**W8 V1 Firm Supply**

0:09  
In this video, we're going to talk about a firm supply curve.

0:12  
Now we've already talked about this when we've done Module 3.

0:16  
So in that sense, you're going to come here and you're going to say, well, what's different?

0:19  
What's different here is the following.

0:20  
In Module 3, we didn't talk about the firm's decision to produce or not.

0:25  
That's what we're going to incorporate here now that we have a full understanding of the different types of firms costs.

0:31  
The other thing we're going to do is we're going to talk a little bit more carefully about the perfect competition assumptions.

0:35  
We've talked about them briefly, but the details matter for perfect competition.

0:40  
So we'll spend some time at the start thinking about that.

0:42  
And the way we're going to phrase that is talking about how the demand for an individual firms product depends or is different from the demand for market demand for the entire product.

0:56  
OK, so a perfectly competitive market.

0:58  
We've said the fundamental thing that we initially started working with is that every firm is a price taker.

1:03  
There's a flashing red sign and they respond to prices.

1:06  
They do not choose prices.

1:08  
Now the perfect competition, the competition aspect comes from the fact that consumers treat all of these goods as identical and they can switch.

1:15  
Even if there's a teeny tiny one cent difference, they're going to switch because there's no transaction costs.

1:21  
So these two are going to give us a lot of the intuition that we're going to start out with for the firm supply curve.

1:27  
And then we'll use the last perfect competition assumption, which we've kind of been ignoring a little bit for now, which is this idea of free entry and exit, to talk more about how the market characteristics look like.

1:39  
OK.

1:40  
Remember all those other assumptions to the whole, we're just not focusing on them as much, but they're still there in the background, OK.

1:47  
So when we say you're small relative to the market, we've been saying essentially you're a price taker and that we took to mean that when you are looking at your profits, you have no control over your price.

2:01  
That's the flashing red sign that's given to you.

2:03  
And we said that's useful because then if I want to figure out average revenue, just divide by quantity, I have the price and it's also the marginal revenue.

2:13  
Every extra unit I sell, I get exactly the market price, not higher, not lower because I am too small to change the market price.

2:21  
I just respond to the market price by choosing my quantity.

2:25  
So when we're talking about price versus versus marginal cost, effectively we're kind of also saying that the firm in a perfectly competitive firm in a market has marginal revenue equal to price.

2:40  
This is not so important and we'll hardly use it.

2:42  
But sometimes when we write it, we write it this way to elicit from you that you understand that firms are price takers.

2:49  
So just pay attention to that.

2:52  
OK.

2:52  
Now the other flip side about not being able to affect the market price is that you can sell as much as you want at the market price without the market price going up or down, right?

3:04  
And that's kind of cool, because not only do you get the same price for every unit, you will just flood the market if you want and nothing changes.

3:13  
What that means for us is the demand for the firm's products is perfectly elastic if you post a price anything above the market price.

3:24  
So let's say that this is the market price.

3:27  
If you post anything, even one sent above, because consumers treat your goods as identical, nobody's buying from you.

3:33  
Yet the demand for your product is effectively 0.

3:37  
If you post a price that's one cent below the market price, everybody's coming to you 'cause people are super responsive in this world.

3:45  
What this effectively means is that your only option is to post the market price, right?

3:52  
Because if you post anything below, everybody comes to you.

3:56  
If you post anything above, nobody comes to you.

3:58  
Got this huge swing coming from this perfect competition assumptions.

4:02  
So effectively your only option is to post the market price, which is one way of saying when we're thinking about elasticity is that the demand for your products is perfectly elastic or it's just another way of seeing what a price taker means, right?

4:18  
It's not that I'm choosing and I'm just reacting to the prices I keep saying.

4:22  
But if that doesn't feel comfortable for you, you can be like, look, my only option is to post the market price, which means effectively I'm a price taker, right.

4:31  
So that's another way of kind of viewing this price taking assumption.

4:35  
OK, let's go back again principle one, all forms, all costs are opportunity cost.

4:42  
Principle two, I choose my quantity based on price versus marginal cost.

4:48  
Given that this quantity, I then decide whether I'm going to produce or not based on total revenue, total cost.

4:55  
I brought this up before and I said watch out.

4:56  
There's a subtlety in here where the sunk cost aspect comes in.

5:00  
So now we're going to explore that a little bit more and we're going to use the timing aspect, long run versus short run to think about that.

5:08  
OK, long run versus short run.

5:11  
Last week I talked to you about this idea that inputs are different in terms of the flexibility, long run, short run, the short run, At least one of them is fixed.

5:19  
In the long run, everything is variable for this module.

5:22  
We're gonna rely very heavily on the other aspect of long run and short run in the sense of entry and exit.

5:29  
OK.

5:30  
In the long run, everything is flexible.

5:33  
In a certain sense also that you can exit the market, you can cease to exist as a firm.

5:38  
You can write to CRA and say I'm done.

5:40  
I'm no longer a firm and nobody exists, right?

5:44  
You don't exist.

5:45  
On the other hand, you can enter.

5:47  
In the long run, if you choose to become a firm, you file the paperwork, CRE has time to file it, and now you officially exist as a firm.

5:54  
This is not the case in the short run.

5:56  
In the short run, you're stuck.

5:58  
You want to exit.

5:59  
CRE says no, you're still a firm.

6:01  
You still have to file the paperwork every week.

6:03  
Your only option is that you don't produce anything.

6:05  
We call that a shutdown, but you still exist as a firm, OK?

6:10  
And the flip side of that is you cannot even enter, right?

6:13  
You look at this market, you're a firm standing outside and you're like, I want to enter.

6:16  
There's lots of profits here.

6:17  
It says, wait, we're still working on your paperwork.

6:19  
You cannot enter even if you want to in the short run.

6:22  
So that's the difference that we're going to be focusing on a lot in this module in terms of firms and markets.

6:30  
OK.

6:31  
So in the short run, how does this affect my cost for a firm?

6:34  
We've talked about the inputs.

6:36  
In the short run, one of them is fixed.

6:37  
If it's fixed, then that means that the cost is fixed.

6:40  
But also you can't really avoid paying for your rent even though you're like, I'm not producing anything.

6:47  
Too bad.

6:47  
You've signed a lease, it's fixed.

6:48  
You cannot change it.

6:49  
You cannot get out of it.

6:51  
You gotta pay it.

6:52  
Which means that no matter what I do, those costs are sunk.

6:56  
And that is useful because if it is sunk and then I shouldn't take that into account when making my decision to produce or not, right.

7:06  
So what we say for firms in the short run is that you're going to choose to shut down or not produce if you cannot cover your non sunk costs.

7:19  
OK, we'll use the shorthand variable costs and fixed costs over here, effectively meaning that fixed costs are sunk in the in the short run.

7:30  
But please don't over interpret that.

7:32  
The key intuition that I want you to keep is what is sunk versus not.

7:36  
OK, so in the short run you will choose not to produce if you cannot get on average enough to cover your variable costs, because you can avoid your variable costs by just shutting down in the short run.

7:51  
Now notice that you may make some negative profits in the short run, right, because you're not able to cover your rent for example.

7:56  
That's your fixed cost.

7:57  
You still choose not to produce because you would do worse if you produced if your price is less than your average variable cost.

8:05  
If, on the other hand, your price is above your variable cost, you will produce, but it could be that the price is not enough to cover your average total cost.

8:19  
In that case, you're going to be making negative profits, but you will still choose to produce because at least you're able to cover your variable cost.

8:27  
Now is there a quick way to do this?

8:29  
Because if you're as I'm talking, it sounds really complicated.

8:32  
There's a lot of calculations to do.

8:34  
Is there a really simple way to find out where the price is higher than or equal to average variable cost?

8:42  
Now this is slightly complicated because variable cost, average variable cost depends on the quantity.

8:46  
You ramp the quantity up or down, you change my average variable cost.

8:50  
So first I need to figure out the quantity and then I'm going to figure out the average by finding out the total What is the quantity?

8:57  
Well, we know this.

8:58  
We've done this all the way in module 1.

9:01  
Tell me your price.

9:03  
I will figure out the quantity for which price is equal to marginal cost under the assumption marginal cost is increasing.

9:12  
And I will tell you for all of the units, all of these units prices above marginal cost keep increasing.

9:18  
Keep increasing.

9:18  
All of these units price is below marginal cost do not produce.

9:25  
I stop exactly here so I know the quantity.

9:29  
Now all I've got to do is to figure out whether this quantity is at this price.

9:34  
At this quantity, variable cost is higher or lower.

9:37  
So take the same thing, fix your quantity, and then put your average curves on that.

9:43  
Here we're going to use the relationship that we derived in the previous week when we were talking about the relationship between average GPA and the GPA of your extra class.

9:53  
What we talked about was that there's this one minimum point, OK, For quantities above this quantity, this magic quantity, marginal cost is going to increase your average.

10:05  
And for quantities below that magic point where they're equal because marginal cost, because the extra classes has a GPA that's that's lower than your average, it's going to pull it down South.

10:17  
I've got that relationship going in there.

10:20  
With that relationship, I also know that for quantities here, OK, averages are going to be lower than marginals.

10:28  
Now why is that useful?

10:29  
That is useful because in the previous slide we talked about I know price and marginal cost.

10:35  
I know that relationship and that's the flexibility that I'm going to use, right.

10:39  
So if you're giving me a quantity here, the only reason I would choose this quantity is if price was here and as price is here, I know that it's going to be above average total cost.

10:52  
Profits on the other hand, it's going to be here if quantity is down there.

10:58  
I would choose this quantity only if marginal cost was here.

11:04  
And clearly average total cost is going to be higher.

11:07  
I just talked about it with average total cost, but you can do exactly the same thing for average variable cost because the relationship between marginals and averages are exactly the same.

11:19  
So if you're asking in the short run, do we have a short form way to figure out whether the price is above average variable cost or not, The answer is tell me where your price is relative to your minimum average variable cost.

11:36  
If it's above that, I know exactly what your quantity choices and I know the relationship between price and average variable cost at that quantity.

11:43  
OK.

11:44  
So let's use that information.

11:46  
You already know from Module 3 the relationship between a demand curve and marginal willingness to play, except here we're going to use the supply curve and marginal cost.

11:56  
You've been flexible with that.

11:58  
You've been going back and forth with that, but now we're going to add on this extra bit about, you know what?

12:02  
There's some quantities where you would prefer not to produce.

12:06  
So where does that matter for the short run?

12:09  
In the short run, there are some inputs that are sunk, I can ignore them, some costs that are sunk, and I can identify that point where you switch from positive to negative in terms of covering my variable costs.

12:25  
In the short run as this magic point here, this is my minimum ABC.

12:30  
So I find this minimum ABC on my supply curve and then I say for anything, any price above this, you give me any price above this right here.

12:43  
I will choose this quantity, let's say here.

12:47  
And then at this quantity, price is going to be above ABC produce.

12:51  
So any quantity or price above that I just follow my intuition from module 3, produce along my marginal cost curve.

12:59  
On the other hand, if you give me a price that's below that, I'm going to say I cannot cover my average variable cost.

13:05  
So instead I'm just going to produce zero.

13:09  
OK, so the only thing we're adding on from module 3 is this point where I choose because I cannot cover all of my variable costs to instead produce a quantity of 0.

13:21  
That's it.

13:22  
And we're using that minimum point as a short form, as a way to kind of identify this quickly.

13:29  
Here's another way we can use it using discrete data.

13:31  
OK.

13:32  
Here I'm given that marginal revenue is 19.

13:36  
I don't know what marginal revenue is, but actually I do want to know what it is because in a perfectly competitive market, OK.

13:46  
And that's what I'm scanning for on the rest of the question, is our marginal revenue equal to price?

13:52  
And the answer is absolutely yes, right.

13:54  
So Mr.

13:55  
Here's marginal revenue extra unit, I get the price.

13:57  
And So what this is telling me is that the price that you are facing is equal to $19.00.

14:03  
Follow principle two.

14:05  
When the price is $19.00, how do I choose my quantity?

14:08  
I go to my marginal cost curve.

14:09  
I ignore everything else.

14:11  
And I say, first unit, oh, it's too high, but maybe let's keep going because we want to check second unit.

14:17  
Oh, guess what?

14:17  
I'm more than able to cover my marginal cost.

14:19  
OK, keep going.

14:20  
OK, Third unit, 16 versus 19, keep going, 18 versus 19, keep going 22.

14:27  
No, go back but still scan ahead.

14:29  
No, it's going to 44.

14:30  
Absolutely not.

14:32  
OK, I don't have exactly 19 here.

14:34  
So that means that I have to stop at the closest.

14:39  
That's what happens with discrete data.

14:40  
And I'm stopping at 18, which is a quantity of four.

14:43  
OK.

14:44  
So at a price of four.

14:46  
At a price of 19, OK, I'm going to choose a quantity of four.

14:51  
If you produce, do you want to produce or not?

14:55  
Well, check price versus average variable cost price is 19.

15:00  
At a quantity of four, average variable cost is 17.

15:08  
You can more than cover that you produce.

15:11  
Your punch line is produce quantity equal to four.

15:17  
That's how we do it.

15:18  
Same logic, same thing using first principles.

15:20  
The only thing we're checking for is can you cover your variable costs or not.

15:25  
So here's what we've done.

15:27  
Choose the quantity based on principle two, then decide produce or not.

15:31  
But here anything that's sunk, you ignore in For us that's going to be fixed cost as a as a shortcut way of figuring that out in the short run.

15:40  
And then we're going to say I need to cover my variable cost.

15:44  
We use the averages.

15:45  
We use that nice trick point where they're exactly equal at that minimum point above.

15:50  
Below there's a pattern.

15:51  
And so we say your short run supply curve is the marginal cost curve above minimum ABC.

15:58  
Same logic for the long run.

16:01  
Exact same logic.

16:02  
The only difference is in the long run, no costs are sunk.

16:06  
Everything can be avoided.

16:07  
Because in the long run I don't exist as a firm.

16:08  
I don't have to pay anything, right?

16:10  
So all costs matter in the long run.

16:13  
Nothing is sunk by the definition of a long run being a long run, which means now you have to care about all your costs.

16:20  
So instead of just thinking about variable costs, you're thinking about total costs.

16:24  
Everything else is exactly the same.

16:27  
Now because you can avoid all of your costs, you're never going to tolerate any negative profits.

16:31  
You're going to make sure you at least have non negative profits.

16:34  
0 is OK, but negative not OK.

16:36  
In the long run you will exit in that case.

16:41  
Same exact logic.

16:43  
This is the magic point for us.

16:45  
This minimum ATC, anything above that I continue on producing based on P equals to MC.

16:52  
Same logic from module 3, adding on this produce or not decision using this relationship between averages and marginals.

16:59  
Below that, I choose to produce nothing.

17:03  
Exactly the same as short run.

17:06  
What about the discrete data?

17:08  
Any differences?

17:08  
No, it's exactly the same, right?

17:10  
Given a price of 19, I scanned down my marginal cost column.

17:15  
The closest I can get is 18, which means that if I produce, I produce a quantity of four.

17:24  
Does this cover my total cost?

17:26  
Well, at a quantity of four, price is 19, but my average total cost is 19.5.

17:37  
In this case, I can't cover my average total cost, so I'm going to choose to exit instead and cease to exist as a phone.

17:45  
That's it.

17:46  
Same logic.

17:47  
You're just looking at a different cost.

17:49  
Because in the long run, no costs are sunk, OK.

17:52  
So please, the only thing we're adding in here is that the minimum price at which firms are willing to produce a positive quantity or not may change in the long run or the short run.

18:04  
Because in the short run some cost by the nature of short run are sunk and we ignore those, OK, shutting down and exiting.

18:12  
The only difference comes in from the fact that in the short run, because I cannot enter or exit, the best I can do is not produce and we give that a fancy name for shutdown.

18:22  
Whereas in the long run, to differentiate the fact that I cannot exit, or to verbally convey that we say that you just cease to exist as a firm and you exit.