**W5 V1 Surplus Definitions**

0:10  
In this video, we're going to talk about surplus.

0:12  
We're going to start by defining our terms, calculating them and showing you what they look like on a graph.

0:19  
Why do we use surplus?

0:20  
We use surplus because it helps us answer 2 questions about trades that happen in the market.

0:24  
One is, are these trades making people better off?

0:28  
And if they are making them better off, how much better off?

0:32  
So we're going to use surplus as a way to measure who benefits and how much, and much more importantly for us to be able to compare allocations across time and contacts.

0:43  
At this point, students typically ask, well why not use price, right?

0:46  
That's a dollar measure, easy to compare.

0:48  
We've converted already lots of stuff into dollars.

0:51  
Why just not use prices?

0:53  
And to convince you that surplus is better, let's just use an example that most of you have encountered.

1:00  
Everyone of you uses Internet.

1:02  
Most of you may have Internet at home that you pay for.

1:05  
Average prices of home Internet in Canada is $95 a month.

1:08  
So if we just use prices, then in a way it's kind of saying your surplus from home Internet is $95 a month.

1:16  
And that's the same for kind of everyone, depending on how much they pay.

1:19  
Now that may be true.

1:20  
But if you introspect a little bit and I ask you, let me take away your Internet, right, no Internet.

1:26  
Would you pay me exactly 95 or would you pay me more than 95?

1:30  
Question we want to know is how valuable is Internet to you?

1:34  
And we already have a measure for that, which we've done in week 1, which is your marginal willingness to pay, right?

1:40  
And this is how much you're willing to pay for home Internet.

1:45  
Would you have to pay is the price.

1:49  
And so anything extra that you get is a measure of how much better off you are from buying home Internet at this price.

1:58  
OK.

1:59  
So willingness to pay and then we're looking at a specific transaction which is your act of buying home Internet.

2:04  
So this good, what's your surplus from this one unit of good given that you've paid this price.

2:11  
So for an individual, this price is going to be really important because that gap between willingness to pay in price is surplus.

2:17  
You've seen a version of this before when we said keep buying that extra unit as long as your willingness to pay is at least as high as your price.

2:25  
If your willingness to pay is higher, you get what we call surplus.

2:28  
So it's not a new concept, it's just putting a term for something we've already encountered before, OK.

2:34  
Now, if we're thinking about consumers and we're thinking about one unit, then we say your surplus from that one unit that you buy as a consumer is just your difference between your willingness to pay and what you had to pay.

2:48  
Sometimes I want to take a step back and look at all of the units that you buy and think about your total consumer surplus, right.

2:55  
And we've already encountered this again when we looked at Principle 2, which is quantity based on extra willingness to pay an extra price, right, extra surplus.

3:04  
And then we took a step back in principle three and said, do you want to take this decision or not?

3:09  
And there we looked at totals.

3:10  
Same thing here, right?

3:12  
Total consumer surplus is your total willingness to pay.

3:15  
You sum up the marginal willingness to pay for all of those units.

3:18  
You look at the total price paid, that difference.

3:21  
Consumer surplus.

3:24  
Exactly the same for producer surplus, right?

3:26  
Each unit, they are willing to sell it to you at minimum at that price, that cost, you give them something higher, they're happy.

3:34  
How much happier, right?

3:36  
That difference is producer surplus, same thing.

3:40  
What we want to do is we want to say on the whole, do the consumers, do the producers want to take this deal or not produce this good or not?

3:48  
Well, they're looking at the total benefit, which is price times quantity, right under the assumption again here that we're in this perfectly competitive world where every unit they sell, they get the same price.

3:59  
But more generally, it's kind of what they get from selling the total quantity, which in our world here is revenue.

4:04  
Now total marginal cost, we're gonna, when we talk about the cost module define this more fully.

4:10  
But because I wanna tie this to a diagram for now, I'm just gonna call it the area under the marginal cost curve.

4:16  
And when we do the cost module, we'll have a more specific shorter term for this variables.

4:21  
That's where we're able to use to communicate, OK, but that is what consumer surplus and producer surplus is.

4:27  
It is just basically using concepts that we've done in module 1, giving them terms that allow us to be able to communicate certain concepts in a faster, more efficient way.

4:37  
Let's think about how to calculate it.

4:38  
So again, we've got two types of data, discrete data, continuous data.

4:41  
Let's start off with discrete data, right.

4:43  
So if I'm saying this is your willingness to pay for each one of those units, I want to calculate your consumer surplus, right?

4:51  
What's the first thing I need?

4:52  
Consumer surplus needs two parts.

4:54  
One is your willingness to pay and then the second one is the price that you actually pay.

4:58  
So you cannot calculate consumer surplus without the price.

5:02  
Always pay attention to that willingness to pay.

5:04  
1 aspect price is a second.

5:06  
So the first thing you should ask me when you see this data is what price are people paying?

5:10  
So I'm going to give you a price here of $1.00.

5:14  
OK, now that you have this price of $1.00, your second step should be when facing this price, how many units does this consumer actually buy?

5:23  
Which way back?

5:24  
Module?

5:25  
One right?

5:26  
First unit.

5:27  
Do they buy it?

5:27  
Yes, willingness to pay is 15.

5:30  
They only have to pay one.

5:31  
They buy the unit and they get a consumer surplus of $14.00, right?

5:37  
That difference.

5:39  
Second unit willing to pay 10, have to pay one, buy it and get a surplus of $9.

5:45  
Third one, right, willing to pay 5, have to pay one, buy it with a consumer surplus of four.

5:51  
Last one I don't want, I don't willing to pay at all.

5:54  
I have to pay one.

5:55  
I do not buy this right?

5:57  
So I get zero consumer surplus on this just because I don't buy it.

6:02  
How do we represent this information on a graph?

6:06  
So each individual unit gives me this amount of consumer surplus.

6:10  
So we had represented on the graph is I would say unit 1, Unit 234.

6:17  
OK, first one I'm willing to pay 15, I only have to pay one.

6:24  
This gap here is the consumer surplus I get from that one unit.

6:29  
Second one willing to pay 10, third one willing to pay 5.

6:38  
And then the 4th one I don't even buy South, I'm not even interested in that.

6:43  
Now this difference here between this and one is my consumer surplus from each one of those units.

6:50  
Total consumer surplus, Just the sum of each one of those individual surpluses area under a graph.

7:02  
Well, if we've got one unit in here, consumer surplus is just this area, right?

7:11  
Because it's base times height and the base is just one unit.

7:15  
So again, it's not continuous data.

7:17  
I don't want to approximate a line here because I do not have data on this dotted area, So I do not have that data, I cannot use it.

7:24  
But using the data I have visually, that's how you'd represent it on a graph.

7:28  
This is why in module one we said it's important to be able to work with discrete data on a graph as well as continuous data.

7:34  
Same thought process, same intuition for continuous data, right?

7:39  
Give me your equation here.

7:41  
We're pulling from module one as well as module three when we did demand and supply to notice that your demand curve is also your marginal willingness to pay curve and it's also the price curve, right?

7:58  
So this here is the way that we write down the demand curve.

8:01  
So I'm using the concept from Demand and from module 1 to say when I face a price of $1.00, given that I have information on the willingness to pay for each one of those teeny tiny bits, I know that the consumer will stop at this quantity.

8:19  
The consumer surplus they get from each teeny tiny bit because now I have information on it is given by that little small line.

8:29  
Total consumer surplus is just this area.

8:33  
OK, so I find a lot of students memorizing it has to be a triangle.

8:36  
It doesn't have to be a triangle.

8:37  
We're not adding anything extra then.

8:39  
Just a graphical way of representing what we've already done in module one and three, right?

8:44  
Difference between willingness to pay and a price for every unit and then summed up to get total consumer surplus, exact same or process or producer surplus.

9:01  
Tell me your marginal cost.

9:02  
Tell me your price.

9:03  
I will figure out which units you're buying.

9:06  
Right.

9:07  
So here, sorry, selling here it cost me $2.00 to produce.

9:13  
I'm getting 5 dollars $3 worth of surplus produce.

9:16  
This here 54 produce, $1.00 worth of surplus.

9:21  
Here it cost me 6 to produce.

9:22  
I'm only getting $5, not producing, not producing, right.

9:26  
So if I'm just kind of on a discrete data, just summing it up, I'll get total producer surplus as the sum of these two individual surpluses on a graph.

9:37  
You're going to do exactly the same thing that we did before.

9:40  
The producer here is getting $5 for each unit.

9:45  
First unit cost them $2.00 to produce, so they're getting that gap right?

9:53  
A producer surplus, second one cost them $4.00, they're getting five, that's the producer surplus.

10:02  
And then no more.

10:03  
They're not producing these two units, so they don't get any surplus on that, right?

10:07  
Exactly the same as what we did for consumer surplus in the continuous form.

10:13  
It's also going to look the same way.

10:14  
We're going to use the inside from module 3 that I can interchangeably use the supply curve, right?

10:20  
This is the supply curve and the marginal cost curve.

10:27  
So when producers face a certain price, they know what quantity that they're going to supply.

10:33  
And then for every single unit supplied, that's a visual representative of the surplus and total producer Surplus would just be area below price and above the marginal cost curve, right?

10:47  
That's it.

10:48  
Simple as that.

10:49  
Now the complication comes in when we're talking about total surplus.

10:53  
And here I want you to pay attention about to how total surplus is defined.

10:59  
In the previous one, we're talking about consumers, we're talking about producers, the next one.

11:03  
But here when we talk about total surplus, it's not just all consumers and producers, it's everyone in the economy.

11:10  
If we have only consumers and producers, fine, then that's OK.

11:13  
But society is larger, and we want to look at social surplus.

11:19  
So when you're starting out, I want you to, in the, in the back of your head, always toggle between social surplus and total surplus so that you don't forget the total surplus is everybody in the economy.

11:30  
We call it total surplus, but it includes every single member of society that is affected by this trade.

11:40  
OK, they get a surplus.

11:41  
They don't get a surplus if they are affected by this trade.

11:45  
Whether they participate in the trade or not, their surplus should be counted in here.

11:50  
It's gonna be really important when we have things like externalities in there.

11:53  
And if you forget now, you're gonna get hit when we hit the externality module.

11:58  
OK, so how do we calculate social surplus?

12:01  
The concept is the same, right?

12:03  
Here's what I'm willing to pay.

12:05  
Here's what I actually have to pay.

12:07  
But now from a society perspective, you're looking at the extra benefits to society, right?

12:14  
And the extra cost to society.

12:18  
That's the only difference is the social cost of producing this good and the social benefit of the person who consumes this good.

12:25  
That gap is surplus from that one unit and you just sum it up if you want to know total surplus, that's it, right?

12:35  
That's the concept.

12:36  
The trick here is remembering that is social surplus when we do total surplus, so why there's difference, right?

12:42  
Why not just, say consumers, producers.

12:45  
And why do we have to do this difference?

12:46  
Because in some cases social cost may not be equal to private cost.

12:52  
So your cost of producing something may not be the cost to Society of producing something.

12:57  
And similarly for the benefits.

12:59  
So that's why we need to at the back of I remember there's a difference.

13:02  
And then check whether in this case it actually works out or not.

13:08  
And the other thing, again, I want to stress this.

13:10  
I've said this, but I want to keep stressing it because I see a lot of students memorizing a formula like this.

13:16  
How do I calculate consumer surplus?

13:19  
I know how to do that, I know how to do this.

13:20  
And then I calculate total surplus.

13:22  
That works fine if consumers and producers are the only one benefiting from this transaction.

13:27  
It works fine if you have a price, right?

13:31  
Because remember consumer surplus and producer surplus.

13:34  
I need a price.

13:36  
I can't calculate them without that.

13:38  
So sometimes you don't have a price, but you have other information that you can use to calculate total surplus.

13:44  
So that's the flexibility we need from you.

13:46  
And not just saying, OK, this way works for me and I'm also going to only work this way.

13:50  
OK, so keep that in mind.

13:52  
You need to be flexible to calculate this independently of consumer surplus and producer surplus.

13:59  
OK, so here's what we've done.

14:00  
To calculate consumer surplus, producer surplus.

14:02  
I need to know prices.

14:04  
Without prices I cannot separately identify them.

14:07  
OK, I need to know willingness to pay and marginal cost, total surplus.

14:12  
I need similar information, right?

14:13  
I need the quantity being traded, but I need to know how members in society.