouldn't care about outcomes. That what matters is opportunities, not outcomes.

As long as there is equal opportunities, then let people spend their money as they want and let people end up-- and whatever income distribution results. If Michael Jordan ends up rich because he's the best at basketball, so be it. As long as everyone has equal opportunities. This is a theory which says worry about opportunities, not outcomes.

Now this approach has two fundamental flaws. It's pretty compelling. The story I told is pretty compelling, except for two fundamental problems. The first problem with this approach is what does opportunities mean? By definition, my kids have better opportunities than the kids born to a poor single mother living in a poor part of Boston. They have more resources, they're at better schools, things like that.

So in some sense, equalizing opportunities is actually by itself pretty radical. That would involve a large social structural change. So first of all, equalizing opportunities is not as easy as it sounds. We don't all start equal. And it would require a large social upheaval to get us to that point we started equal.

The second problem with it is, it turns out that much of what accounts for success in life is not skill or hard work, but luck. And in that case, it's not true that rich people are rich because they deserve it or because they have skills or worked harder. They're just lucky. And why do we necessarily want to reward luck? Indeed, can't we think of redistribution as kind of luck insurance?

Imagine a world where a random event is going to happen to you. You get hit by a car. We talked about why you want insurance. Want insurance to make sure that if we get hit by the car or don't get hit by the car, we're in the same off. Well, same thing. Rawls talked about behind the veil of ignorance.

Imagine before you're born, you don't know if you're going to be rich or poor. You would choose a system which would insure you against being poor. And that system, which would involve transfers. So if much of success is due to luck, we're going to want a system that distributes the rich to the poor, because the rich got lucky, the poor didn't. That's uncertainty we want to insure against.

Fascinating fact. If you interview people around the world and ask them, is success mostly due to hard work or to luck? In the US, people say hard work. In Europe, people say luck. In Europe, they have much higher redistribution than we do in the US, because they have a view that much more success comes from luck. Now, the answer is it's both in every case. But it's an interesting two ways to think about the world.

And then finally, there's a totally different alternative, which has a lot of appeal, which is called commodity egalitarianism. Commodity egalitarianism. This view has a lot of appeal as well. It simply says, look, let's get rid of this focus on me versus you. That's just destructive. Let's take a page from Rawls' book and say, look, let's just make sure that the poor have enough to live. And beyond that, let it rip.

So commodity egalitarianism view is, much like Rawls, we want to make sure the poor are at a decent level, but we don't care then how much more the rich have. As long as the poor have achieved a standard of living where they can survive, then let it rip. I don't care how rich Bill Gates is, as long as each of you can have shelter and food and basic health care and other basic needs met.

It's kind of a compelling argument, right? That basically, why should I care about a guy who has a billion versus the guy who was a million? All I care about is making sure everybody can lead a decent life. It's in some sense a nice compromise between a lot of these different views in many ways. And it speaks to a key issue we'll talk about later, which is should we really be giving people money, or should we be giving people the goods, like housing and health care, that make up a decent standard of living?

So these are four different views. Only two of them could have been easily expressed mathematically. These obviously you can write down models, but they're more complicated. But the bottom line is with all these views, given those views, you can figure out whether a given policy that transfers person A to person B makes sense. These are different ways of providing a social welfare framework. OK, questions about that. Yeah.

STUDENT: [INAUDIBLE]

JONATHAN GRUBER: Sure, yeah. They're related. So here's the difference. Let's say we all decide that everyone needs $50,000 to lead a decent life in America. What commodity egalitarians say is once everyone has $50,000, I don't care how rich people are above that. Rawls would say, I do. If everyone has $50,000 but one guy has 40-- if everyone has $50,000 and someone else has $1.00 billion, we'd rather make everyone else have $50,003 and that guy come down to 50,003.

We don't want anybody above the minimum. We want to make sure the minimum is as high as it possibly can be. Whereas commodity egalitarianism says as long as the minimum is the decent state of living, let the rich guy have as much as he wants. Rawls cares about inequality as a concept. Commodity egalitarianism doesn't. Good question. Other questions?

OK, so armed with these views, let's talk about the facts. What do we know about inequality? And here I'm just going to run through some facts from my textbook that I used in 1441. So let's start with figure 23-2. This shows relative income inequality in the United States. How do we do that? We divide the population into quintiles. That is fifths of the people.

So each of these rows is 20% of the people. Each number shows the percent of income earned by that share of people. In other words, in a perfectly equal society, every number in this table would be 20. In a perfectly equal society, every fifth of people would get a fifth of the money.

But in fact, that's never true anywhere. You see, always the higher quintiles control a larger share of income. That's always true. What's more notable is how it's changed over time. From 1967 to 1980, it stayed relatively flat. But look, from 1980 to 2019. The share held by the poorest has fallen by about 25%. The poorest 20% of people used to earn 4.2% of the income. Now they get 3.1% of the income. The richest 20% of people in 1980 had 44% of the income. Now they have 52% of the income.

Society has gotten much more unequal. This has been driven not just by the richest 20%. To be clear, the richest, just to fix ideas here, the richest 20% of people would be people with incomes above, say, nationally, people with incomes above, say $85,000. So it's not mega rich. Maybe $100,000. Not mega rich. It's well off, but not mega rich. But this trend has been driven by the very wealthy.

Figure 23-3 shows the share of income going to the top 1% of income holders. This people's income above about $500,000. These are the rich. At the turn of the 20th century 1913 and peaking right before the Great Depression, the rich held about 25% of all income. That is, 1% of people got 25% of the income. That fell, then fell precipitously till in the early 1970s, 1% of people only had about 10% of income. And it's risen dramatically since. So we're back at the level actually above where we were at the peak of the 20th century with the top 1% earning more than 1/4 of all the resources in the society. So it's a very unequal society.

Now, you might say, well, how do I know it's unequal? What's the natural state? Well, what we want to do is compare countries. Figure 23-4 compares countries. This is just a small comparison of some countries that are in the OECD. Just a subset alphabetically of countries that are what we call developed countries. From countries that we consider our peers, like the UK or Sweden, to countries that are poorer, like Czechoslovakia or Turkey.

What you show here is the share of income held by the bottom 10%, the bottom 20%, and the bottom 40%, as well as the top 40%, the top 20%, and the top 10%. Just compare the bottom two rows. The bottom row is the average for all developed countries. So on average, across all developed countries, the bottom 10% of people have 3% of the income, and the top 10% of people have 25% of the income. In the US, the bottom 10% have only 1.6% of the income, and the top 10% have almost 30% of the income.

So the US is unequal. It's much more unequal. Indeed, we are the most unequal. what's considered developed country except for Mexico. We're not equal to any other country considered a developed country. We're the most unequal except for Mexico and maybe Turkey. There's some debate there. So we're very unequal.

Now, many people, particularly people in these camps, three and four, would say, well, look, that's all well and good, but why are you so worried about inequality? Sure, we got some rich guys, but we don't care about that. We just care that poor people have enough to live. That's what matters. We want to focus on what is the standard of living of the poor.

Well, in other words, they want to shift their focus from relative inequality versus absolute deprivation. That is, what are people actually living on? Well, to do that, the problem with that is relative income inequality is easy to measure. Just look at what group has relative to another. It's unit free. Once you want to measure absolute deprivation, you have to make a stand on what it means to be deprived.

The US has taken such a stand and we've created something called the poverty line. The poverty line is the US measure of what you need to lead a minimally acceptable life in the US, below which what does it mean to be in poverty. Now, this is a pretty foundational concept, yet its origins are very modest.

For those of you who think that working in the government doesn't involve-- for those of you who think being a government bureaucrat doesn't have much power, in the mid 1960s, a mid-level government bureaucrat made this number up. She said, well, look, her name was Mollie Orshansky. she said, look, poor people spend about a third of their budget on food. Let me just price out what a nutritionally adequate diet costs, multiply it by three, and we'll call that the poverty line. That exercise, updated by inflation, is literally the way today we transfer trillions of dollars in the United States. So that has remained our standard for what is poor.

The poverty line itself is shown in figure 23-5. So the poverty line for a family of one is considered to be about $13,000. It then doesn't double per person, because we view that living together has economies of scale. We don't think you need twice as much money for two people to live together as you do for one person to live together, because for two bedroom apartment, it's typically not twice a one bedroom apartment, certainly. So basically, there's economies of scale. So it doesn't double, but it goes up thereafter. So a family of four we think is a poverty line of about twice the poverty line for an individual.

Now, is that a fair number? Is that correct? Well that's a debate for another day. You can come to 1441. We spent a lot of time talking about it. It's a very controversial number for many reasons. But let's take that as a given for now.

What does it imply has happened over time? Well, look at figure 23-6, which shows poverty rates over time. What you see, if you look at the blue line, that's all people. You see for all people, poverty rates fell dramatically until about 1979, and then have been pretty flat since. That's a combination of a dramatic fall in poverty for those-- I'm sorry, that's not the blue line.

Yeah. Let's see. No, I'm sorry, the blue line is-- I'm sorry. The red line is all people. My bad. It fell dramatically until about 1970, and then it's been flat since. That's a combination of a dramatic fall in poverty for the elderly, which is the blue line. And actually, poverty kind of has been risen a bit for youth. That's under 18. But the bottom line is you look at this line from about 1980 onward and it all looks pretty flat.

Contrast that to I'll go all the way back to table 23-2. Table 23-2 seemed to show that inequality has gotten a ton worse since 1980. So how you feel about what's happened to American society depends very much on how you feel about table 23-2, figure 23-2 versus figure 23-6. Do we care about what's happened relatively, which is the rich relative to the poor, which approach one and two would say we should care about. Or do we care what just happened absolutely, which is what the poor have, which is what approach four says we should worry about?

And there's no right answer. But how you think about it determines how you're going to end up thinking about the problem. To my mind, I think you want some of both. But to my mind, the simplest and most striking way to think about this is the following example, which is just stunning.

Many of you may remember about 10 years ago there were the-- maybe less-- there was the Freddie Gray riots. Freddie Gray was a prisoner arrested in a poor neighborhood of Baltimore. He was killed in the police car on the way to the police station. It was one of the founding events of Black Lives Matter movement. Led to a lot of riots and things like that in Baltimore. Those riots highlighted how much inequality there is in Baltimore.

Go to figure-- I think, one of the most stunning figures I've ever seen. Figure 23-7. This figure, this is just a graph of Baltimore. This shows neighborhoods in Baltimore and the life expectancy in each neighborhood. How long you expect to live. And I'm going to highlight two neighborhoods. Sandtown-WInchester, which is where Freddie Gray was from, and Roland Park, which is three miles away.

Where Freddie Gray was from, the average life expectancy-- let's do Roland Park. Roland Park is a wealthy neighborhood, typical wealthy suburb. The average life expectancy there is 84. That's above the US average. Three miles away, where Freddie Gray is from, the average life expectancy was 67. That is below the life expectancy of North Korea. Three miles and a 17 year difference in how long you can expect to live. I don't see how anyone can look at that and not care about inequality. How can you not care about a world where people living three miles apart have a 17 year difference in how long they expect to live?

What's going on? Three miles away, the average income in Sandtown is four times the average-- the average income, sorry, in Roland Park is 4 times the average income in Sandtown. In Roland Park, 2.5% of kids live in poverty. In Sandtown, 55% of kids live in poverty. Three miles. And the odds a kid lives in poverty is 20 times different. These are the reasons why many of us feel very strongly we need to address inequality, as well as simply absolute deprivation. OK, questions about that?

Now, with that in mind, let's talk about what do we do about it? So let's say I've got you at least motivated. Let's say you came in this not really thinking about rich versus poor. Hopefully this has motivated you to think it's an interesting problem and think about maybe it's something we might want to do something about.

Well, to do so, we run into an important problem. Because remember, we're the dismal science. Nothing's easy. The problem is the efficiency costs of redistribution. Remember, I said life isn't typically like our example of perfect competition versus perfectly price discriminating monopolist. Typically, in life, if we want to take money from one group and give it to another, there's a leak in the bucket. What is that leak in the bucket?

OK, well, there's fundamentally two leaks. So let's say the way we do redistribution in reality is we tax the rich and give money to the poor. Well, that leads to two sources of leakage. The first source of leakage is the deadweight loss of taxation. When you tax an activity, you create less of it. And that has a deadweight loss, because there are socially optimal trades that no longer get made. That's the first source of leakage.

The second source of leakage is the deadweight loss of transfers, which is a little more subtle, but actually works the same way. When you subsidize a lack of economic activity, you create more of it. That's the moral hazard problem we talked about last time.

So to tax something activity, you create less of it. When you subsidize a lack of activity, you create more of it. Transferring from rich to poor involves both ends of that. So there's double deadweight loss you create.

So to see that, we're going to go through a fairly large example here. We're going to end the lecture with a strong example, which illustrates this point. In this example, we're going to say everyone earns $20 an hour. So our example, the wage for everyone is decided to be $20 an hour. So everyone has the same underlying marginal product of labor. Everyone is $20 an hour marginal revenue product of labor.

But different people earn different amounts of income. And society's utilitarian. The government is utilitarian, so it cares about that. There are different amounts of income. So let's say that the government wants to make sure that there's a minimum guarantee. The government is a commodity egalitarian. The government says, you know what? I want to make sure there's a minimum guarantee of $5,000. I want to make sure that everyone in society has at least $5,000, because I feel like you can't survive with less than $5,000.

But I have to pay for that. So the way I'm going to pay for that, I'm going to have a tax. And the tax is going to be that anyone with income-- oh, I'm sorry. Let me go back. So let me go back. Let me finish this first. There's a guarantee of $5,000.

But here's the thing. I'm not going to give everyone $5,000. I'll make sure everybody has $5,000. But if you have some money already, I don't want to guarantee you have $7,000. I want to make sure you have $5,000. So what I'm going to do is I'll set up a transfer program that's what we call a negative income tax. The way it works is if you have 0, I give you $5,000. You have 100, I give you 4,900. If you have 1,000, I give you 4,000. That is, I top up your income to get you to 5,000.

In particular, I give you a transfer. I give you a transfer, which is equal to the max of 0 comma 5,000 minus y. That's the transfer I give you. If your income is above 5,000, I give you nothing. If your income's below 5,000, I give you enough to get up to 5,000. That's how I implement my commodity egalitarianism solution. I get everyone up to 5,000. People clear on that? I get everyone up to 5,000.

And to finance this, I'm going to have a tax. The tax is going to be only on the rich. So what I'm going to do is I'm going to say anyone whose earnings is above $20,000 is going to pay a 50% tax rate above 20K. Just on your earnings above 20K. So all earnings below 20k I don't touch. But on any earnings above 20K, I'm going to take back half of it to finance this program. That's the way the program is going to work.

Well, let's see how that affects people's budget constraint. Let's go to figure 23-8. This is a standard leisure consumption trade off. People, remember, I said earn $20 an hour. So without the government, the budget constraint is the black line. They can work up to 2,000 hours a year and have no consumption. I'm sorry, they take 2,000 hours a year leisure. My bad. Leisure is on the x-axis. 2,000 hours of leisure and have no consumption or take 0 leisure and have a 40,000 in consumption.

And let's assume we're going to measure price of goods is all one. So consumption is just this consumption bundle. Like we talked about this numeraire good idea, that basically we think of dollars and units of consumption interchangeably. So basically, consumption costs $1.00. The price of consumption is $1.00. So basically, the trade off is simply for every hour I take of leisure, I give up $20 of consumption.

And that leads to that black line. The program I just described changes that line as follows. First of all, on the left hand side, if you take, first of all, I'm sorry, on the right hand side. My bad. On the right hand side, if you take more than 1,750 hours of leisure, we're going to give you money. Why?

Because if you take less than $750 of leisure, you're going to have more than $5,000 already. Look at the x. Look at the y-axis. 750 hours of leisure at a $20 wage means you're working 250 hours. It means you got $5,000 in income. So your income's below $5,000. That means you must be taking more than 1,750 hours of leisure.

For those people who are simply going to say, look, we're going to make sure you have at least $5,000. What does that do to the budget constraint? That says it becomes flat from the point of 1,750 all the way to the point of 2,000 and then drops back down. The new budget constraint on the right is the red segment. It's the flat segment. Because we're saying no matter how much leisure you take above 1,750, you always get $5,000 in income. We just send you a check for the rest.

Likewise, we're going to pay for that by a tax on those who earn above $20,000. Well, at $20 an hour, that means people who take less than 1,000 hours of leisure are the ones who earn more than $20,000. So on those people, we're taxing them 50%. So that lowers the slope of the budget constraint. Now for every hour you work above 1,000, you take home only $10 an hour. So that lowers the opportunity cost of work, lowers the budget constraint to the upper left right side. Questions about that?

Now, let's assume that there's three people in this world. Person A and B have the same utility function. Their utility function is U equals C to the 3/4 times L to the 1/4. Person C has a differentiable function. They have C to the 1/9 L to the 8/9. So person C really likes leisure relative to person A and B. Person A and B have a 3/4 wait on consumption versus 1/4 on leisure. Person C has a 1/8 ninth weighted consumption relative to 8/9 on leisure. Person C likes leisure. That's the utility function.

Now, in the optimal choice set, people are going to set their MRS equal to their MRT. That's going to be the choice people are going to make in the optimal choice set. So basically, what they're going to do is they're going to find, given this budget constraint, the one I depicted in figure 23-8, what is their optimal choice?

And what we're going to see is that without the government scheme, we'll see that in figure 23-9, and we'll solve the math in section of this example. We'll solve the math in section So you can go through it. But I'm showing you what the answer is. So we'll go through the math in the section. You'll see person A and B will choose to be at that intersection on the left on the black line, A1, B1. That is the choice they'll make. Given this budget constraint and given these preferences, they will choose and figure 23-9 to be the A1 B1 intersection.

Unsurprisingly, person C will choose to be way down on the right at the C1 intersection. Why? Because they love leisure. Person C cares way more about leisure consumption. So way down on the right. We'll work out the math. Just take my word. That's what the math delivers.

Now we put in the tax and transfer scheme. What happens to person C? Why do they move to C2? Why do they move to C2? Well, if you think about it, think about income and substitution effects for person C. The substitution effect is when you're at person C, there is a 100% tax on your earnings. Look at this. 100% tax.

Because every dollar you earn, you get less in transfer. Substitution effect says don't work. Because if you work, you get nothing. The income effect is you're richer. You're getting a transfer. Single effect also says don't work. So they don't work. Turns out if you pay people not to work, they won't. We learned that in the Netherlands last time.

So all the people who were at C1 go to C2. They stop working. What about A1 and B1? Well, here it's unclear. They now face a lower wage effective wage of $10 to / Whether they work more or less depends on income versus substitution effects. Here I am going to assume substitution effects dominate. So they work less.

So the new equilibrium is that person C works less and person A and B work less. What have we found? Leaks in the bucket. We thought we could raise a bunch of money from taxing A and B and give it to C, but we missed two things. First of all, A and B don't work as hard. So we can't raise as much money from them. Second of all, C doesn't work so hard. So we need to give more money to C.

So if you started with point one, A1, B1, and C1, you would have a certain estimate of how much money you have to take to get person C1 to transfer. Your estimate would be too low. Why would your estimate be too low? Because you'd miss the leakage. You missed the fact that A1 and B1 are work less, so you raise less money from them. And C1 is going to work less, so you need give more money to C1.

Those are the leaks. That's a graphical illustration of the leaks in the bucket. That is how the leaky bucket works. It causes taxation causes assuming substitution effects dominate. Taxation causes the rich to work less hard, which means you raise less money. And it causes the poor to work less hard, which means you have to spend more money. And those are the two sources of leaks.

That was very fast and graphical. In section, you go through the math. But that just gives you a sense of how the leakages work. We'll follow up on Monday.