**W6 V3 Taxes as Wedges**

0:09  
In this video, we're going to start talking about taxes.

0:11  
We're going to look at a particular type of tax, and I'm going to show you a method of how we think about as economists think about taxes as wages.

0:20  
Now, this is going to be different for you guys who have seen economics before, because this is not how they teach you in high school.

0:28  
And I'm going to strongly encourage you to follow this method because a, it gives you the intuition about what's happening here, which you don't get if you're just shifting curves because you're doing it mechanically without thinking about the economics, #1 #2 is if you're just shifting curves, you will make mistakes that will be caught on the exam, OK?

0:48  
Because you're not thinking about the economics, you're just following procedures.

0:53  
So for both of those reasons, even if you have seen taxes or shifting curves, I strongly encourage you not to do it, to think about taxes as wages.

1:00  
OK, I'm not even going to touch shifting curves in here because I really do not want to use that at all.

1:07  
I'm not saying that shifting curves is wrong.

1:09  
It is right.

1:10  
It's a shortcut mechanism.

1:12  
But we only use shortcuts.

1:14  
If we understand what's truly happening, then we can kind of take a shortcut.

1:18  
If we don't understand what's truly happening and we take a shortcut, we're going to lose economic intuition and we're going to make mistakes that will be costly for you on an exam.

1:28  
OK, so we will use shifting curves, but we'll use that in later modules when we're sure that you understand the intuition.

1:35  
So we can then take shortcuts.

1:37  
OK, but we're going to do the same thing that we've always done.

1:39  
Find the equilibrium, calculate it, find the different surpluses, and check if there's said weight loss.

1:44  
And why.

1:47  
OK, why taxes?

1:48  
Taxes are everywhere, right?

1:50  
But they're a good source of revenue for the government.

1:52  
And sometimes they're a policy tool where we can make behavior more expensive so people start doing it less, For example, smoking.

1:58  
Or we can encourage behaviors that the government wants to improve, for example, subsidized TTC tickets and get more people to take public transport instead of driving cars.

2:09  
OK, we're going to do everything here with taxes.

2:13  
I strongly encourage you to do the same thing with subsidies.

2:16  
Subsidies are nothing but a negative tax and they help you with the concepts doing both on our video.

2:21  
It takes really too much time and I've already got really long videos, so we'll do some of them in class.

2:26  
The problem set has many examples, but please do subsidies because they're the best way to identify whether you know taxes or not.

2:34  
OK, Now the most common taxes you see, if you buy anything, you pay GST, HST on it, right?

2:40  
Those are what we call percentage taxes.

2:43  
Now they're the most common and we will use them, but not in 101 because calculation wise they're pretty complicated and we're trying to keep the math as simple as possible in 101.

2:54  
Reason one reason 2 is if you're focused on a bunch of calculations, you're gonna miss the economics and we want you to get the economics down pat before you start thinking about more realistic.

3:06  
So what we're going to do is think about more unrealistic, but taxes.

3:10  
That will help us understand the intuition, which is what we call per unit taxes.

3:14  
So you buy an AC, it's not a percentage of the price.

3:17  
You walk it there and you have to pay $100 in tax.

3:21  
OK, fixed amount that just tied to the number of units that you buy.

3:26  
Now there are some fixed taxes that do not depend on quantity, right?

3:30  
Everyone has to pay $1000.

3:31  
Doesn't matter how much you buy or if you don't buy anything, you still pay $100.

3:34  
OK?

3:35  
Those are what we call lump sum taxes.

3:37  
We're not doing lump sum taxes just yet, even though we can talk about them.

3:42  
And the reason we're not doing that right now is cuz we wanna focus on what we call distortionary taxes, OK.

3:48  
Taxes that have a gap between marginal benefit and marginal cost, right.

3:55  
Because as soon as we have that difference in there, then we're going to get a change in quantity, then we're going to get a difference from the efficient quantity and then we can talk about things like getaway losses, inefficiencies, OK.

4:07  
So for that reason, we're going to talk about distortionary taxes and we're going to use the simple example of a per unit tax.

4:15  
But we will bring up occasionally as we go on non distortionary taxes, which are lump sum taxes.

4:21  
They're not going to be the golden solution because they're non distortionary because they do tend to be very regressive.

4:27  
If I had to say everyone pays $1000, people who are going to be hurt more are going to be the people with the lower income than people with higher income.

4:34  
That's what we mean when we say regressive.

4:37  
We're going to view taxes as wages and for a wedge you kind of need two things, right, and a gap in between.

4:43  
So what are those two things?

4:44  
So far we've been looking at prices and there's always been one price.

4:48  
That's the market price.

4:49  
How do you find the market price?

4:50  
Well, you go to the shop, you look at the the price on the shelf, the sticker price and you say, oh, that's the market price.

4:55  
Fantastic, right.

4:56  
And that's what we have meant so far with the tax.

4:59  
That's not the same as what we're going to be considering.

5:03  
What we're looking at is what we call effective prices.

5:07  
OK.

5:07  
So suppose you walk in and the price on the shelf is $20.00 for a T-shirt and you're like, oh great, the T-shirt costs $20.

5:14  
That's what I'm paying for the T-shirt.

5:17  
But then you go to checkout and they add on a $500 tax, you're going to be like, hang on a minute, right, I'm effectively paying $20.00 for the T-shirt, but I'm adding on $500 off a tax and that's a huge amount to pay for a T-shirt.

5:34  
Will you change your decision?

5:35  
Probably.

5:36  
Right?

5:36  
Because we're going to assume that you don't care so much or you don't care at all about what the price on the shelf is, what the market price is.

5:45  
Where you as a buyer care about is your effective price, the actual amount of money that's leaving your pocket.

5:53  
OK, so that's the first difference from what we've seen before.

5:56  
Same thing for the producer, right?

5:58  
They're like, oh, you know what consumers are paying two $520.00 for this T-shirt.

6:04  
Am I getting $520?

6:05  
No, 'cause they're gonna take $500 away and go give it to the government.

6:10  
And they're left for $20.00, right?

6:12  
Producers only care about their in pocket effective price and that's going to be the big concept that we have with taxes that sometimes tends to be the most confusing.

6:23  
So here's the visual to help you with this.

6:25  
OK, I'm the consumer.

6:26  
I'm sitting here, this is my pocket and I have $20 or whatever it is PD dollars that's leaving my pocket and it's going to flow all the way to the producers pocket before without any taxes.

6:45  
If I send out $20 the producer would get exactly $20.

6:50  
No nothing happening.

6:51  
It's seamless transaction.

6:53  
The problem is when you have a tax your money is leaving your pocket but before it gets to the producer pocket the government jumps in and pulls some tax revenue out, right?

7:02  
The government says, wait a minute, I'm going to come in here and I'm pulling out tax revenue in between as the money flows from here to here, tax revenues coming up.

7:14  
So what's the relationship between PD and PS?

7:17  
Well, consumers are paying PD.

7:20  
The money is leaving the producer consumers pocket before it gets the whole amount gets to the producer pocket.

7:28  
The government is jumping in and taking some money away.

7:30  
And so producers left with whatever is left over after the tax.

7:33  
So that's the relationship between effective prices.

7:36  
Or you can rewrite this to say that the difference between what the consumers pay and what the producers get is the amount of the tax taxes are a wedge between consumer effective price and producer effective price taxes as wages.

7:55  
OK, but I still have to put a market price, right?

7:59  
I still have to put a price on the shelf.

8:00  
So what price should I put?

8:03  
And the answer is, it depends on who pays the tax by putting the word pays in quotation marks, because how we're gonna use it in the course may differ from how you think of it.

8:14  
So please pay attention to that word and adjust the meaning of that word to match what the way we're gonna use it in this course.

8:20  
When I say who pays the tax, here's what I'm thinking about.

8:25  
If the buyer pays the tax.

8:27  
If the consumer pays the tax, you're taking the good to checkout, and at checkout, the tax is added to the bill that the consumer pays.

8:35  
This is typically what you're used to, right?

8:37  
You walk into the store, they add on the HST to your bill and then you are paying the tax, OK.

8:46  
The other extreme is the seller pays the tax.

8:49  
So you just walk out, you pay exactly what's on the shelf and then the producer has to look at that money, take some money away from that revenue and give it to the government as a tax.

8:59  
That is what we in one O 1 mean when we say buyers pay the tax or sellers pay the tax.

9:05  
If you're thinking where it's something different, please change it to adjust it to this.

9:09  
This is the most common source of mistakes on the multiple choice questions.

9:13  
OK, good.

9:14  
So if I have buyers paying the tax, and I'm gonna call the price on the shelf P, what price do I put on the shelf?

9:24  
OK, well, if you're gonna add on T dollars to the buyers bill, the buyer is effectively paying what this market price is plus the tax.

9:38  
So the buyer price is going to be the market price plus the tax.

9:42  
How much is the seller getting?

9:44  
The seller is getting effectively just was on the shelf because anything extra that needs to go to the government that's coming out of the buyers bill at checkout.

9:50  
So the producer is effectively just getting the market price.

9:57  
Notice the punchline.

10:01  
When you look at the word buyer pays the tax.

10:03  
What you are going to interpret that is I am looking for what the producer price is because that price is what I'm going to put as market price.

10:11  
That's it.

10:13  
You find your effective prices, you pick one.

10:15  
If buyers are paying the tax, producer price gets picked.

10:18  
That's the price you put on the shelf.

10:20  
Seller pays the price.

10:22  
We have the same logic right at the checkout.

10:25  
Buyers walk out paying the sticker price and the money is coming out of the sellers revenue.

10:30  
So what the seller is getting is the market price minus the tax, what the seller is getting is market price minus the tax and the buyer is just paying market price.

10:42  
So if I had to put a relationship between those two, that would be the relationship, which if I rewrite is exactly the same equation that I got before.

10:52  
So from a mathematical point of view, it doesn't matter how you work with it, who pays the tax, the tax is still a wedge between consumer price and producer price.

11:04  
The only difference is if the seller pays the tax, you pick the market price to be the effective consumer price.

11:12  
That's it.

11:13  
OK, so if it doesn't matter who pays the tax, and the only thing that I'm doing with the tax is picking which one I post on the shelf, then that doesn't feel right, does it?

11:29  
Right, 'cause it feels like, oh, you know what, here's a new tax.

11:32  
The buyer should pay, the seller should pay.

11:34  
It feels instinctively wrong, right?

11:36  
So shouldn't something be different depending on who pays the tax, Right?

11:40  
Shouldn't, I don't know, market quantity or the effective prices something be different and that's kind of a reasonable instinct.

11:47  
So let me convince you on the other page that it doesn't really matter.

11:52  
Doesn't affect the market outcome.

11:56  
The only thing who pays the tax does is which price to pick to put on the shelf.

12:02  
That's it.

12:02  
Everything else, surpluses, outcomes will be exactly the same.

12:07  
OK, now for that I've got to find you the equilibrium.

12:10  
So how do we find the equilibrium?

12:12  
Well, define the equilibrium.

12:13  
We're going to have to do the same thing that we did before.

12:16  
What do people want to buy?

12:17  
What do people want to sell?

12:18  
And then what's kind of the equilibrium quantity?

12:21  
Same logic.

12:22  
The only difference is now buyers are reacting to their effective price.

12:26  
Sellers are reacting to their effective price, right.

12:29  
So when you go to checkout to buy their T-shirt, you're not just basing it in what you see on the shelf, you're basing it on what's actually coming out of your pocket and seems kind of a reasonable assumption to make.

12:39  
And then we're going to take that and we're going to say equilibrium as before, is where demand equals supply.

12:45  
People want to buy stuff, people want to sell stuff.

12:47  
And as long as they're kind of equal, we are stable.

12:50  
We're stability, no excess demand, no excess supply.

12:53  
But this is a problem because before I had one equation and I could find one price for that, but now I've got two prices.

12:59  
So how can I use find 2 prices with one equation?

13:03  
But actually you've got two equations because you have the second equation, which is the relationship between PD and PS.

13:09  
They are LinkedIn such a way that the tax is the difference between PD and PS.

13:15  
So we use both of those pieces of information to find the equilibrium.

13:20  
It does not require knowing who pays the tax.

13:23  
In fact, I'm not going to tell you in the example that we do who pays the tax.

13:26  
I'm just going to tell you, you have a wedge and find me the equilibrium.

13:30  
To really convince you that you don't need to know who pays the tax to find the equilibrium.

13:34  
It's going to be the same equilibrium regardless of who pays the tax.

13:38  
OK, so here's the thing.

13:40  
OK, if you want the equations, you've got the equations at the top.

13:42  
But basically what we're doing is we're given a demand curve, we're given a supply curve, and I'm imposing a per unit tax of $2.00.

13:50  
That's all I'm telling you.

13:50  
I'm not telling you who pays the tax.

13:52  
OK, so now I have a problem.

13:54  
So what's my problem?

13:55  
I have demand which depends on what people are willing to pay, right?

14:05  
Willingness to pay comes here and it depends on their price.

14:09  
I have supply which producers react to and that's their thing.

14:17  
So if you're gonna tell me equilibrium is where quantity demanded is equal to quantity supplied, have a problem now because I have two prices.

14:32  
OK, so at this point you're like fine, just give me the math.

14:35  
What do I need for the math?

14:36  
The math is going to give me that extra equation which is the gap between PD and PS, and I'm going to say 2 equations, 2 unknown.

14:46  
I'm going to pull my math out, and I'm not going to think about it.

14:50  
You could do that, and there are examples of how to do that in in the problem set.

14:53  
But I really want to focus on the economics.

14:55  
So I'm going to say, no, don't do that.

14:57  
OK, how do we want to do that without that?

15:00  
So here's the logic.

15:01  
I need the gap between PD and PS to be exactly $2.00.

15:05  
So let's pick some examples.

15:08  
What if I have PD equals to 14?

15:13  
Then that means automatically that PS is going to be 12.

15:17  
Why?

15:17  
Because $2.00 from those 14 are going to go to the government.

15:20  
OK, good with this equilibrium.

15:26  
Well, if producers, consumers are paying $14.00, they're going to say I don't want to buy anything.

15:35  
If producers are getting $12.00, they're going to say fantastic.

15:40  
I love this high price.

15:43  
I'm willing to supply you 12 units.

15:45  
It's not going to be equilibrium, right?

15:46  
12 units out there and nobody wanting to buy it.

15:49  
Let's drop the prices.

15:51  
If you drop PD, you're gonna have to drop PS.

15:54  
So let's drop them.

15:56  
Let's drop them So, so low.

15:58  
So let's make PD $4.00, which means that PS has to be $2.00.

16:10  
PD is $4.

16:12  
Lots of people want to buy.

16:13  
The good quantity demanded is 10 quantity supplied.

16:20  
They're like too low.

16:21  
Four that's too low.

16:24  
So let's kind of keep going back and forth so that we find a set of prices where the gap between those prices is exactly $2.00 and quantity demanded equals quantity supplied.

16:37  
OK, so let's play around with this a little bit.

16:39  
What about if I pick for example, PD equals 8.

16:51  
If I pick PD equals 8, it must mean automatically that PS is 6 because $2.00 is taken away by the government at PD equals 8, we're going to get a quantity demanded if of six PS has to be 6 quantity supplied 6 equilibrium, right.

17:15  
So what we're doing intuitively is we have this wedge of $2.00 and we're moving this wedge up and down, up and down.

17:24  
We're kind of moving this wedge up and down and we're kind of thing, where do we stop?

17:28  
Where do we stop?

17:29  
You're going to stop here.

17:30  
You're going to stop there.

17:31  
You're going to stop at exactly the place where the gap between PD and PS is $2.00 and quantity demanded equals quantity supplied.

17:42  
That's what it is.

17:43  
I haven't told you who's paid the tax, but I've found equilibrium.

17:46  
I found the quantity, which in this case is 6, and I found the prices corresponding to that that result in this outcome, which is PD and PS of eight and six respectively.

17:57  
That's my market, right?

17:59  
So that's how you find a market with a tax.

18:03  
That's as simple as that.

18:05  
Now here's a question that comes up.

18:06  
You're like, oh, you stopped on this side.

18:08  
You're only looking on this side.

18:09  
Why didn't you go on the other side?

18:13  
So why didn't you go here?

18:16  
Now say, good question, right?

18:18  
If I go here, what am I assuming about PD and PS?

18:22  
If I go there, I'm going to say PD has to be 6.

18:28  
Why?

18:29  
Because you're reading it on the demand curve.

18:32  
OK.

18:32  
So that's going to be PD is going to be 6, which means that PS has to be somewhat lower than that, right, Because money is coming away from the transaction.

18:45  
The government's not pumping money into that transaction.

18:48  
So this is not possible when we have a tax because if you wanted to put the wedge here and call that PD because that's where demand is, supply has to be lower than that.

18:59  
So that's not even possible.

19:01  
The hint I'm going to give you though is that it is going to be possible when you have a subsidy.

19:05  
So think about that when you're going to go to a subsidy.

19:07  
But for now, that's not going to be possible with the tax because I always need money flowing from the consumers pocket to be higher so that the government can pull some money out of that as a tax revenue.

19:19  
Now we're done, right?

19:20  
We have our PD, we have our PS.

19:23  
We have our quantity demanded and quantity supply, and they're exactly the same.

19:28  
So what should I put is market price.

19:30  
This is the only time you'll bring in who pays the tax.

19:33  
A buyers pay the tax, Then you're going to pick $6 to be your market price.

19:39  
Let me just write that down.

19:40  
Buyers pay the tax.

19:47  
Market price will be PS, which will be $6 because that's going to be the price in the shop you walk to check out.

19:52  
They add $2.00 to your bill.

19:53  
Sellers pay the tax market price will be what consumers pay and they walk out of the door, which is $8.

20:01  
That's the only thing that matters for who pays the tax, which one of those two prices you pick for sticker price.

20:11  
Now at this point, students kind of say, you know what?

20:13  
You feel like you're cheating, right?

20:16  
You've kind of said OK, good, there's PD, there's PS.

20:21  
And fine, I buy this explanation that this is what the market price is.

20:25  
A market quantity is 6 and market price could depend.

20:29  
It's either PS or PD depending on who pays the tax.

20:33  
But shouldn't it matter for consumer surplus and producer surplus?

20:37  
And the answer is, again, going back to that $20 and and $500 tax example, what is your surplus depend on as a consumer?

20:45  
Does it depend on the fact that the price on the shelf of the T-shirt was $20 or the fact that you were effectively paying 520 because you had to pay a whole bunch of money as a tax?

20:55  
If you're working with the assumption that what matters to you is the effective price that you pay, then that's what we're looking at.

21:02  
For consumer surplus.

21:03  
It's the difference between what you were willing to pay and what you actually effectively have to pay.

21:09  
I don't need to know the market price for that.

21:11  
Same way for producer surplus.

21:13  
I don't care about what the, you know, taxes or the sticker prices.

21:17  
What I care about is how much I'm actually getting compared to my cost.

21:22  
So I do not need to know what the market price is.

21:27  
This is my producer surplus, This is my consumer surplus.

21:39  
OK.

21:40  
And what's that gap in between?

21:41  
Well, this gap in between is the amount of the tax, 2 dollars, $2.00 for six units, $2.00 \* 6 units is the tax revenue.

21:49  
This is how much is going to the government, right?

21:51  
Because now we have an additional player in the market, which is the government.

21:55  
So that is tax revenue.

21:57  
So we've got this total surplus, market surplus, social surplus, which is consumer surplus, producer surplus plus government surplus, OK.

22:09  
Or the difference between willingness to pay and marginal cost for all of the units traded under the no externality assumption given that we're looking at perfectly competitive markets.

22:31  
OK.

22:32  
So do we have a dead way loss?

22:34  
Yes, for exactly the same reason that we had before, right.

22:37  
These are units that should be produced, that are not being produced, right, because the tax is distortionary.

22:42  
It's raising the price on consumers.

22:44  
So they're trying to run away from that and buy fewer goods.

22:46  
It's lowering the price of producers.

22:48  
So they are trying to run away from that by producing fewer goods.

22:52  
And that means that on the whole, because of these distortionary taxes, we have fewer units being produced in the market and we have a deadweight loss.

23:00  
OK, always check for misallocation.

23:03  
Is it possible that some people want to produce that don't get to produce?

23:07  
No, because here the price is so low.

23:09  
Everybody who wants to produce is the one producing who should be producing.

23:13  
Same thing for buyers.

23:14  
Some buyers want to buy the good that can't get the good.

23:16  
No, because the price is so high for them.

23:18  
Effectively there is no misallocation in there.

23:21  
OK.

23:22  
And that should come from the hint that you're looking for is quantity demanded.

23:26  
Is quantity supplied in this equilibrium?

23:31  
So taxes result in two effective prices if we view taxes as a wedge between consumer price and producer price.

23:40  
And please when you start out with do not shift curves, do not worry about who's paying the price.

23:45  
Ignore that information even if it is given for you.

23:48  
Find the equilibrium using those two pieces of information we have.

23:52  
I need markets to clear, but people are responding to their own effective prices, so I can get market clearing as one equation.

24:00  
Second equation I need is a tax as a wedge, and I can describe everything in terms of the surpluses, in terms of the quantity, in terms of everything else.

24:09  
The only thing I use who pays the tax is to find what price to put on the shelf, and that's like a secondary afterthought for us in this world.