

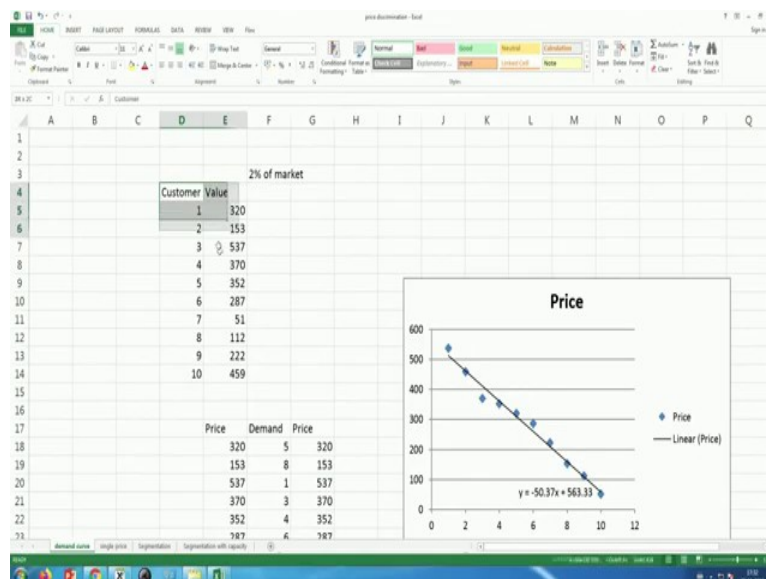
Marketing Analytics
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Lecture 25
Pricing (Contd.)

Hello, everybody welcome to Marketing Analytics course. This is Dr. Swagato Chatterjee from VGSOM IIT, Kharagpur who is taking this course. We are in week 5 and we are discussing about pricing and in this particular video in details we will talk about a Price Base Segmentation. We also call it as price discrimination sometimes and will see how that is applied in multiple situations.

So, price discrimination is something which is in economics 101 you have probably studied and that is first order and second order price discrimination which is heavily used in the market, heavily used by let us say airplanes for the same seat in the airplane you get charged at the different time, different money. For example, if you pay, if you book it early you have to pay less. If you book close to the travel date, you have to pay more that is one type of price discrimination.

Another type of price discrimination is for different, for the same type of people coming in the same, at the same time period, you give them okay some better services at a better price and some lower services at a lower price like business class and economic class. So, business class and economic class people coming at the same time period both are buying let us say 2 years, 2 months earlier than the travel date will pay different because the facilities giving is different that is also one type of price discrimination.

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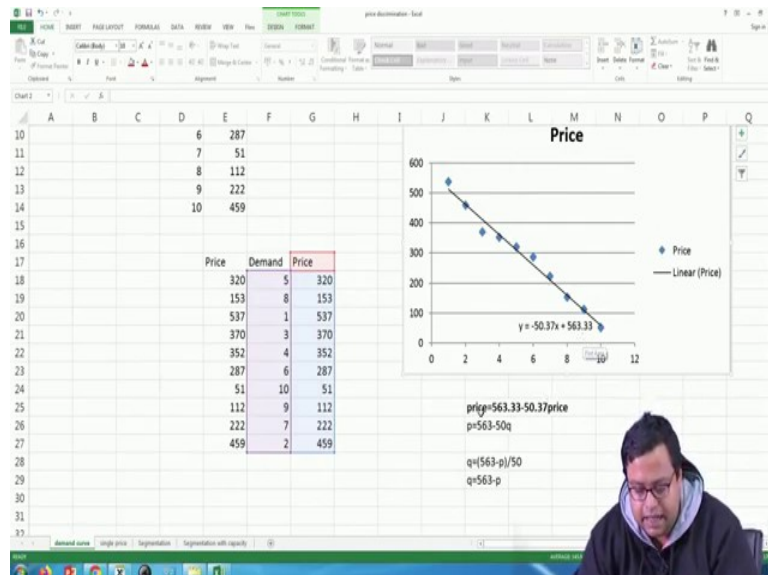


So, we will talk about price discrimination in this particular excel file and let say what we do is, we actually as I told for a long period of time I told that there is something called willingness to pay that you have to find out when you are dealing with the price. Now, willingness to pay is found out how in the, in if you remember in your conjoint analysis case, we told that we show people options and ask them that how much you are willing to pay? In monetary term they actually give that.

And now you cannot ask every customer in your whole a whole market. So, you actually ask around 2 percent of the market, you do study but something sometimes study for something means you actually break the whole population into certain demographic profiles. And from each profiles based on the proportion of the overall population, you actually create the similar proportion in your sample and based on that you would collect the data.

So, that is part of marketing research if you have done marketing research course, you will know how this is done which I will not focus on in this particular class. But, let us say from a marketing research background or whatever you got certain data which looks like this, that there are 10 customers and these are the willingness to pay expressed by these 10 customers which is written here. Now, what I do? I want to know that at what price how much demand I will get?

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So, I put this prices here and then the demand is nothing but this formula. So, count if, count if in what in if E5 to E14 so if you count within this particular column if E5 to E14 and what will it count? It will count if that particular value is greater than or equal to E18 that is 320. So, whatever values are higher than 320 that value will be counted. So, how many values are

higher than 320 or higher than equal to? So, the first value is this one is yes, this one is yes, this one is also yes and then probably this one is also yes, so 4 and last one 5. So, that is why the value here coming up to be 5.

So, when the price is 320 the demand is 5 and so on and it has been done for all of the other cases. Now, this is the price this is the demand with that I plot, I have plotted this particular curve and I have plotted in the basic pricing, introduction to pricing or basic pricing slide above we told how to find out the trend line. So, we found the trend line and the formula is $(563 - 5137 \times x)$. So, basically the formula is price is equal to this one is, sorry this one is which one is price?

This is price, this is demand, so price = $50 - 37 \times$ demand. So, this is wrong actually, this is demand so $p = 563 - 50q$. Then, what is q? q is basically $(563 - p) / 50$ so that is the formula. And I can actually ignore this by 50 so if I take the in 50 this is the formula. So, let say this is a easier formula to remember so I will go ahead with this one so this is my demand card. So, now I have found out my demand card and I will show you how price discrimination works.

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The screenshot shows an Excel spreadsheet with the following data in column G:

1	
2	
3	
4	
5	q=563-p
6	
7	
8	price \$200.00
9	demand 363.00
10	revenue \$72,600.00
11	
12	
13	
14	
15	
16	
17	

The Solver Parameters dialog box is open, showing the following settings:

- Set Objective: \$G\$10
- To: Of Max
- By Changing Variable Cells: \$G\$8:\$G\$9
- Subject to the Constraints: (empty)
- Make unconstrained variables non-negative:
- Select a Solving Method: GRG Nonlinear

price discrimination - Excel

q=563-p

high	\$300.00
low	\$200.00
highdemand	263.00
lowdemand	100.00
highrevenue	\$78,900.00
Lowrevenue	\$20,000.00
Totalrevenue	\$98,900.00

Solver Parameters

Set Objective: \$B\$6
To: Max Min Value Of: 0

By Changing Variable Cells: \$B\$2:\$B\$3

Subject to the Constraints:

High Demanded Variable Not Negative

Significant Variable Cells: Non-Negative

Solving Method: GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for Linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

price discrimination - Excel

q=563-p

high	
low	
highdemand	
lowdemand	263.00
highrevenue	\$70,437.64
Lowrevenue	\$35,218.69
Totalrevenue	\$1,05,656.33

Solver Results

Solver has converged to the current solution. All Constraints are satisfied.

Save Solver Solution

Preserve Original Values

Return to Solver Parameters Dialog

Load/Save Scenario

Solver has stopped to the current solution. All Constraints are satisfied.

Solver has performed 1 iterations for which the objective did not move.

Help/Options: To view the convergence status, in a software development environment.

>high charge high
low

price discrimination - Excel

q=563-p

price	\$281.50
demand	281.50
revenue	\$79,242.25

Here I am doing segmentation based on price. So, let say there if I can find out there certain people who are when let us say when it is high demand and low demand. There are two time periods and I have to keep this thing for high demand and low demand, there are two time periods.

For high, when it is high demand I will charge more and when there is low demand I will charge low as simple as that. So, here what do I am do? I am saying that there are two price, 300 and 200 these are my starting values and when the price is 300 dollars, how many people are buying? The number of people who are buying is 563-F10, F10 is the high price. And when I price it low, see first what will I do? First I will actually sell all the products whoever is trying to buy that high price I will sell them up.

Whatever, is remaining I will sell it in a lower prices. So, this happens probably for all those cases where you have certain number of seats and seats you can book the seats. The demand is high and the supply is low. In such kind of situation this applies that you actually sell at a higher price early and then for late comers high price, high demand is taken care of for the lagers, for the late comers you charged lower prices.

So, here also let say this 263 and then lower price is 563 - F11 - F12. So, 563 - F11 is the demand when the price is low but of their particular demand F12 number of people that means 263 number of people have already bought at a higher price. So, that is why the one that is left is only 100. So, 563 - 200 comes to be 363, this part. This is the demand when the price is low but there are people who are willing to be more than that more than 200 dollars, they have already bought at a higher price.

How many those people? F12 number of those people who have already bought at a higher price. So, this people will not buy once more. So, this is the 563 - F11 - F12 is the demand at the lower price that you get. Then what is high revenue? High pricing \times high demand. What is low revenue? Low pricing \times low demand and what is total revenue? This + this. Now, your catch is that how I will price in such a way such that I accumulate maximum amount of money at the high revenue but still I get good amount of money the low revenue, so together I will do a balance.

So, all customers who are \geq to high who are high demand charge them high. Then whoever is left charge them low. For example, to give an example let us say, sometimes we have certain various institutes have certain kind of programmes. Now, in certain times of programmes which first what we do is we those kinds of programmes, the seats are limited let us say they

are 56 or in this one there is no capacity limit but initially we charge it high and then we give discounts for to fill up the last of the seats so that is something that also happens here.

So, now if given the situation if I try to solve it, what I am doing here? I am doing maximise F16 by changing F10 and F11 and F10 and F11 is this the high price and low price these are the two values which are variables all other values are depended on this and you have to do a unconstraint variable non negative and I try to solve this and it quickly solves and gives me this is the price.

Now, check one easy check that the revenue is higher than this. It is almost I would say 50 out of 70 that means almost 70 % higher than the previous one, so which is a big jump the moment I get this. Now, often times there are capacity constraints as well so you do not know you might have a number of seats which are limited. Let say, airplane why the number of seats are limited?

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The screenshot shows an Excel spreadsheet with the following data:

q=563-p			
high	\$350.00		
low	\$300.00		
highdemand	213.00		
lowdemand	50.00		
highrevenue	\$74,550.00		
lowrevenue	\$15,000.00		
Totalrevenue	\$89,550.00		
total buying	263.00	<=	capacity 300

The Solver Parameters dialog box is open, showing the following settings:

- Set Objective: Total revenue
- To: Max
- By Changing Variable Cells: high, low
- Subject to the Constraints: total buying <= capacity
- Make Unconstrained Variables Non-Negative: checked
- Select a Solving Method: GRG Nonlinear engine

price discrimination - Solver

q=563-p

high charge high

high
low
highdemand
lowdemand
highrevenue
Lowrevenue
Totalrevenue \$1,014,000

total buying 300.00 <= capacity 300

Solver Results

Solver found a solution. All Constraints and optimality conditions are satisfied.

Show Solver Solution Report Input Values

Report to Solver Parameters dialog Outline Reports

OK Cancel Save Scenario

Solver found a solution. All Constraints and optimality conditions are satisfied. When the GRG engine is used, Solver has found at least a local optimal solution. When Simplex LP is used, this means Solver has found a global optimal solution.

price discrimination - Solver

q=563-p

All customers => high charge high
rest charge low

high \$413.00
low \$263.00
highdemand 150.00
lowdemand 150.00
highrevenue \$61,950.00
Lowrevenue \$39,450.00
Totalrevenue \$1,014,000

total buying 300.00 <= capacity 300

price discrimination - Solver

q=563-p

For all customers => high charge high
rest charge low

high \$375.33
low \$187.67
highdemand 187.67
lowdemand 187.67
highrevenue \$70,437.64
Lowrevenue \$35,218.69
Totalrevenue \$1,056,563.33

So, let say if you have capacity constraint, so everything remains same whatever I did they are remains same so this is like this etc etc. But, I added of total buying so I will just copy here. Let say 300 and 200 and okay not here 300 and 200 let say 350 and 250, I would say 300. Okay, now these value is 263 lower than the capacity. What is this value? This value is actually high demand + low demand that extra one variable which has been taken.

High demand + low demand which is your total buying currently and your capacity is 300. So, you have to make sure that whatever pricing you do, your demand does not shoot out above the capacity. You have to make sure that it remains within the capacity so you do the pricing such a way such that people who are in high demand will actually pay high, people who are in low demand will actually pay low but the capacity is something like this, so capacity constant is taken care off. So, I will go to solve but the same thing whatever we did here the extra thing that is given here is that $F16 \leq F16$.

So, that means this particular value 263 is ≤ 300 and then I try to solve and I get 101400, it is still higher than the first single price. Now, I have a small question at this point, can you tell me that why this particular value which is 101000 dollar is lower than 105000 dollar here?

So, here I am getting 105000 dollar, so here I am getting 101000 dollar. Why this is smaller? Can you tell me? This is smaller because there is capacity constraint that means when this guys doing optimisation has already consider this situation. But if I just put this 413 and 263 this value will be so in this case if you check the high demand and low demand, this value is higher than the capacity.

Which was not there so 375 the capacity is 300 so that capacity constraint is not there in this particular case and that is why the revenue that is getting generated is higher than expected revenue when there is a capacitive constraint. Similar things are applicable for allocation of your resources, for high demand people and low demand people, for as I told airplanes, for seats in a movie hall, how many seats will be 500 rupees, how many will be 1000 rupees, what will be of 200 rupees gold, silver, probably platinum such like that so all of this come into the picture by focusing on the demand. So, thank you very much, I will meet you in the next video with some other problems of pricing. Thank you.