Marketing Analysis
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Lecture 47
Customer Churn and Customer Lifetime value
(Contd.)

Hello everybody welcome to marketing analytics course. This is Dr. Swagato Chatterjee from VGSOM IIT, Kharagpur who is taking we were in week 9 and this is session 3. And in this session, in this video, we will discuss about customer switching behavior, but in the context of product. So, in the last video, we talked about how customer churn can impact service business. And here, we will talk about product.

So, product sifting of customers generally happen in those kinds of products which are not durable. For example, it can be FMCG products. It can be a soap or toothpaste or shampoo. While again, multiple though it is tangible, you can see the production et cetera but there are multiple moments of truth means you generally have a switching behavior and your variety seeking certain behavior sometimes that you see the product, try the product probably you have been trying for quite some time and then you switch back and then probably you did not like the new product again came back to the old product. This kind of switching oftentimes happen. It can also happen for Coke and Pepsi, it can also happen for let us say Lux and Lifebuoy and Cinthol and so on that kind of switching is very common.

Now, what the marketers has to focus on that if this switching cannot be avoided, you have to try whatever you were to try to reduce the switching and that is done by creating brand affinity kind of stuff. But still switching will happen. But if switching happens then the marketing managers target is that how quickly I can bring it back or how I can increase this stable market share of my brand. So, even some people comes goes out for my barnd, some people comes in from other brand to my brand, I have to make sure that my overall market share remain stable and that is something that marketing managers try to do.

So, here I am bringing in that kind of a case study where there is a retail shop which is there in the market and the retail shop is further focusing on how I can switch the customers of the normal brands to the retailing brand. That means retailer has his private labels for example More has his private label or some other Aditya Birla group or let say Nilgiris or there is different kind of retail shops will have big bazaar will have their own private labels. So, when those private labels are there, they want that okay, if there is Aashirvaad Aata I will put my

private level Aata beside it and I will might try to make sure that people who are coming from Aashirvaad Aata part a little bit of price sensitive for something is there.

I will put it in my Aata in a favorable position in Aashirvaad Aata in a not so favorable position so that people will pick up my Aata and I will give price discounts. I will give some better services and et cetera, so that this, now they now retailer set them major for this kind of product like Aata and et cetera, which are low involvement products. The retailer or the pool makers, not nobody comes to only buy Aashirvaad Aata to a particular store. But they come to do grocery shopping and the retailer is the pool maker, they come to retailer X rather than they come to buy something they come to retailer X.

So, when the retailer becomes the pool maker in some kind of product categories, the negotiation power of the retailers goes up very high and then because they have high negotiation power, either they will bring in private labels or they will ask more money to the manufacturers for favorable positions of the manufacturer products in the retail shop. So, this is some way of making money that they are trying to do.

Now, my focus is to read in this case study and then to see that what kind of things can actually be measured by both the retailer or the manufacturer to get an idea that how this mechanism will work, how I will do business, how much money I should pay, how much money I should not pay, what is the customer lifetime value of a customer staying back with me, this kind of analysis should be done by the both the retailer and the manufacturer. And that is a context why this particular session is in.

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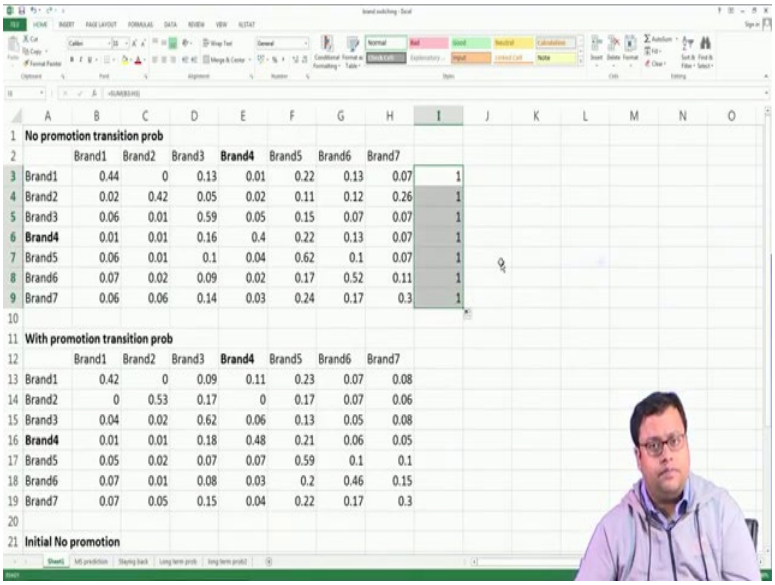
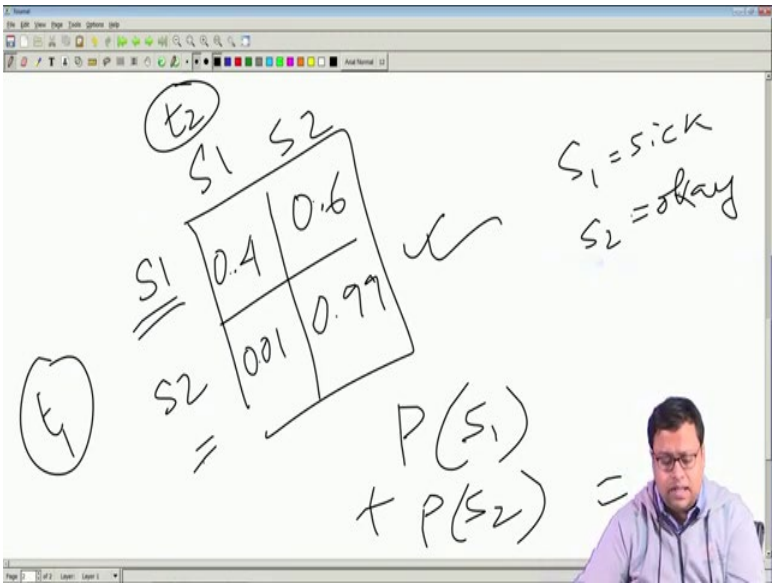


	A	B	C	D	E	F	G	H	I
1	**No promotion transition prob**								
2		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7	
3	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07	1
4	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26	1
5	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07	1
6	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07	1
7	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07	1
8	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11	1
9	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3	1
10									
11	**With promotion transition prob**								
12		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7	
13	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08	
14	Brand2	0	0.53	0.17	0	0.17	0.07	0.06	
15	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08	
16	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05	
17	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1	
18	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15	
19	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3	
20									
21	**Initial No promotion**								



So, if you come in your files, you will see there is something called brand switching dot Excel file. So, here there is a case study which looks like this that there are 7 brands. Brand A to brand 7, brand 1 to brand 7 and brand 4 is the retailer's brand. When the retailer has lots of customers and they have been collecting data from the customers both from their purchase data and sometimes through interviews also, the combination of a purchase data and the survey and they found out that what is the probability of a customer of brand 1 who has bought brand 1 in time period 1 will switch to brand 2 in time period 2 or brand 3 in time period 2 or brand 4 in time period 2, what is the probability of that those are the data that they have collected. And they have collected for 2 situations.

One situation there is a promotion, one situation there is no promotion, the promotion for whom, these guys are actually working for their own Private Label brand. This is a retail company, which has come up with a private label brand and it is trying to target that how my private label brand makes more money. So, in this case brand 4 which is highlighted, which is bolded, is the private label brand. Brand 1 to brand 7 is the normal brand. Now, you see if I carefully understand if somebody has bought brand 1, this is actually the, this particular matrix is called a transition matrix. So, if it is like in a Markov chain if you know in a Markov chain, there is a transition.

So, this is state 1, this is state 2. And this is state 1 and this is state 2, at time periods 1 and time period 2. It is like let us say state 1 is sick and state 2 is okay. So, if you are okay, if you are sick at time period 1, what is the probability you will still remain sick in time period 2, let us say, day 1 and day 2. If you are sick in day 1, the probability of remaining sick in day 2 is let us say around 0.4 then what is the probability that it will be okay, 0.6. But if you are okay

in day one, the probability of getting sick is probably 0.01. And probability of remaining sick is 0.99.

Now, that is a transition probability. Now, if this transition keeps on happening for every time period every time period after n number of time period, which is very large after let us say infinite time period, you reach a steady state, we call it a steady state. So, where the probability of S1 and probability of S2 is fixed and this 2 adds up to be 1. So, this becomes fixed. So, once this become fixed this is the, this is the transition probability in our case.

So, somebody who has bought brand 1 somebody who has bought brand 1 will actually change to brand 1 will remain in brand 1 with the probability of 0.4, he will never go to brand 2, he will go to brand 3 with a probability of 0.13, brand 4 with the probability of 0.1 and so on. And if I just do a summation of these particular numbers, I will get the value as 1, exactly 1. So, that is the probability that the summation is 1 that is this all the transitions are taken care of. And if I just drag it for all these things, it is coming up to be 1 only fair enough. So, these are the transition probabilities, so somebody has bought brand 4, the probability that he will remain in brand 4 is 0.4, the probability that he will go to brand 1 is 0.01 only. And see these particular transition probability is not symmetric over your diagonal element.

So, brand 1, to brand 2 switch is not same that is brand 2 to brand 1 switch, they are different and those are the things that they have collected this data from survey and from past purchase experiences of the past purchase data of the customers. Now, they have character this designed into 2 time periods when there is a promotion going on. And there is a promotion not going on. The first one is non promotion. The second one is promotion and promotion is going on for whom? Promotion is going on for brand 4 that means the brand which is giving this.

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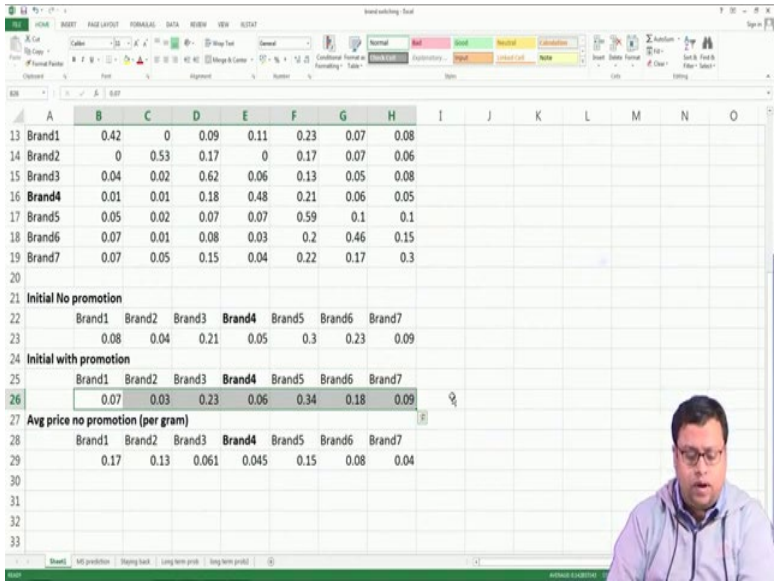

	A	B	C	D	E	F	G	H
13	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08
14	Brand2	0	0.53	0.17	0	0.17	0.07	0.06
15	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08
16	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05
17	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1
18	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15
19	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3
20								
21	**Initial No promotion**							
22		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
23		0.08	0.04	0.21	0.05	0.3	0.23	0.09
24	**Initial with promotion**							
25		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
26		0.07	0.03	0.23	0.06	0.34	0.18	0.09
27	**Avg price no promotion (per gram)**							
28		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
29		0.17	0.13	0.061	0.045	0.15	0.08	0.04
30								
31								
32								
33								

Now, what is promotion? Promotion means that in average cases prices 0.045 and when promotion is going on, it gives a 90 percent, sorry around 20 percent discount it charges 80 percent of this value. So, that is promotion and initially when there was no promotion going on, this was the market share initial market share and when there was promotion going on, these was the market share. Now with this information, we have to decide that promotion should be given or promotion should not be given by brand 4 and to do what, we will check that.

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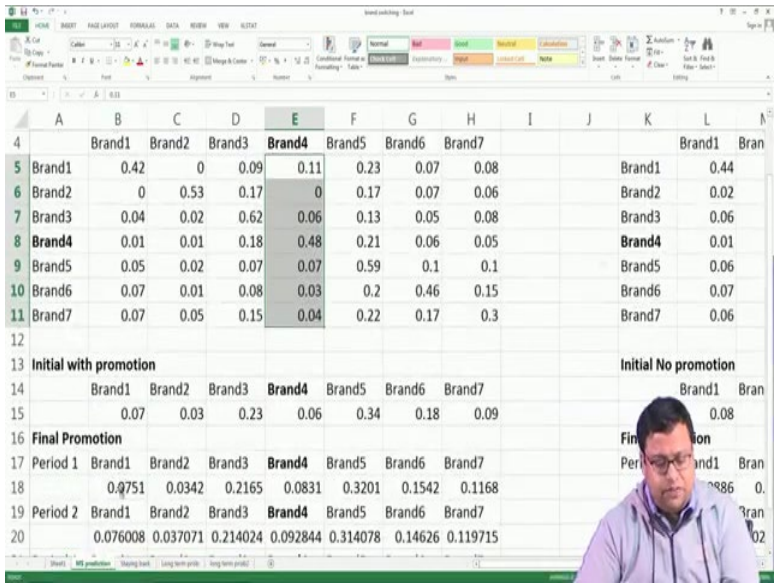
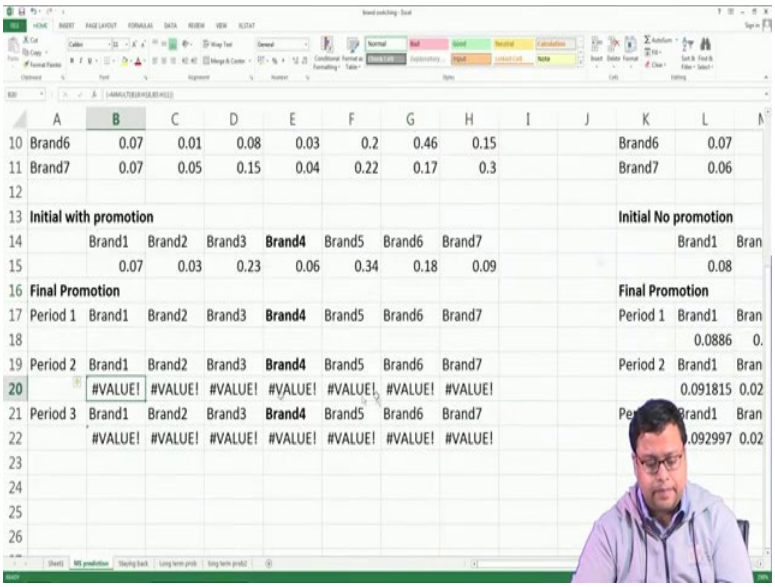
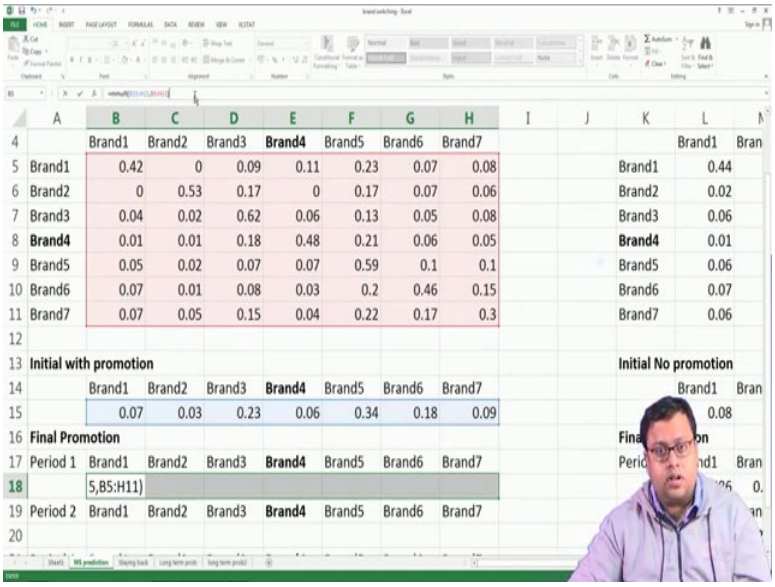


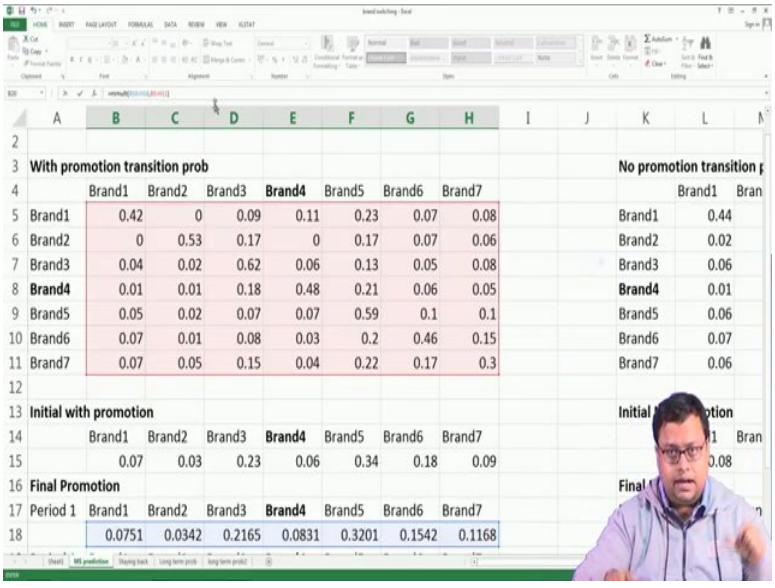
	A	B	C	D	E	F	G	H	I	J	K	L	M
4		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
5	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08			Brand1	0.44	
6	Brand2	0	0.53	0.17	0	0.17	0.07	0.06			Brand2	0.02	
7	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08			Brand3	0.06	
8	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05			**Brand4**	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	**Initial with promotion**										**Initial No promotion**		
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	**Final Promotion**										**Fin**		**ion**
17	Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Per	nd1	Bran
18		0.0751	0.0342	0.2165	0.0831	0.3201	0.1542	0.1168				886	0.
19	Period 2	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7					Bran
20		0.076008	0.037071	0.214024	0.092844	0.314078	0.14626	0.119715					02



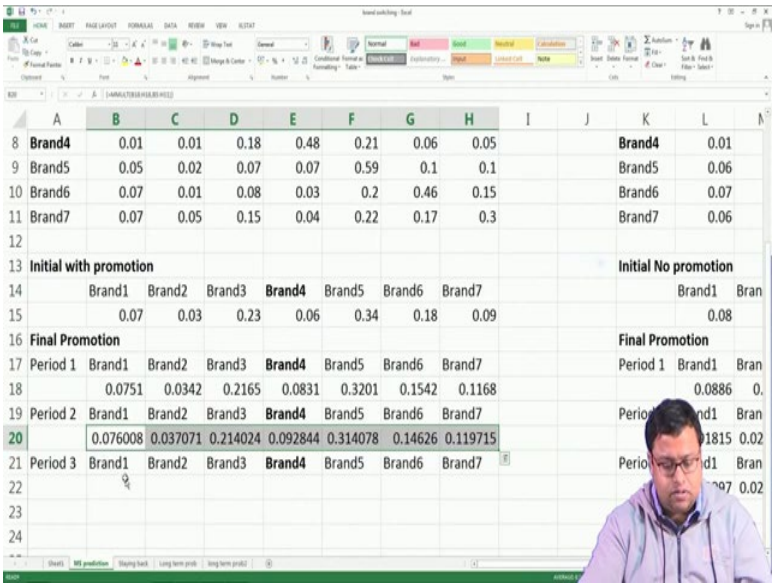
	A	B	C	D	E	F	G	H	I	J	K	L	M
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	**Initial with promotion**										**Initial No promotion**		
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	**Final Promotion**										**Final Promotion**		
17	Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Period 1	Brand1	Bran
18												0.0886	0.
19	Period 2	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Period 2	Brand1	Bran
20		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				0.091815	0.02
21	Period 3	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Pe	Brand1	Bran
22		#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!				092997	0.02
23													
24													
25													
26													



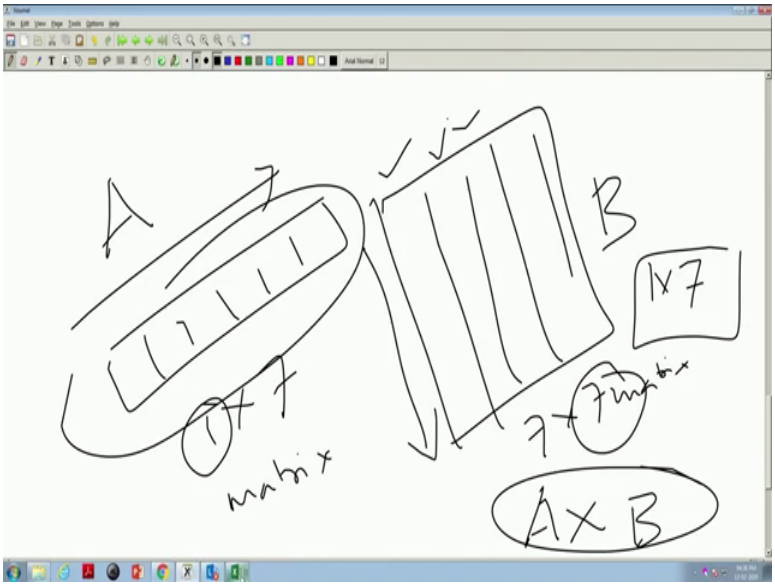
	A	B	C	D	E	F	G	H	I	J	K	L	M
4		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
5	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08			Brand1	0.44	
6	Brand2	0	0.53	0.17	0	0.17	0.07	0.06			Brand2	0.02	
7	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08			Brand3	0.06	
8	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05			**Brand4**	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	**Initial with promotion**										**Initial No promotion**		
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	**Final Promotion**										**Fina**		**on**
17	Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Peri	nd1	Bran
18		5,B5:H11)										26	0.
19	Period 2	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7					an
20													



	A	B	C	D	E	F	G	H	I	J	K	L	M
2													
3	**With promotion transition prob**										**No promotion transition p**		
4		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
5	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08			Brand1	0.44	
6	Brand2	0	0.53	0.17	0	0.17	0.07	0.06			Brand2	0.02	
7	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08			Brand3	0.06	
8	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05			**Brand4**	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	**Initial with promotion**										**Initial**		**otion**
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				**1**	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	**Final Promotion**										**Final**		
17	Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7					
18		0.0751	0.0342	0.2165	0.0831	0.3201	0.1542	0.1168					



	A	B	C	D	E	F	G	H	I	J	K	L	N
8	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05			**Brand4**	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	**Initial with promotion**										**Initial No promotion**		
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7				Brand1	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	**Final Promotion**										**Final Promotion**		
17	Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Period 1	Brand1	Bran
18		0.0751	0.0342	0.2165	0.0831	0.3201	0.1542	0.1168				0.0886	0.
19	Period 2	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Perio	nd1	Bran
20		0.076008	0.037071	0.214024	0.092844	0.314078	0.14626	0.119715				1815	0.02
21	Period 3	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7			Perio	d1	Bran
22												97	0.02
23													
24													



See, the first thing is how to change that? Now, if this is my transition matrix, I just copied and pasted it from the previous page to this page. If this is my transition matrix and this is my initial brand promotion, then what will be after first period will be this thing? You see, just understand this thing very carefully. Brand 2 or customers from brand 1 at time period 2 can come from which brands? Customers are trying to can come, so let us say if there are 100 customers, if there are initially if there are 100 customers, then 7 customers are in brand 1, 3 customers in brand 2, 20 customers in brand 3, 6 customers in brand 4, 34 customers in brand 5, 18 customers in brand 6, and 9 customers in brand 7, fair enough.

Now understand this very carefully that if this 7 persons are there at time period 1, or in this case time period 0, how many of these 7 people will stay back with brand 1 at time period 1 from 0 to 1 when I change the time period from 0 to 1, how many of this 7 people will stay

back? 42 percent of the 7 people will stay back. So, 0.07 * 0.42 fair enough. How many of brand 2, how many of those customers who bought brand 2 will switch to brand 1? Nobody, those who have bought brand 2, nobody switches to brand 1.

How many of those customers whose bought brand 3 will switch to brand 1? 4 percent, so these guys bought earlier it was brand 3, now it is brand 1 only 4 percent. So, 0.23*0.4 is coming from brand 3. 0.06 *0.01 coming from brand 4, 0.034 into point, so basically this row into this column for brand 1. If this row* this column is for brand 1, then from band 2 this is this row and the second column. For brand 3, it is this row and the third column for brand 4, it is this row and so, basically row and column and do you remember how it is being done just it is being done like this.

That there is a 1 into 7 rows 1 into 7 matrix and then there is a 7 by 7 matrix. If I do matrix multiplication, this will be taken row wise, this will be taken column wise, one column at a time so, first this column, then this column and this column. So, basically we are doing if it is A and it is B, we are doing AXB matrix multiplication is something that we are trying to do and that will give me 1*7. So, this 1 will be given and this 7 will be given. So, 1 to 7 another 1*7 matrix which is looking like this only basically that will be my output. Now how to do that in Excel matrix multiplication? So I will first remove this. So, I will just, what I have to do here.

So, let me remove all this thing. What you do here that I have to select all the cells, because I am doing an array calculation, all the cells has to be selected together. In the function bar you write is equal to m mult, m mult at fix multiplication and this is my first matrix. This is my second matrix. And I close this and then I press Shift, control and enter. Shift, control and enter and the moment I press it, it gives me the values at time period 1. The same operations happens with time period 2. So, I select this area, I go to function bar and write m mult. And this is my for time period 2 time periods 1 probability is the initial comma and this matrix and then I close this after closing, I am pressing Shift, Ctrl and Enter, Shift, Ctrl and Enter. So, I got it for the second one also.

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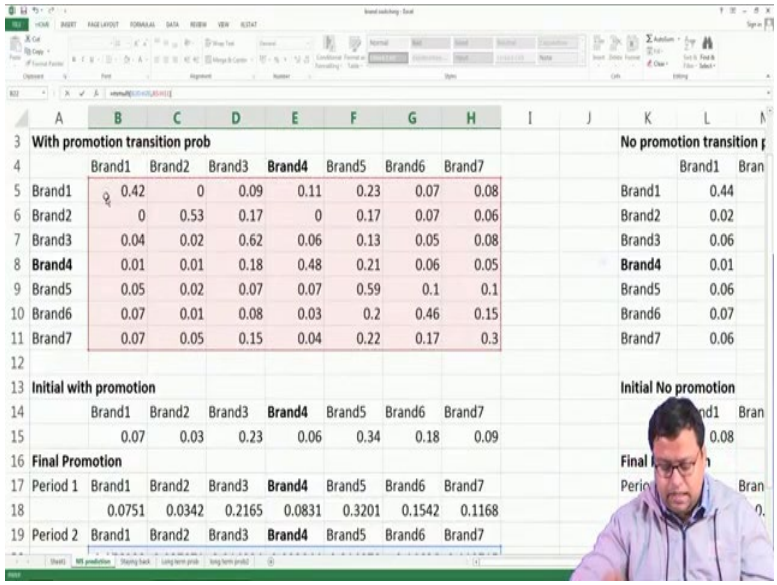
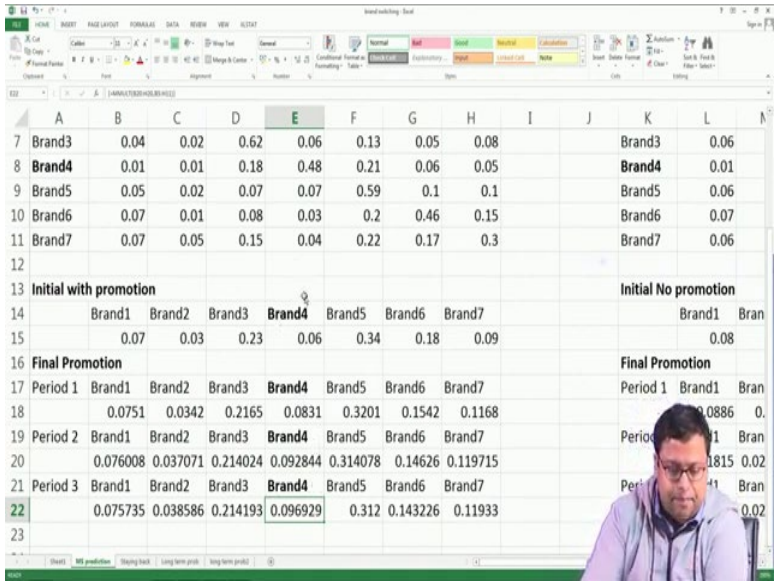


	A	B	C	D	E	F	G	H	I	J	K	L
3	With promotion transition prob										No promotion transition p	
4		Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7				Brand1	Bran
5	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08			Brand1	0.44	
6	Brand2	0	0.53	0.17	0	0.17	0.07	0.06			Brand2	0.02	
7	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08			Brand3	0.06	
8	Brand4	0.01	0.01	0.18	0.48	0.21	0.06	0.05			Brand4	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	Initial with promotion										Initial No promotion		
14		Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7					
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	Final Promotion										Final		
17	Period 1	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7			Perio		Bran
18		0.0751	0.0342	0.2165	0.0831	0.3201	0.1542	0.1168					0.
19	Period 2	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7					



	A	B	C	D	E	F	G	H	I	J	K	L
7	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08			Brand3	0.06	
8	Brand4	0.01	0.01	0.18	0.48	0.21	0.06	0.05			Brand4	0.01	
9	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1			Brand5	0.06	
10	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15			Brand6	0.07	
11	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3			Brand7	0.06	
12													
13	Initial with promotion										Initial No promotion		
14		Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7				Brand1	Bran
15		0.07	0.03	0.23	0.06	0.34	0.18	0.09				0.08	
16	Final Promotion										Final Promotion		
17	Period 1	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7			Period 1	Brand1	Bran
18		0.0751	0.0342	0.2165	0.0831	0.3201	0.1542	0.1168				0.0886	0.
19	Period 2	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7			Perio	1	Bran
20		0.076008	0.037071	0.214024	0.092844	0.314078	0.14626	0.119715				1815	0.02
21	Period 3	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7			Per	1	Bran
22		0.075735	0.038586	0.214193	0.096929	0.312	0.143226	0.11933					0.02
23													

And the same operation I will be doing for third one remember you have to select all the cells by the output will come because matrix multiplication will give you a matrix output. So, you have to select the whole output range m mult comma this comma this, close it and then Shift, Ctrl, Enter, Shift Ctrl, Enter, fair enough. So, you see just the situation. So, first it is 6 percent when you are not giving any proportion, you are giving proportion, it is slowly increasing 6 percent to 8 percent, 8 percent to 9 percent enters into 9.7 percent slowly brand 4 is increasing and that is practically happening because not only I am retaining many people here, I am bringing in some other people from other, so maximum of bringing in from brand 1.

But other guys also are bringing in some other customers and accumulating tip to my brand. But will it be going on will it be increasing increasing increasing and become 100 percent, we will see that.

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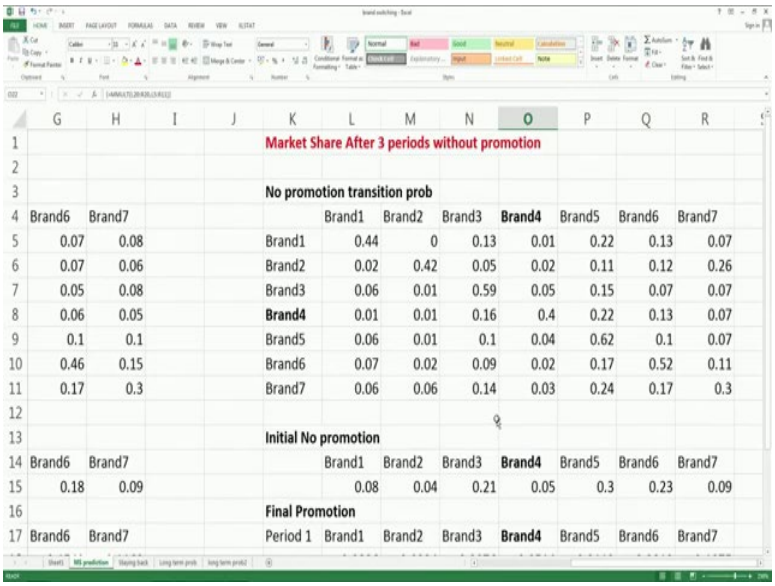
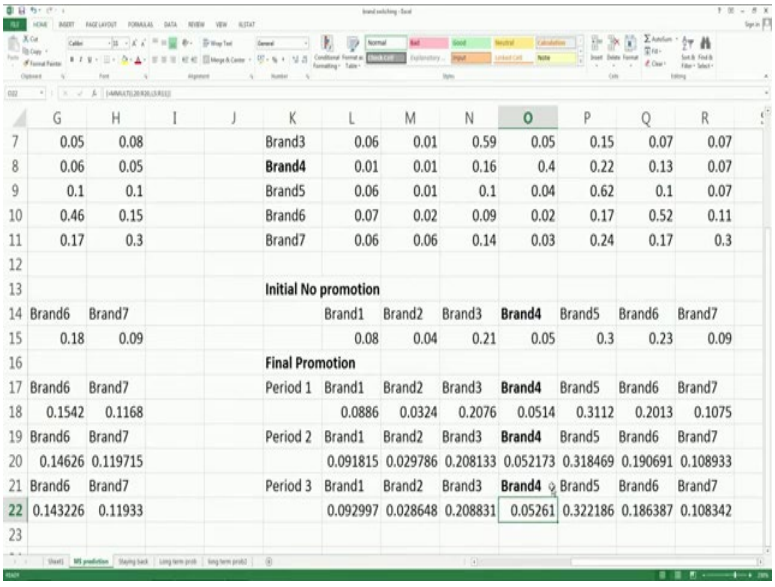


	G	H	I	J	K	L	M	N	O	P	Q	R
1					Market Share After 3 periods without promotion							
2												
3					No promotion transition prob							
4	Brand6	Brand7				Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
5	0.07	0.08			Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07
6	0.07	0.06			Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26
7	0.05	0.08			Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07
8	0.06	0.05			**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07
9	0.1	0.1			Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07
10	0.46	0.15			Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11
11	0.17	0.3			Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3
12												
13					Initial No promotion							
14	Brand6	Brand7				Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
15	0.18	0.09				0.08	0.04	0.21	0.05	0.3	0.23	0.09
16					Final Promotion							
17	Brand6	Brand7			Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7



	G	H	I	J	K	L	M	N	O	P	Q	R
7	0.05	0.08			Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07
8	0.06	0.05			**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07
9	0.1	0.1			Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07
10	0.46	0.15			Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11
11	0.17	0.3			Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3
12												
13					Initial No promotion							
14	Brand6	Brand7				Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
15	0.18	0.09				0.08	0.04	0.21	0.05	0.3	0.23	0.09
16					Final Promotion							
17	Brand6	Brand7			Period 1	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
18	0.1542	0.1168				0.0886	0.0324	0.2076	0.0514	0.3112	0.2013	0.1075
19	Brand6	Brand7			Period 2	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
20	0.14626	0.119715				0.091815	0.029786	0.208133	0.052173	0.318469	0.190691	0.108933
21	Brand6	Brand7			Period 3	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
22	0.143226	0.11933				0.092997	0.028648	0.208831	0.05261	0.322186	0.186387	0.108342
23												

Now the same thing, if I quickly try to do with the market share for 3 time periods when there is no promotion. This was the starting value for the no promotion we need the same thing and you will see that here it is increasing but much slower rate 0.5, 0.5, so 5.1 percent, 5.2 percent 5.26 percent, so 5.26 percent basically 5.3 percent at maximum very slower rate this increase is happening. So, that is something that we have to focus on that the increase in this particular case is much smaller. But again the question still remains same that what will be the ultimate

market share if I go on doing this, if I go on giving promotion or if I go on giving no promotion, what will be the market rate?

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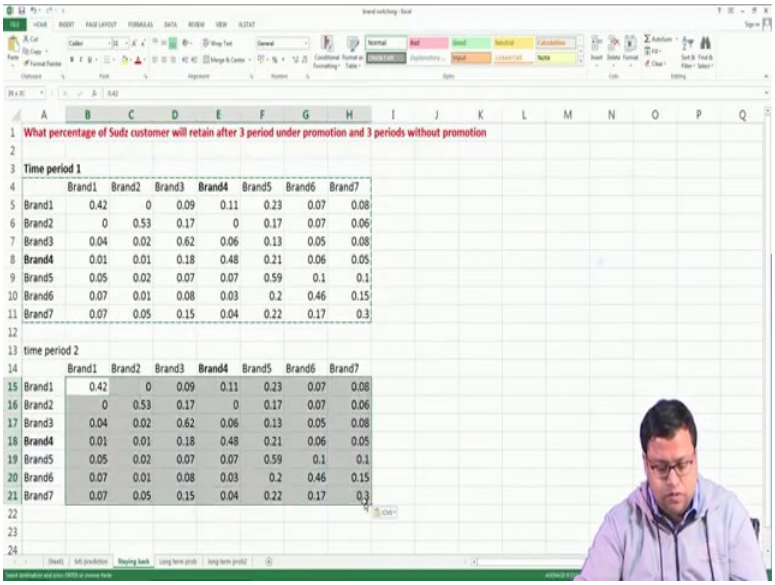
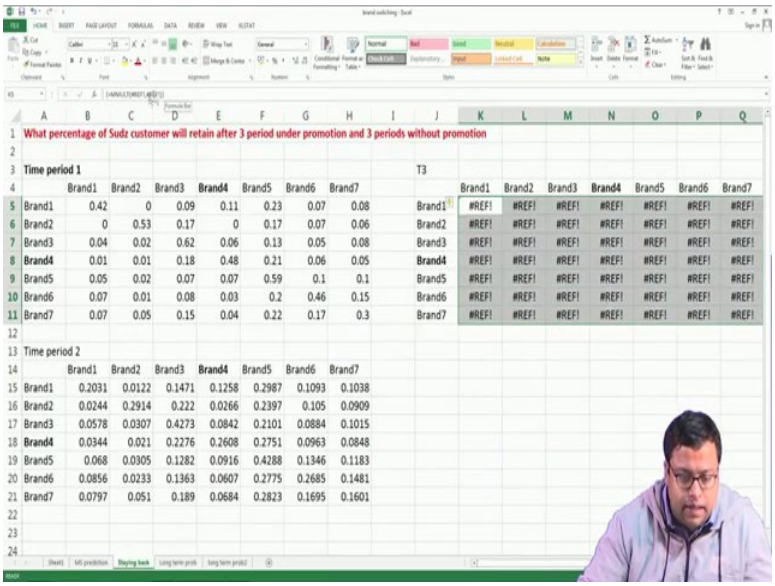
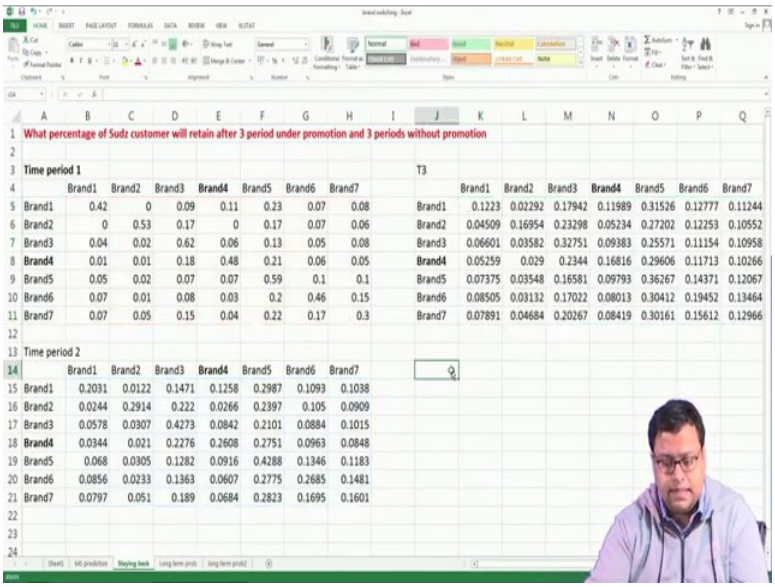






What percentage of Sudz customer will retain after 3 period under promotion and 3 periods without promotion

Time period 1

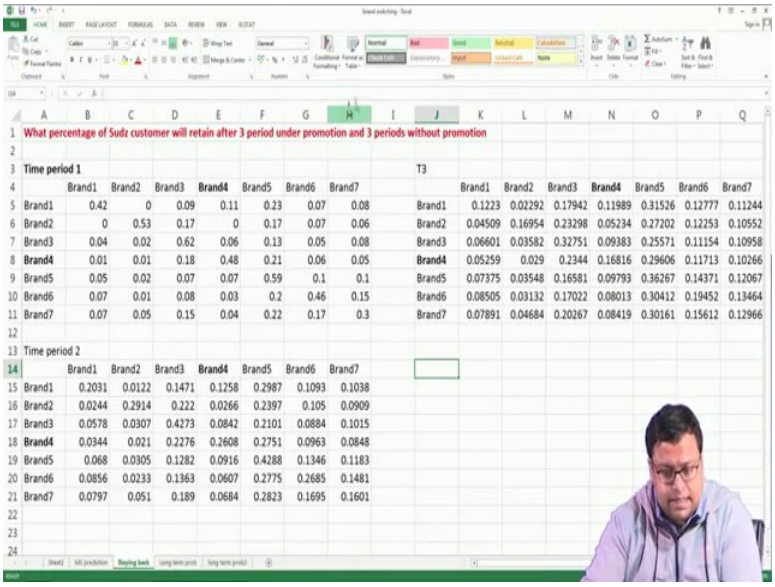
	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08
Brand2	0	0.53	0.17	0	0.17	0.07	0.06
Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08
Brand4	0.01	0.01	0.18	0.48	0.21	0.06	0.05
Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1
Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15
Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3

T3

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.1223	0.02292	0.17942	0.11989	0.31526	0.12777	0.11244
Brand2	0.04509	0.16954	0.23298	0.05234	0.27202	0.12253	0.10552
Brand3	0.06601	0.03582	0.32751	0.09383	0.25571	0.11154	0.10958
Brand4	0.05259	0.029	0.2344	0.16816	0.29606	0.11713	0.10266
Brand5	0.07375	0.03548	0.16581	0.09793	0.36267	0.14371	0.12067
Brand6	0.08505	0.03132	0.17022	0.08013	0.30412	0.19452	0.13464
Brand7	0.07891	0.04684	0.20267	0.08419	0.30161	0.15612	0.12966

Time period 2

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.2031	0.0122	0.1471	0.1258	0.2987	0.1093	0.1038
Brand2	0.0244	0.2914	0.222	0.0266	0.2397	0.105	0.0909
Brand3	0.0578	0.0307	0.4273	0.0842	0.2101	0.0884	0.1015
Brand4	0.0344	0.021	0.2276	0.2608	0.2751	0.0963	0.0848
Brand5	0.068	0.0305	0.1282	0.0916	0.4288	0.1346	0.1183
Brand6	0.0856	0.0233	0.1363	0.0607	0.2775	0.2685	0.1481
Brand7	0.0797	0.051	0.189	0.0684	0.2823	0.1695	0.1601



What percentage of Sudz customer will retain after 3 period under promotion and 3 periods without promotion

Time period 1

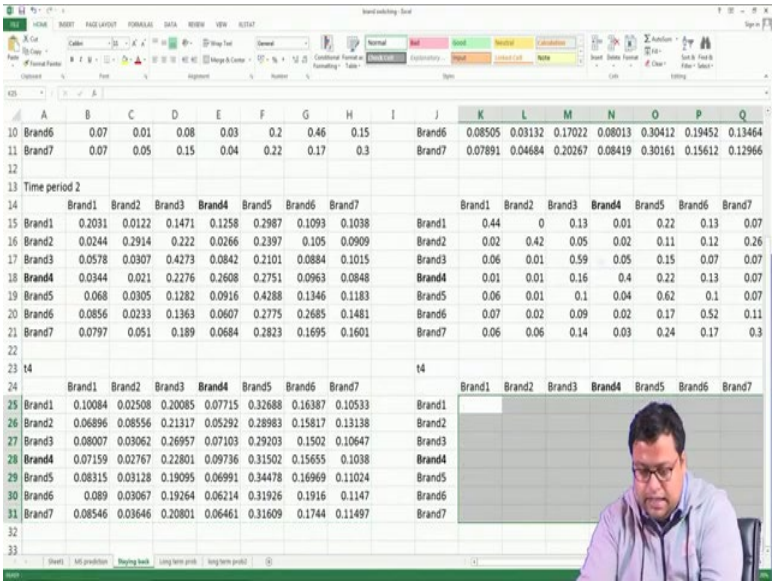
	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08
Brand2	0	0.53	0.17	0	0.17	0.07	0.06
Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08
Brand4	0.01	0.01	0.18	0.48	0.21	0.06	0.05
Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1
Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15
Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3

T3

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.1223	0.02292	0.17942	0.11989	0.31526	0.12777	0.11244
Brand2	0.04509	0.16954	0.23298	0.05234	0.27202	0.12253	0.10552
Brand3	0.06601	0.03582	0.32751	0.09383	0.25571	0.11154	0.10958
Brand4	0.05259	0.029	0.2344	0.16816	0.29606	0.11713	0.10266
Brand5	0.07375	0.03548	0.16581	0.09793	0.36267	0.14371	0.12067
Brand6	0.08505	0.03132	0.17022	0.08013	0.30412	0.19452	0.13464
Brand7	0.07891	0.04684	0.20267	0.08419	0.30161	0.15612	0.12966

Time period 2

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.2031	0.0122	0.1471	0.1258	0.2987	0.1093	0.1038
Brand2	0.0244	0.2914	0.222	0.0266	0.2397	0.105	0.0909
Brand3	0.0578	0.0307	0.4273	0.0842	0.2101	0.0884	0.1015
Brand4	0.0344	0.021	0.2276	0.2608	0.2751	0.0963	0.0848
Brand5	0.068	0.0305	0.1282	0.0916	0.4288	0.1346	0.1183
Brand6	0.0856	0.0233	0.1363	0.0607	0.2775	0.2685	0.1481
Brand7	0.0797	0.051	0.189	0.0684	0.2823	0.1695	0.1601



	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15
Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand6	0.08505	0.03132	0.17022	0.08013	0.30412	0.19452	0.13464
Brand7	0.07891	0.04684	0.20267	0.08419	0.30161	0.15612	0.12966

Time period 2

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.2031	0.0122	0.1471	0.1258	0.2987	0.1093	0.1038
Brand2	0.0244	0.2914	0.222	0.0266	0.2397	0.105	0.0909
Brand3	0.0578	0.0307	0.4273	0.0842	0.2101	0.0884	0.1015
Brand4	0.0344	0.021	0.2276	0.2608	0.2751	0.0963	0.0848
Brand5	0.068	0.0305	0.1282	0.0916	0.4288	0.1346	0.1183
Brand6	0.0856	0.0233	0.1363	0.0607	0.2775	0.2685	0.1481
Brand7	0.0797	0.051	0.189	0.0684	0.2823	0.1695	0.1601

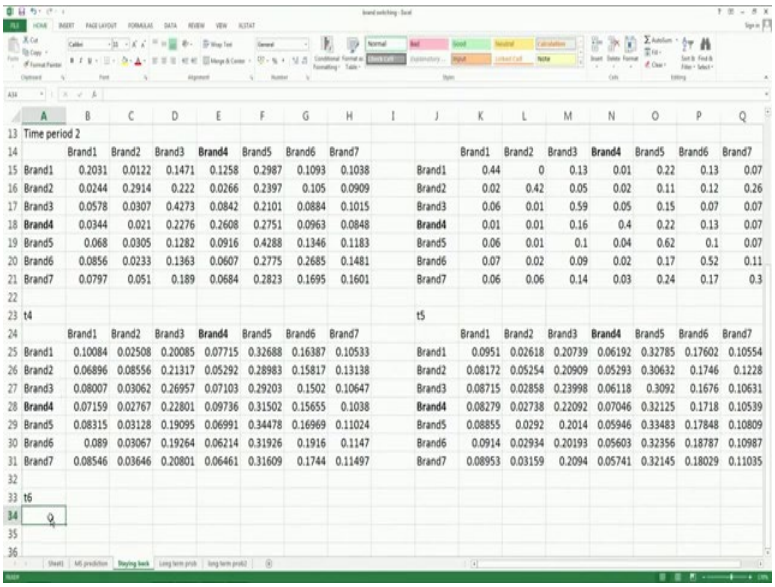
	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07
Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26
Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07
Brand4	0.01	0.01	0.16	0.4	0.22	0.13	0.07
Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07
Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11
Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3

t4

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1	0.10084	0.02508	0.20085	0.07715	0.32688	0.16387	0.10533
Brand2	0.06896	0.08556	0.21317	0.05292	0.28983	0.15817	0.13138
Brand3	0.08007	0.03062	0.26957	0.07103	0.29203	0.1502	0.10647
Brand4	0.07159	0.02767	0.22801	0.09736	0.31502	0.15655	0.1038
Brand5	0.08315	0.03128	0.19095	0.06991	0.34478	0.16969	0.11024
Brand6	0.089	0.03067	0.19264	0.06214	0.31926	0.1916	0.1147
Brand7	0.08546	0.03646	0.20801	0.06461	0.31609	0.1744	0.11497

t4

	Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
Brand1							
Brand2							
Brand3							
Brand4							
Brand5							
Brand6							
Brand7							



13	Time period 2															
14		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
15	Brand1	0.2031	0.0122	0.1471	0.1258	0.2987	0.1093	0.1038	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07
16	Brand2	0.0244	0.2914	0.222	0.0266	0.2397	0.105	0.0909	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26
17	Brand3	0.0578	0.0307	0.4273	0.0842	0.2101	0.0884	0.1015	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07
18	**Brand4**	0.0344	0.021	0.2276	0.2608	0.2751	0.0963	0.0848	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07
19	Brand5	0.068	0.0305	0.1282	0.0916	0.4288	0.1346	0.1183	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07
20	Brand6	0.0856	0.0233	0.1363	0.0607	0.2775	0.2685	0.1481	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11
21	Brand7	0.0797	0.051	0.189	0.0684	0.2823	0.1695	0.1601	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3
22																
23	t4								t5							
24		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
25	Brand1	0.10084	0.02508	0.20085	0.07715	0.32688	0.16387	0.10533	Brand1	0.0951	0.02618	0.20739	0.06192	0.32785	0.17602	0.10554
26	Brand2	0.06896	0.08556	0.21317	0.05292	0.28983	0.15817	0.13138	Brand2	0.08172	0.05254	0.20909	0.05293	0.30632	0.1746	0.1228
27	Brand3	0.08007	0.03062	0.26957	0.07103	0.29203	0.1502	0.10647	Brand3	0.08715	0.02858	0.23998	0.06118	0.3092	0.1676	0.10631
28	**Brand4**	0.07159	0.02767	0.22801	0.09736	0.31502	0.15655	0.1038	**Brand4**	0.08279	0.02738	0.22092	0.07046	0.32125	0.1718	0.10539
29	Brand5	0.08315	0.03128	0.19095	0.06991	0.34478	0.16969	0.11024	Brand5	0.08855	0.0292	0.2014	0.05946	0.33483	0.17848	0.10809
30	Brand6	0.089	0.03067	0.19264	0.06214	0.31926	0.1916	0.1147	Brand6	0.0914	0.02934	0.20193	0.05603	0.32356	0.18787	0.10987
31	Brand7	0.08546	0.03646	0.20801	0.06461	0.31609	0.1744	0.11497	Brand7	0.08953	0.03159	0.2094	0.05741	0.32145	0.18029	0.11035
32																
33	t6															
34																
35																
36																

Before I go to that, another question has been asked to me that what is the transition, what percentage of source customer will retain after 3 period of promotion and 3 period of no promotion? So, in first time period, so with promotion this 48 percent remains This is after time period 1, after time period 2, how many percent's remains, after time period 2 people who remain if I just copy, so, this is this is basically. So, let me do it properly. So, after time period 2, how many persons will remain? These values will be nothing but is equal to mm matrix multiplication of this matrix comma this matrix once more and then Shift, Ctrl, Enter that is after second time period. So, basically this many people will remain originally source customer how many will remain?

After time period 2 this many people will remain and then after time period three. So, I will just write here after T3, how many percent will remain, if I just copy and paste it here and I say that this is mmult sorry not this I have to select the whole area and I write mmult this comma this and then Shift, Ctrl, Enter I get after time period 3 what will be the case. Now, the transition probability changes then the next appears without promotion. So, without promotion, this is the transition probability which is different so, if it is different I have to copy and paste that. So, after t 4 in case of t 4, what will be the case?

Again you select the whole area then go to this you write mmult, this is at the end of time period 3 and this is at the transition probability when no promotion is there, shift, Control, Enter. So, one round of no promotion is done, second round of no promotion I have to write, so, I will just copy and paste it here, delete and then write mmult, this is my first round, fourth round, and this is the transition probability, and then Shift, Ctrl, Enter. This is basically t 5 and after t 6, how much?

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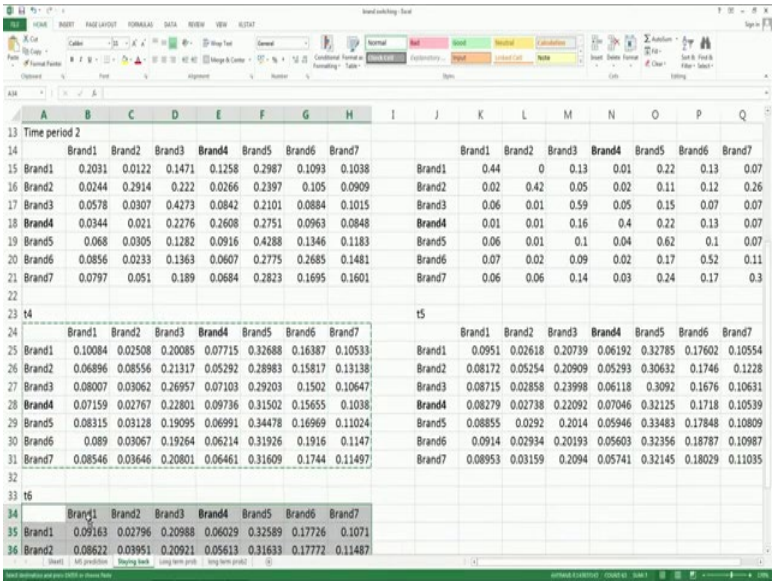


Time period 2

	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.2031	0.0122	0.1471	0.1258	0.2987	0.1093	0.1038
Brand2	0.0244	0.2914	0.222	0.0266	0.2397	0.105	0.0909
Brand3	0.0578	0.0307	0.4273	0.0842	0.2101	0.0884	0.1015
Brand4	0.0344	0.021	0.2276	0.2608	0.2751	0.0963	0.0848
Brand5	0.068	0.0305	0.1282	0.0916	0.4288	0.1346	0.1183
Brand6	0.0856	0.0233	0.1363	0.0607	0.2775	0.2685	0.1481
Brand7	0.0797	0.051	0.189	0.0684	0.2823	0.1695	0.1601

	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07
Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26
Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07
Brand4	0.01	0.01	0.16	0.4	0.22	0.13	0.07
Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07
Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11
Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3

t4

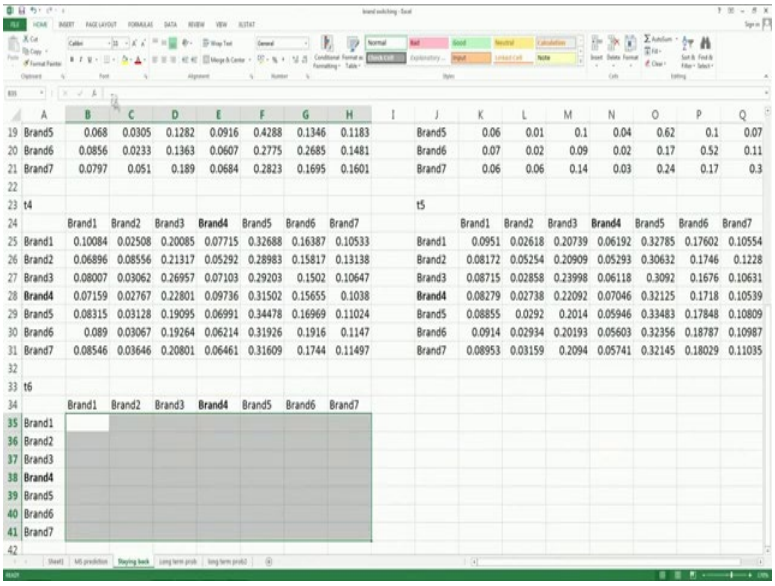
	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.10084	0.02508	0.20085	0.07715	0.32688	0.16387	0.10533
Brand2	0.06896	0.08556	0.21317	0.05292	0.28983	0.15817	0.13138
Brand3	0.08007	0.03062	0.26957	0.07103	0.29203	0.1502	0.10647
Brand4	0.07159	0.02767	0.22801	0.09736	0.31502	0.15655	0.1038
Brand5	0.08315	0.03128	0.19095	0.06991	0.34478	0.16969	0.11024
Brand6	0.089	0.03067	0.19264	0.06214	0.31926	0.1916	0.1147
Brand7	0.08546	0.03646	0.20801	0.06461	0.31609	0.1744	0.11497

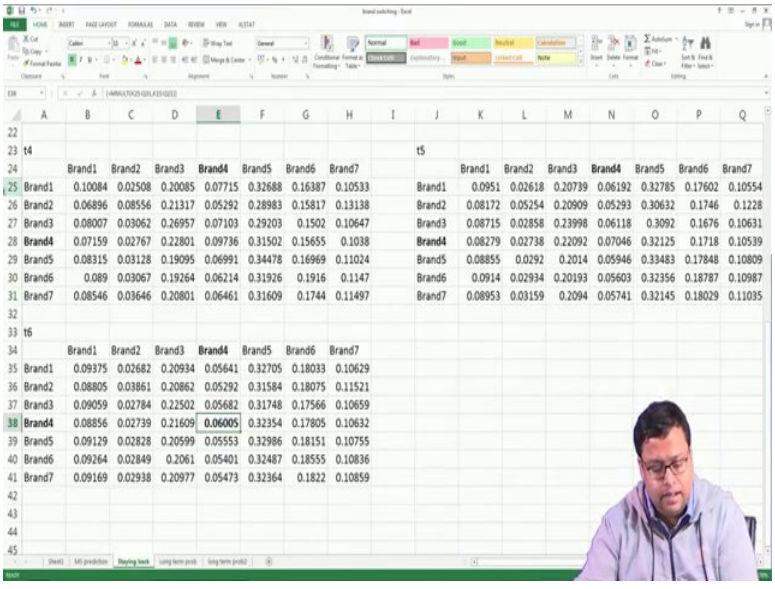
t5

	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.0951	0.02618	0.20739	0.06192	0.32785	0.17602	0.10554
Brand2	0.08172	0.05254	0.20909	0.05293	0.30632	0.1746	0.1228
Brand3	0.08715	0.02858	0.23998	0.06118	0.3092	0.1676	0.10631
Brand4	0.08279	0.02738	0.22092	0.07046	0.32125	0.1718	0.10539
Brand5	0.08855	0.0292	0.2014	0.05946	0.33483	0.17848	0.10809
Brand6	0.0914	0.02934	0.20193	0.05603	0.32356	0.18787	0.10987
Brand7	0.08953	0.03159	0.2094	0.05741	0.32145	0.18029	0.11035

t6

	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.09163	0.02796	0.20988	0.06029	0.32589	0.17726	0.1071
Brand2	0.08622	0.03951	0.20921	0.05613	0.31633	0.17772	0.11487





t6

	Brand1	Brand2	Brand3	Brand4	Brand5	Brand6	Brand7
Brand1	0.09375	0.02682	0.20934	0.05641	0.32705	0.18033	0.10629
Brand2	0.08805	0.03861	0.20862	0.05292	0.31584	0.18075	0.11521
Brand3	0.09059	0.02784	0.22502	0.05682	0.31748	0.17566	0.10659
Brand4	0.08856	0.02739	0.21609	0.06005	0.32354	0.17805	0.10632
Brand5	0.09129	0.02828	0.20599	0.05553	0.32986	0.18151	0.10755
Brand6	0.09264	0.02849	0.2061	0.05401	0.32487	0.18555	0.10836
Brand7	0.09169	0.02938	0.20977	0.05473	0.32364	0.1822	0.10859

After t 6 it is basically if I just copy it and paste it here, and if I probably delete this one, I can probably delete this and then I can write okay is equal to mmult, this is my t 5 and then this is my transition probability. And then if I close and then Shift, Ctrl, Enter and I get after t6. So, basically you see that if I do some rounds of discounts and some rounds of non-discounts, ultimately only 6 percent of my original guys will remain with me which is the something which has to be thought about that 6 percent is very less number but to deal with it. So, this is how we have to find out that.

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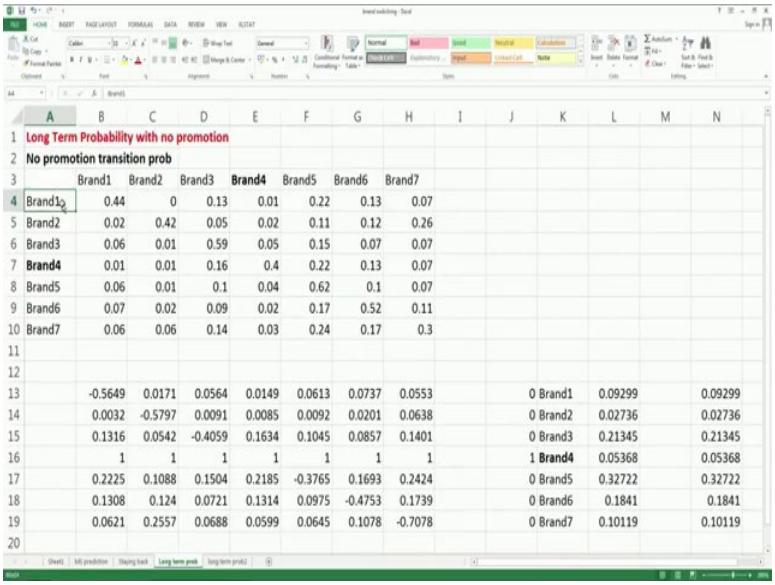
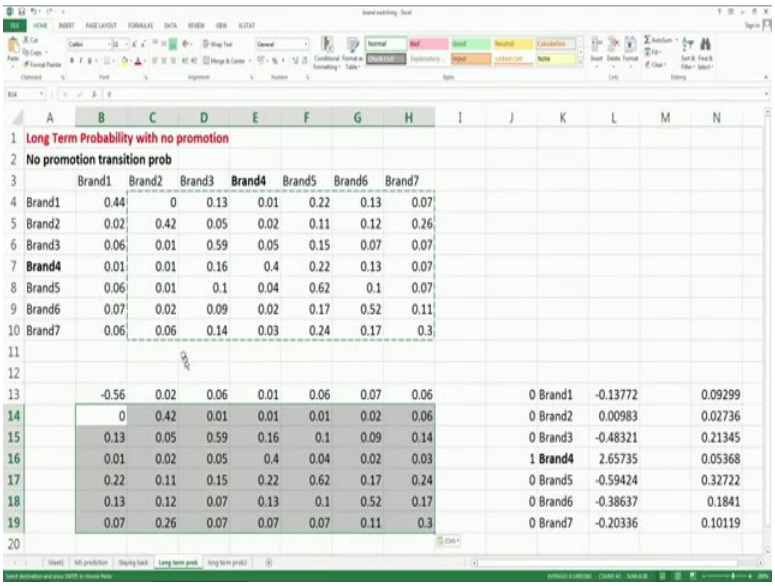
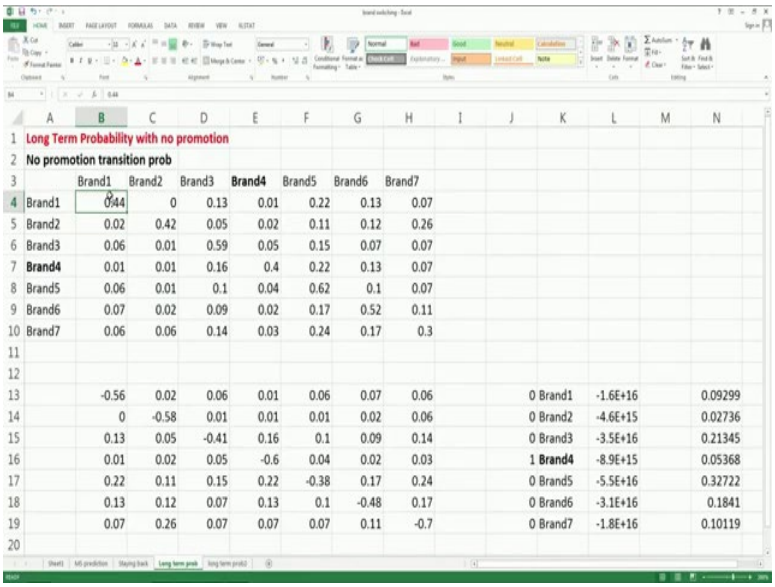


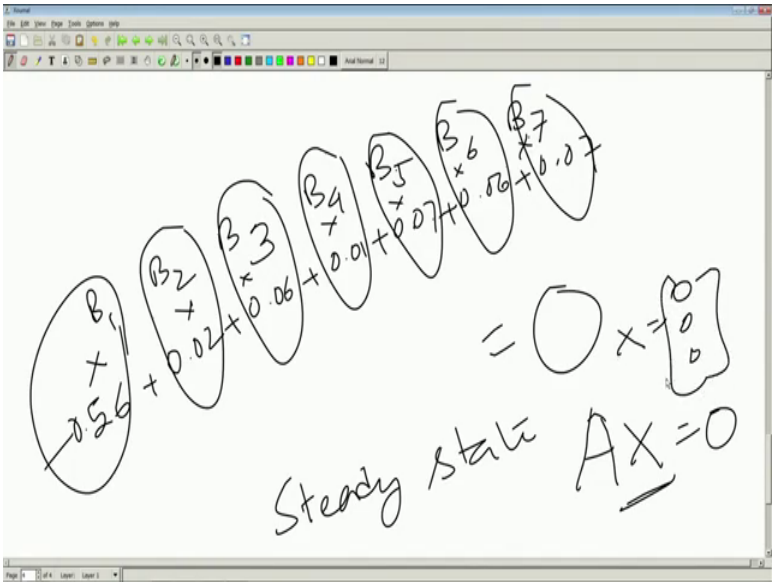
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Long Term Probability with no promotion													
2	No promotion transition prob													
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7						
4	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07						
5	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26						
6	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07						
7	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07						
8	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07						
9	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11						
10	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3						
11														
12														
13		-0.5649	0.0171	0.0564	0.0149	0.0613	0.0737	0.0553		0	Brand1	0.09299		0.09299
14		0.0032	-0.5797	0.0091	0.0085	0.0092	0.0201	0.0638		0	Brand2	0.02736		0.02736
15		0.1316	0.0542	-0.4059	0.1634	0.1045	0.0857	0.1401		0	Brand3	0.21345		0.21345
16		1	1	1	1	1	1	1		1	**Brand4**	0.05368		0.05368
17		0.2225	0.1088	0.1504	0.2185	-0.3765	0.1693	0.2424		0	Brand5	0.32722		0.32722
18		0.1308	0.124	0.0721	0.1314	0.0975	-0.4753	0.1739		0	Brand6	0.1841		0.1841
19		0.0621	0.2557	0.0688	0.0599	0.0645	0.1078	-0.7078		0	Brand7	0.10119		0.10119
20														

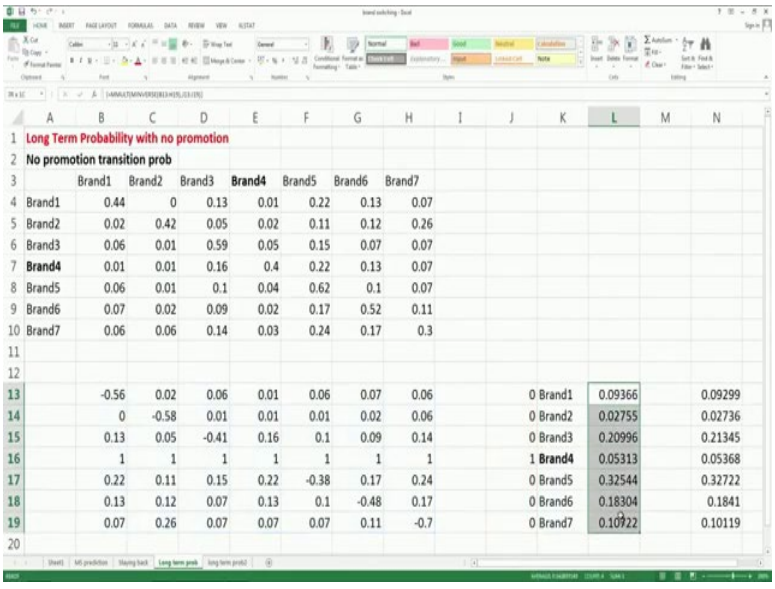


	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Long Term Probability with no promotion													
2	No promotion transition prob													
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7						
4	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07						
5	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26						
6	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07						
7	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07						
8	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07						
9	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11						
10	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3						
11														
12														
13		-0.56	0.02	0.06	0.01	0.06	0.07	0.06		0	Brand1	-0.13772		0.09299
14		0	0.42	0.01	0.01	0.01	0.02	0.06		0	Brand2	0.00983		0.02736
15		0.13	0.05	0.59	0.16	0.1	0.09	0.14		0	Brand3	-0.48321		0.21345
16		0.01	0.02	0.05	0.4	0.04	0.02	0.03		1	**Brand4**	2.65735		0.05368
17		0.22	0.11	0.15	0.22	0.62	0.17	0.24		0	Brand5	-0.59424		0.32722
18		0.13	0.12	0.07	0.13	0.1	0.52	0.17		0	Brand6	-0.38637		0.1841
19		0.07	0.26	0.07	0.07	0.07	0.11	0.3		0	Brand7	-0.20336		0.10119
20														

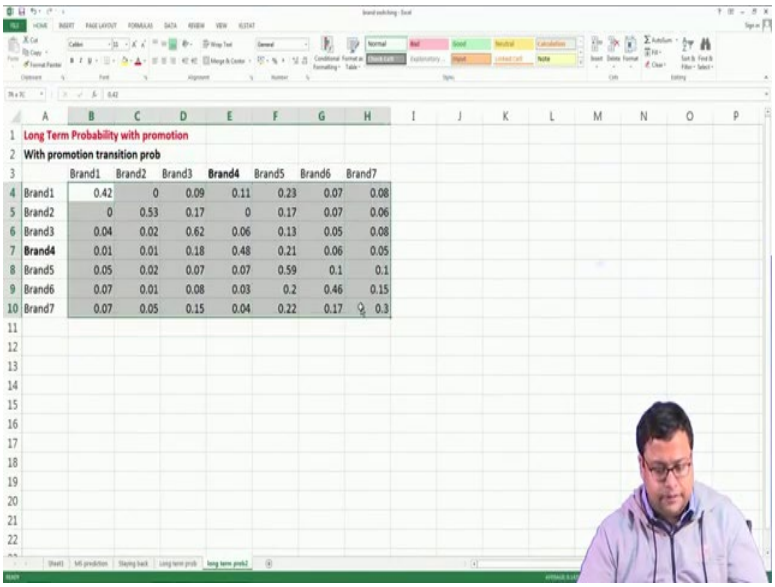


	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Long Term Probability with no promotion**													
2	**No promotion transition prob**													
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7						
4	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07						
5	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26						
6	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07						
7	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07						
8	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07						
9	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11						
10	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3						
11														
12														
13		-0.56	0.02	0.06	0.01	0.06	0.07	0.06		0	Brand1	-1.6E+16		0.09299
14		0	-0.58	0.01	0.01	0.01	0.02	0.06		0	Brand2	-4.6E+15		0.02736
15		0.13	0.05	-0.41	0.16	0.1	0.09	0.14		0	Brand3	-3.5E+16		0.21345
16		0.01	0.02	0.05	-0.6	0.04	0.02	0.03		1	**Brand4**	-8.9E+15		0.05368
17		0.22	0.11	0.15	0.22	-0.38	0.17	0.24		0	Brand5	-5.5E+16		0.32722
18		0.13	0.12	0.07	0.13	0.1	-0.48	0.17		0	Brand6	-3.1E+16		0.1841
19		0.07	0.26	0.07	0.07	0.07	0.11	-0.7		0	Brand7	-1.8E+16		0.10119
20														





	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Long Term Probability with no promotion**													
2	**No promotion transition prob**													
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7						
4	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07						
5	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26						
6	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07						
7	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07						
8	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07						
9	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11						
10	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3						
11														
12														
13		-0.56	0.02	0.06	0.01	0.06	0.07	0.06		0	Brand1	0.09366		0.09299
14		0	-0.58	0.01	0.01	0.01	0.02	0.06		0	Brand2	0.02755		0.02736
15		0.13	0.05	-0.41	0.16	0.1	0.09	0.14		0	Brand3	0.20996		0.21345
16		1	1	1	1	1	1	1		1	**Brand4**	0.05313		0.05368
17		0.22	0.11	0.15	0.22	-0.38	0.17	0.24		0	Brand5	0.32544		0.32722
18		0.13	0.12	0.07	0.13	0.1	-0.48	0.17		0	Brand6	0.18304		0.1841
19		0.07	0.26	0.07	0.07	0.07	0.11	-0.7		0	Brand7	0.10722		0.10119
20														



Now, what is the long term probability is my question, what happens when the, if there is long term probability when I keep on giving this no promotion. So, long term probability will be what, you see that at long term probability means that it will not the probability will not change, fair enough. So, long term probability means in the next time period, the probability will not change in a very long time, if you keep on doing this at one point there will be a steady state. But the steady state into the transition probability is again the steady state, fair enough.

So, let us assume that the steady state is x, then I have to find out such an x such that x into the transition probability is still x. That means, what that means what, for each of the states, the number of persons going out and the number of persons coming in are same. That means those who are brand 1 customer said the steady state, out of them, 10 guys, if go out and buy something else, then 10 more guys will come from outside and replace these people then only I will be in steady state. If the number of outflow, and number of inflow is same, then I am in the steady state.

So, that is what we will be checking. So, this is transition probability. So, brand 1, how many guys are going out on brand 1? So, the guys who are going out of brand 1, if I am not wrong, just 1 minute. So, this is basically I have to copy this. So, if how many persons are going out of brand 1, so I think this is 0.44-1. This many persons are actually going out of brand 1, 44 percent remaining means this many persons are going out and how many persons are staying coming into brand 1, if I just copy it and paste it in as a transpose, so that many person will be coming in. And the same thing I have to do it keep on doing for everybody so I just copied

this guys and then paste it here as a transpose and then the middle ones this is basically 0.42-1 because 0.42 guys are staying back.

So this many brands will be leaving, then 0.59-1, so these guys are staying back. So, this many person are will be leaving, then 0.04 is staying back. That means 0.04-1, will be leaving 0.062 is staying back that mean that minus 1 is leaving. And then point staying back that was that many persons are leaving and 0.03 is staying back and that many person are leaving just understand what I have done. See 44 persons were staying back from brand 1 to brand 1 they were staying back. So, how many persons are leaving from brand 1? 56 percent, so therefore minus 0.56 and these guys are coming from other brands. So, if I just write it down in this way that in a steady state if B 1, B 2, B 3, B 4, B 5, B 6, B 7 these plus the brands market share. Then out of these brands 56 percent of the brand 1, 56 persons are going away and 0.2 percent, 6 percent, 1 percent, 6 percent, 7 percent and 6 percent.

So, 2 percent, 6 percent, 1 percent, 7 percent, 6 percent and 7 percent of B 1, B, 2, B 3, B 4, B 5, B 6, they are coming in to brand1 in time period, next time period steady states next time period and minus 0.56 guys are going away. So, if I just do the addition of this peaking, how much will be the total change? The total change is 0 and that is why it is a steady state. So, this into this, this into this, this into this, this into this, this into this, this into this and this into this, this will be 0. It is a steady state. So, that is the thing I have done for every brand and these values are 0, see these values are 0 this values are 0.

Now, if everything is 0, if everything is 0, you will not be able to solve the problem. So, if it is, let us say, by any chance, if you are trying to solve A*x=0, solve for x, then x will be 0, you will not be able to solve any problem. So, to show that, we do not face that, what I do is I am saying that the summation of the probability that B 1, B 2, B 3, B 4, which is the steady state probabilities, the summation of this probabilities will be 1. So, to do that, these are the coefficients.

This is equal to 1 this is what I am trying to get. Now, what I have to solve then if there is a case, see this is the steady state probability is this let us say and these are the values and this is my y. Then what will be a steady state probability? Basically if Ax * B is equal to this, then these values will be inverse of B 3 to H 9. So, A inverse into y that is what I am writing here, see M inverse into J 3 to J 9. So, I have selected this once, and I will just go here and press Shift, Ctrl, Enter, and I am getting the probabilities.

So, the probability long term probability if I keep on giving this thing is 0.5313. Now, the same thing, if I can calculate for the promotion case, there is no promotion case.

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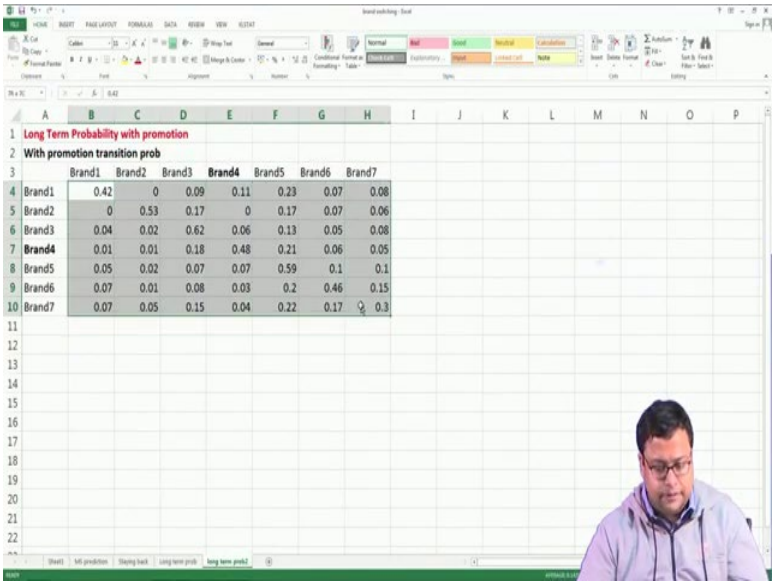
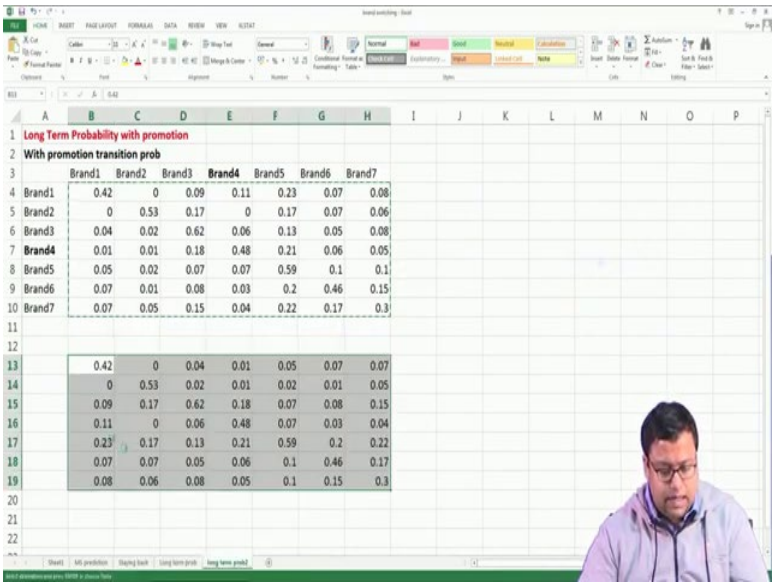
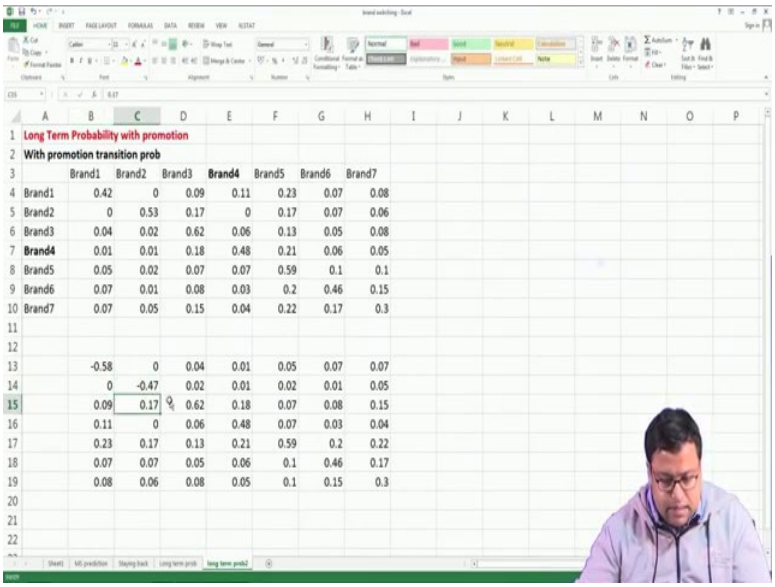
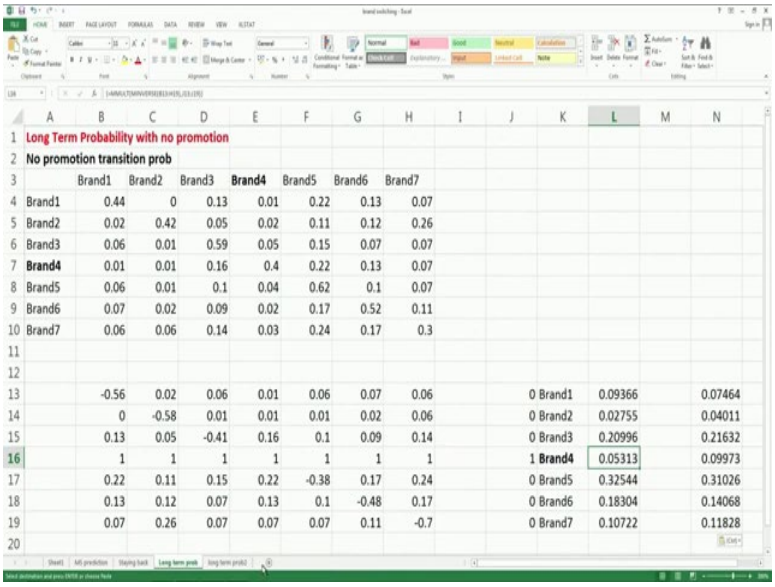






	A	B	C	D	E	F	G	H
1	Long Term Probability with promotion							
2	With promotion transition prob							
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7
4	Brand1	0.42	0	0.09	0.11	0.23	0.07	0.08
5	Brand2	0	0.53	0.17	0	0.17	0.07	0.06
6	Brand3	0.04	0.02	0.62	0.06	0.13	0.05	0.08
7	**Brand4**	0.01	0.01	0.18	0.48	0.21	0.06	0.05
8	Brand5	0.05	0.02	0.07	0.07	0.59	0.1	0.1
9	Brand6	0.07	0.01	0.08	0.03	0.2	0.46	0.15
10	Brand7	0.07	0.05	0.15	0.04	0.22	0.17	0.3
11								
12								
13		-0.58	0	0.04	0.01	0.05	0.07	0.07
14		0	-0.47	0.02	0.01	0.02	0.01	0.05
15		0.09	0.17	0.62	0.18	0.07	0.08	0.15
16		0.11	0	0.06	0.48	0.07	0.03	0.04
17		0.23	0.17	0.13	0.21	0.59	0.2	0.22
18		0.07	0.07	0.05	0.06	0.1	0.46	0.17
19		0.08	0.06	0.08	0.05	0.1	0.15	0.3
20								
21								
22								



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Long Term Probability with no promotion													
2	No promotion transition prob													
3		Brand1	Brand2	Brand3	**Brand4**	Brand5	Brand6	Brand7						
4	Brand1	0.44	0	0.13	0.01	0.22	0.13	0.07						
5	Brand2	0.02	0.42	0.05	0.02	0.11	0.12	0.26						
6	Brand3	0.06	0.01	0.59	0.05	0.15	0.07	0.07						
7	**Brand4**	0.01	0.01	0.16	0.4	0.22	0.13	0.07						
8	Brand5	0.06	0.01	0.1	0.04	0.62	0.1	0.07						
9	Brand6	0.07	0.02	0.09	0.02	0.17	0.52	0.11						
10	Brand7	0.06	0.06	0.14	0.03	0.24	0.17	0.3						
11														
12														
13		-0.56	0.02	0.06	0.01	0.06	0.07	0.06			0 Brand1	0.09366		0.07464
14		0	-0.58	0.01	0.01	0.01	0.02	0.06			0 Brand2	0.02755		0.04011
15		0.13	0.05	-0.41	0.16	0.1	0.09	0.14			0 Brand3	0.20996		0.21632
16		1	1	1	1	1	1	1			1 **Brand4**	0.05313		0.09973
17		0.22	0.11	0.15	0.22	-0.38	0.17	0.24			0 Brand5	0.32544		0.31026
18		0.13	0.12	0.07	0.13	0.1	-0.48	0.17			0 Brand6	0.18304		0.14068
19		0.07	0.26	0.07	0.07	0.07	0.11	-0.7			0 Brand7	0.10722		0.11828
20														

For yes promotion case, what is the values I will quickly calculate very quickly I will calculate, so I will copying it on practically I am copying this one and then pasting it here as a transpose. And then this is basically this minus 1 and this is minus 0.47, to be precise, this is how much minus 0.38, this one is minus 0.52, this one is minus 0.41, this one is minus 0.54 and this one is minus 0.7, fair enough, and then instead of doing this I will choose any one of them to be 1. So, this is 1 and then other values are 0, 0, 0, 1, 0, 0, 0 exactly what I did before.

So, then what will be this thing the, the probabilities will be is equal to mmult within that matrix inverse M inverse of what, M inverse of this people comma inverse comma and then into of this. So, that is for Shift, Ctrl, Enter I got the probabilities, this is the probability if I just copy this and just paste it here, you will see that if I compare now brand 4, if I keep on

giving it will probably saturate at 10 percent level, if I keep on giving the promotion. If I do not keep on giving the promotion it will saturate at a 5 percent level. So, this is something that is important.

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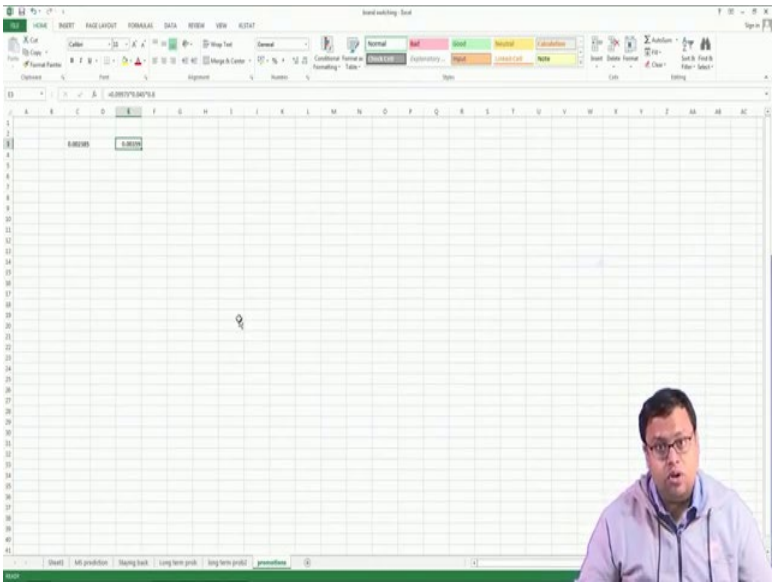

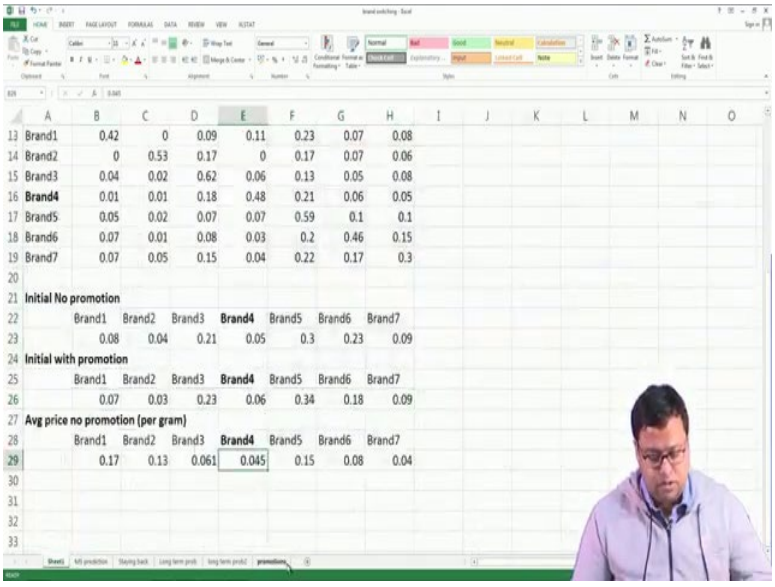

Now understand what I am giving in terms of promotions, what I am doing? So, if I keep on giving promotion, then this is my salary, you know this is my this is my price 0.045. So, 0.045 multiplied by the long term probability, long term probability is how much? 0.053, 0.045 into 0.053, it is my long term revenue. And the long term revenue earned and multiplied by whatever. And in this case, 0.045, if I give promotion, that means I am increasing this, this becomes 0.9973, so 0.09973 into how much 0.045*0.8, I am giving 20

percent discount, and I am getting see more than that more than whatever I would have got in our steady state condition, I am getting more.

So, I should give promotion, and I will want one more and we have to see that how the transition happens. But this is something that is a basic idea that whether you should give promotion whether you should not give promotion in a switching condition. So, that is where we will stop today. This is a classic case of brand switching where the customer lifetime value and the switching behavior matters. In the, as we go on we will discuss about customer lifetime value, how to calculate that and how to take a call on that that which kind of decisions can be taken in marketing. We will discuss about that. Thank you very much. I will see you in the next video.