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Homework 2
Managing Disruptive Technologies
Fall 2021

1.

- a. The parameter β represents the center of source. It means that, at any period of time, the central source transmits positive information about the product to $\beta\%$ of the entire population of consumers. The higher the β , the stronger the center of source and the faster will be the diffusion of information.
- b. The parameter γ represents the strength of information sharing. It is the likelihood of people adopting the product due to information sharing. A higher γ means that people are talking a lot about the product and lower γ means that people are not talking much about the product.
- c. The parameter r represents the relative channel strength. It tells us whether the product is diffusing because of the central source or because of information sharing. When r is 0, it means that no central source is present and when r is 1 it means that no information sharing is present. Hence, if r is smaller and close to 0, it means that the product should be marketed using viral(word-of-mouth) marketing whereas if it is larger and close to 1, it means that the product should be marketed using mass marketing

2.

- a) Using multiple regression on the dataset as shown in the picture below,
And using formulas to calculate the Bass Model parameters :

$$\beta = 2.98\%$$

$$\gamma = 21.63\%$$

$$N = 10139$$

	A	B	C	D	E	F	G	H	I	J	K	L
1	t	D(t)		D(t)-D(0)	D(t+1)	D(t-1)	D(t+1)-D(t-1)	D(t+1)+D(t-1)	D(t+1)*D(t-1)	Estimated D(t)	D(t), $\beta=0$	
2	0	150		0	446.125					150	150	
3	1	596.125		446.125	851.57072	0	851.57072	851.57072	0	479.2863128	181.969001	
4	2	1001.57072		851.57072	1319.79999	446.125	873.67499	1765.92499	588795.7705	865.5844236	220.627332	
5	3	1469.79999		1319.79999	1851.53512	851.57072	999.964404	2703.105844	1576713.099	1312.86749	267.316446	
6	4	2001.53512		1851.53512	2443.69166	1319.79999	1123.891665	3763.491645	3225184.222	1822.808386	323.619618	
7	5	2593.69166		2443.691655	3088.49387	1851.53512	1236.958745	4940.028993	5718454.879	2393.77016	391.392824	
8	6	3238.49387		3088.493869	3773.07517	2443.69166	1329.383513	6216.766823	9220232.302	3019.887507	472.793318	
9	7	3923.07517		3773.075168	4479.86804	3088.49387	1391.374168	7568.361906	13836044.97	3690.497381	570.302092	
10	8	4629.86804		4479.868037	5187.95805	3773.07517	1414.882879	8961.033215	19574555.68	4390.208246	686.734602	
11	9	5337.95805		5187.958047	5875.30656	4479.86804	1395.438525	10355.1746	26320598.07	5099.825952	825.231957	
12	10	6025.30656		5875.306562	6521.41979	5187.95805	1333.46174	11709.37783	33832852.26	5798.153565	989.222322	
13	11	6671.41979		6521.419787	7109.81702	5875.30656	1234.510461	12985.12359	41772354.61	6464.393598	1182.33982	
14	12	7259.81702		7109.817023	7629.67351	6521.41979	1108.25372	14151.09329	49756303.78	7080.623808	1408.28648	
15	13	7779.67351		7629.673507	8076.29844	7109.81702	966.481413	15186.11546	57421004.1	7633.736772	1670.62297	
16	14	8226.29844		8076.298436	8450.51145	7629.67351	820.837941	16080.18496	64474643.32	8116.397978	1972.47711	
17	15	8600.51145		8450.511448	8757.29509	8076.29844	680.996649	16833.59352	70726528.6	8526.914926	2316.16822	
18	16	8907.29509		8757.295085	9004.20323	8450.51145	553.691777	17454.71467	76090122.43	8868.248214	2702.76127	
19	17	9154.20323		9004.203225	9199.91423	8757.29509	442.619146	17957.20932	80566363.68	9146.5819	3131.58812	
20	18	9349.91423		9199.914231	9353.13822	9004.20323	348.934995	18357.34145	84217557.32	9369.863964	3599.80221	
21	19	9503.13822		9353.13822	9471.92249	9199.91423	272.008258	18671.83672	87140874.5	9546.593462	4102.06019	
22	20	9621.92249		9471.922489	0	9353.13822				9684.967961	4630.43794	
23												
24			Regressing G on H & I,		G= a+bH+cl		Y = 594.6345330 + 0.1865635429 X1 - 0.00004331153816 X2					
25												
26			a=	594.634533								
27			b=	0.186563543								
28			c=	-4.33115E-05								
29												
30			β =	0.029763435	2.98%							
31			γ =	0.216326978	21.63%							
32			N =	10139.34638								
33												

Fig 1 : Estimation of parameters using multiple regression

b) X-axis : Time

Y-axis : Sales

----- : Observed Sales

----- : Estimated Sales

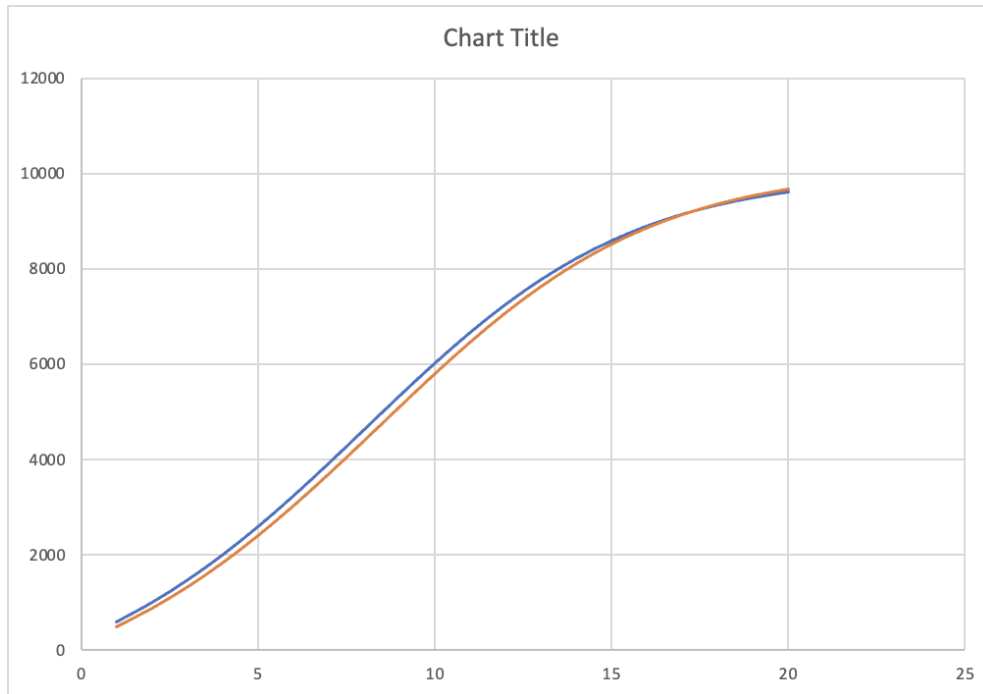


Fig 2 : Diffusion curve when both central source and information sharing is present

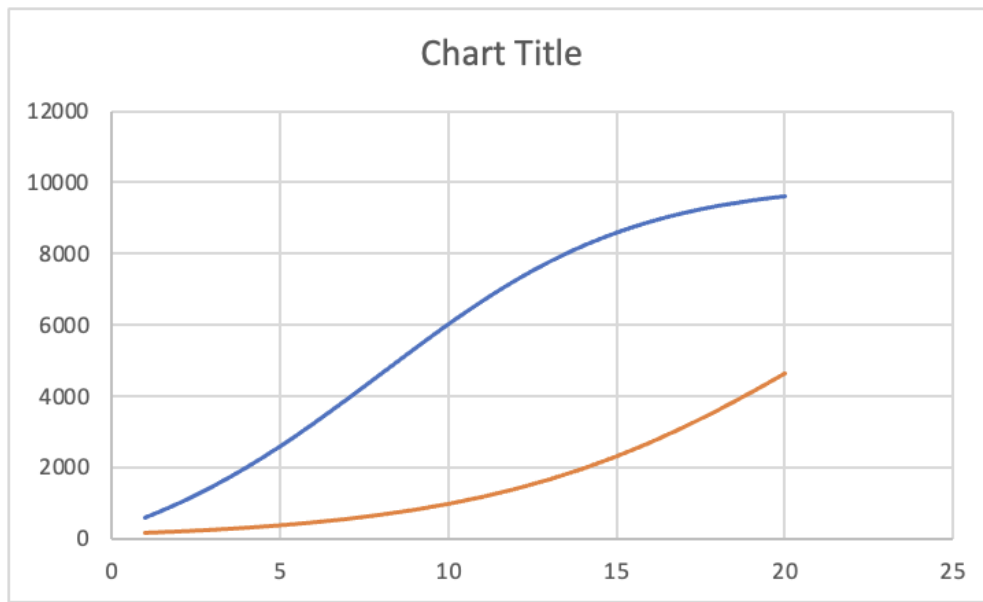


Fig 3 : Diffusion curve when central source is absent

$$r = \beta/(\beta + \gamma)$$

For our model, shown in Fig 2, $r = 0.12$

We can see from both the parameters β and γ that the strength of center of source is very small compared to the strength of information sharing. Since our relative channel strength is small, r suggests that the sales have been driven by word-of-mouth so far and that the center of source is not important. But the two curves plotted above in Fig 2 and Fig 3 show us that even a small center of source has a huge influence on the sales and thus is important for the business' marketing strategy. This is because the center of source feeds into information sharing. Relying only on the relative channel strength parameter ' r ' won't be sufficient to predict the importance of the center of source. Hence, we can conclude that the sales have been driven by mass marketing in the given case.