Exercise session – Customer lifetime value

POLITECNICO
MILANO 1863

AGENDA

- Exercise 4 – Telco

- Exercise 5 – Lifetime estimation

Exercise 4 - Telco

04

Exercise 4 – Telco

A Telco operator which currently has 2,5 million customers in Italy launches its new offer with the following characteristics:

- Price: 20€ / month (paid in advance at the beginning of the month)
- Margin on full price: 40%
- Contract length: 23 months
- 20% discount on the first two months
- Last month for free if the contract is still active

The expected retention rate varies across the duration of the contract:

- From the beginning to 6th month: 99%
- From 7th to 12th month: 95%
- From 13th to 18th month: 90%
- From 19th to 21st month: 92%
- 22nd month: 98%

In case of anticipated interruption by the customer, he/she will have to pay back the 50% of the remaining fees on full price (including the 23rd month).

Exercise 4 – Telco

Assume a monthly discount rate of 1%.

The probability for active customers to call the contact centre is 1.5% for the first 6 months, 0.4% for the last eight months and 0.2% in between. The cost to manage a call is € 3.5

a) *What is the CLV of an acquired customer?*

b) *Compute the CLV on a monthly base of the customer whose life is the 25th percentile.*

The company is planning a campaign to support the launch of this new offer. There are two possible segments:

- Segment A: composed of 100.000 customers. The cost per contact is 10€. Response likelihood is 20%.
- Segment B: composed of 300.000 customers. The cost per contact is 8€. Response likelihood is 15%.

c) *Which segment would you choose to be the target of the campaign?*

Exercise 4 – Telco

A Telco operator launches its new offer with the following characteristics:

- Price: 20€ / month

- Margin on full price: 40%

- Contract length: 23 months

- 20% discount on the first two months

- Last month for free if the contract is still active

- DR = 0,01

RR is not constant over time

Presence of penalties in case of early offer cancellation

The company relies on an external call centre service
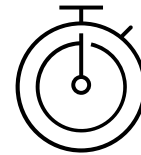
10 minutes

Exercise 4 – Telco

([Excel icon])

Development logic

i. Assess the contribution of the main service
ii. Assess the contribution of churns & penalties
iii. Assess the contribution of call centre activities
iv. Compute the overall CLV

Period	Price	Discount	Main service					Churn					Call centre				
			M	RR	C_RR	Adj_M	Disc_M	C_R	Churn	P	S_P	Disc_P	C_Prob	Calls	Cost	S_Cost	Disc_C
0	20	20%	4	100%	100%	4.00	4.00	0%	0%	220	0	0	1.50%	1.50%	3.5	0.053	0.053

Contribution of the main service to CLV calculation

Contribution of churns & penalties to CLV calculation

Contribution of call centre to CLV calculation

Exercise 4 – Telco

i.   Assess the contribution of the main service

Period	Price		Discount	Margin		RR	Cumulated RR	Adjusted margin	Discounted margin
				Main service					
0	20		20%	4		100%			
1	20		20%	4		99%			
2	20		0%	8		99%			
3	20		0%	8		99%			
4	20		0%	8		99%			
5	20		0%	8		99%			
6	20		0%	8		95%			
7	20		0%	8		95%			
8	20		0%	8		95%			
9	20		0%	8		95%			
10	20		0%	8		95%			
11	20		0%	8		95%			
12	20		0%	8		90%			
13	20		0%	8		90%			
14	20		0%	8		90%			
15	20		0%	8		90%			
16	20			8		90%			
17	20			8		90%			
18	20			8		92%			
19	20		0%	8		92%			
20	20		0%	8		92%			
21	20		0%	8		98%			
22	20		100%	-12		100%			

From text

Last Period is Free

Exercise 4 – Telco

i. Assess the contribution of the main service

Period	Price	Discount	Main service					
			Margin	RR	Cumulated RR	Adjusted margin	Discounted margin
0	20	20%	4	100%	100%	4.00	4.00
1	20	20%	4	99%	99%	3.96	3.92
2	20	0%	8	99%			
3	20	0%	8	99%			
4	20	0%	8	99%			
5	20	0%	8	99%			
6	20	0%	8	95%			
7	20	0%	8	95%			
8	20	0%	8	95%			
9	20	0%	8	95%			
10	20	0%	8	95%			
11	20	0%	8	95%			
12	20	0%	8	90%			
13	20	0%	8	90%			
14	20	0%	8	90%			
15	20	0%	8	90%			
16	20	0%	8	90%			
17	20	0%	8	90%			
18	20	0%	8	92%			
19	20	0%	8	92%			
20	20	0%	8	92%			
21	20	0%	8	98%			
22	20	100%	-12	100%			

$$\text{Adjusted\_M(t)} / ((1+DR)^t)$$

Exercise 4 – Telco

i.   Assess the contribution of the main service

Period	Price	Discount	Main service				
			Margin	RR	Cumulated RR	Adjusted margin	Discounted margin
0	20	20%	4	100%	100,00%	4	4
1	20	20%	4	99%	99,00%	3,96	3,920792079
2	20	0%	8	99%	98,01%	7,8408	7,686305264
3	20	0%	8	99%	97,03%	7,762392	7,5341012
4	20	0%	8	99%	96,06%	7,68476808	7,384911077
5	20	0%	8	99%	95,10%	7,607920399	7,238675214
6	20	0%	8	99%	94,15%	7,531841195	7,095335111
7	20	0%	8	95%	89,44%	7,155249135	6,673830055
8	20	0%	8	95%	84,97%	6,797486679	6,277364903
9	20	0%	8	95%	80,72%	6,457612345	5,904452136
10	20	0%	8	95%	76,68%	6,134731728	5,553692603
11	20	0%	8	95%	72,85%	5,827995141	5,223770271
12	20	0%	8	95%	69,21%	5,536595384	4,913447284
13	20	0%	8	90%	62,29%	4,982935846	4,378319362
14	20	0%	8	90%	56,06%	4,484642261	3,901472699
15	20	0%	8	90%	50,45%	4,036178035	3,476559831
16	20	0%	8	90%	45,41%	3,632560231	3,097924602
17	20	0%	8	90%	40,87%	3,269304208	2,760526873
18	20	0%	8	90%	36,78%	2,942373788	2,459875431
19	20	0%	8	92%	33,84%	2,706983885	2,240678611
20	20	0%	8	92%	31,13%	2,490425174	2,04101418
21	20	0%	8	98%	30,51%	2,44061667	1,980389996
22	20	100%	-12	100%	30,51%	-3,660925005	-2,941173262

Exercise 4 – Telco

ii. Assess the contribution of churns & penalties

Period	Price	Discount		Churn				
				Churn rate	Churn	Penalty	Stochastic penalty	Discounted penalty
0	20	20%		0%				
1	20	20%		1%				
2	20	0%		1%				
3	20	0%		1%				
4	20	0%		1%				
5	20	0%		1%				
6	20	0%		5%				
7	20	0%		5%				
8	20	0%		5%				
9	20	0%		5%				
10	20	0%		5%				
11	20	0%		5%				
12	20	0%		10%				
13	20	0%						
14	20	0%						
15	20	0%						
16	20	0%		10%				
17	20	0%		10%				
18	20	0%		8%				
19	20	0%		8%				
20	20	0%		8%				
21	20	0%		2%				
22	20	100%		0%				

$$1 - RR(t)$$

Exercise 4 – Telco

ii.   Assess the contribution of churns & penalties

Period	Price		Discount		Churn				
					Churn rate	**Churn**	**Penalty**	**Stochastic penalty**	**Discounted penalty**
0	20		20%		0%	0%			
1	20		20%		1%	1%			
2	20		0%		1%	1%			
3	20		0%		1%	1%			
4	20		0%		1%	1%			
5	20		0%		1%	1%			
6	20		0%		5%	1%			
7	20		0%		5%	5%			
8	20		0%		5%	4%			
9	20		0%		5%	4%			
10	20		0%		5%	4%			
11	20		0%		5%	4%			
12	20		0%		10%	4%			
13	20		0%		10%				
14	20		0%		10%				
15	20		0%		10%				
16	20		0%		10%				
17	20		0%		10%				
18	20		0%		8%				
19	20		0%		8%				
20	20		0%		8%				
21	20		0%		2%	1%			
22	20		100%		0%	0%			

Churn rate (t) *
Cumulated RR (t-1)
Or
(Cumulated RR(t)-
Cumulated RR (t-1))

Exercise 4 – Telco

ii.   Assess the contribution of churns & penalties

Period	Price		Discount		Churn				
					Churn rate	**Churn**	**Penalty**	**Stochastic penalty**	**Discounted penalty**
0	20		20%		0%	0%	220		
1	20		20%		1%	1%	210		
2	20		0%		1%	1%	200		
3	20		0%		1%	1%	190		
4	20		0%		1%	1%	180		
5	20		0%		1%	1%	170		
6	20		0%		5%	1%	160		
7	20		0%		5%	5%	150		
8	20		0%		5%	4%	140		
9	20		0%		5%	4%	130		
10	20		0%		5%	4%	120		
11	20		0%		5%	4%	110		
12	20		0%		10%	4%	100		
13	20		0%		10%	7%			
14	20		0%		10%	6%			
15	20		0%		10%	6%			
16	20		0%		10%	5%			
17	20		0%		10%	5%			
18	20		0%		8%	4%	40		
19	20		0%		8%	3%	30		
20	20		0%		8%	3%	20		
21	20		0%		2%	1%	10		
22	20		100%		0%	0%	0		

Sum of remaining payment quotas * 0.5

Exercise 4 – Telco

ii. Assess the contribution of churns & penalties

Period	Price		Discount		Churn				
					Churn rate	Churn	Penalty	Stochastic penalty	Discounted penalty
0	20		20%		0%	0%	220	0	
1	20		20%		1%	1%	210	2,1	
2	20		0%		1%	1%	200	1,98	
3	20		0%		1%	1%	190	1,86219	
4	20		0%		1%	1%	180	1,7465382	
5	20		0%		1%	1%	170	1,633013217	
6	20		0%		5%	1%	160	1,52158408	
7	20		0%		5%	5%	150	7,061101121	
8	20		0%		5%	4%	140	6,260842994	
9	20		0%		5%	4%	130	5,522957926	
10	20		0%		5%	4%	120	4,843209259	
11	20		0%		5%	4%	110	4,217628063	
12	20		0%		10%	4%	100	3,642496963	
13	20		0%		10%	7%	90		
14	20		0%		10%	6%	80		
15	20		0%		10%	6%	70		
16	20		0%		10%	5%	60		
17	20		0%		10%	5%	50		
18	20		0%		8%	4%	40	1,634652104	
19	20		0%		8%	3%	30	0,882712136	
20	20		0%		8%	3%	20	0,541396777	
21	20		0%		2%	1%	10	0,062260629	
22	20		100%		0%	0%	0	0	

Churn(t) * Penalty(t)

Exercise 4 – Telco

ii. Assess the contribution of churns & penalties

Period	Price	Discount		Churn				
				Churn rate	Churn	Penalty	Stochastic penalty	Discounted penalty
0	20	20%		0%	0%	220	0	0
1	20	20%		1%	1%	210	2,1	2,079207921
2	20	0%		1%	1%	200	1,98	1,940986178
3	20	0%		1%	1%	190	1,86219	1,807423268
4	20	0%		1%	1%	180	1,7465382	1,678388881
5	20	0%		1%	1%	170	1,633013217	1,553756043
6	20	0%		5%	1%	160	1,52158408	1,433401032
7	20	0%		5%	5%	150	7,061101121	6,586016501
8	20	0%		5%	4%	140	6,260842994	5,781783463
9	20	0%		5%	4%	130	5,522957926	5,04986038
10	20	0%		5%	4%	120	4,843209259	4,384494161
11	20	0%		5%	4%	110	4,217628063	3,780360064
12	20	0%		10%	4%	100	3,642496963	3,232531108
13	20	0%		10%	7%	90		
14	20	0%		10%	6%	80		
15	20	0%		10%	6%	70		
16	20	0%		10%	5%	60		
17	20	0%		10%	5%	50		
18	20	0%		8%	4%	40	1,634652104	1,366597462
19	20	0%		8%	3%	30	0,882712136	0,730656069
20	20	0%		8%	3%	20	0,541396777	0,443698735
21	20	0%		2%	1%	10	0,062260629	0,050520153
22	20	100%		0%	0%	0	0	0

Stochastic penalty(t) / ((1+DR)^t)

Exercise 4 – Telco

iii. Assess the contribution of call centre activities

Period	Price	Discount		Call probability	Calls	Cost	Stochastic cost	Discounted cost
				Call centre				
0	20	20%		1.50%		3.5		
1	20	20%		1.50%		3.5		
2	20	0%		1.50%		3.5		
3	20	0%		1.50%		3.5		
4	20	0%		1.50%		3.5		
5	20	0%		1.50%		3.5		
6	20	0%		0.20%		3.5		
7	20	0%		0.20%		3.5		
8	20	0%		0.20%		3.5		
9	20	0%		0.20%		3.5		
10	20	0%		0.20%		3.5		
11	20	0%		0.20%		3.5		
12	20	0%		0.20%		3.5		
13	20	0%		0.20%		3.5		
14	20	0%		0.20%		3.5		
15	20	0%		0.40%		3.5		
16	20	0%						
17	20	0%						
18	20	0%						
19	20	0%		0.40%		3.5		
20	20	0%		0.40%		3.5		
21	20	0%		0.40%		3.5		
22	20	100%		0.40%		3.5		

From text   From text

Exercise 4 – Telco

iii. Assess the contribution of call centre activities

Period	Price	Discount		Call centre				
				Call probability	**Calls**	**Cost**	**Stochastic cost**	**Discounted cost**
0	20	20%		1.50%	0,015	3.5		
1	20	20%		1.50%	0,015	3.5		
2	20	0%		1.50%	0,01485	3.5		
3	20	0%		1.50%	0,0147015	3.5		
4	20	0%		1.50%	0,01455449	3.5		
5	20	0%		1.50%	0,01440894	3.5		
6	20	0%		0.20%	0,01426485	3.5		
7	20	0%		0.20%	0,00188296	3.5		
8	20	0%		0.20%	0,00178881	3.5		
9	20	0%		0.20%	0,00169937	3.5		
10	20	0%		0.20%	0,0016144	3.5		
11	20	0%		0.20%	0,00153368	3.5		
12	20	0%		0.20%	0,001457	3.5		
13	20	0%		0.20%	0,00138415	3.5		
14	20	0%		0.20%	0,00124573	3.5		
15	20	0%		0.40%	0,00112116	3.5		
16	20	0%		0.40%	0			
17	20	0%		0.40%	0			
18	20	0%		0.40%	0			
19	20	0%		0.40%	0			
20	20	0%		0.40%	0,00135349	3.5		
21	20	0%		0.40%	0,00124521	3.5		
22	20	100%		0.40%	0,00122031	3.5		

Call Probability (t) *
Cumulated RR (t-1)

Exercise 4 – Telco

iii. Assess the contribution of call centre activities

Period	Price	Discount		Call probability	Calls	Cost	Stochastic cost	Discounted cost
				Call centre				
0	20	20%		1.50%	0,015	3.5	0,0525	
1	20	20%		1.50%	0,015	3.5	0,0525	
2	20	0%		1.50%	0,01485	3.5	0,051975	
3	20	0%		1.50%	0,0147015	3.5	0,05145525	
4	20	0%		1.50%	0,01455449	3.5	0,050940698	
5	20	0%		1.50%	0,01440894	3.5	0,050431291	
6	20	0%		0.20%	0,01426485	3.5	0,049926978	
7	20	0%		0.20%	0,00188296	3.5	0,006590361	
8	20	0%		0.20%	0,00178881	3.5	0,006260843	
9	20	0%		0.20%	0,00169937	3.5	0,005947801	
10	20	0%		0.20%	0,0016144	3.5	0,005650411	
11	20	0%		0.20%	0,00153368	3.5	0,00536789	
12	20	0%		0.20%	0,001457	3.5	0,005099496	
13	20	0%		0.20%	0,00138415	3.5	0,004844521	
14	20	0%		0.20%	0,00124573	3.5	0,004360069	
15	20	0%		0.40%	0,00112116	3.5	0,003924062	
16	20	0%		0.40%	0,00201809	3.5		
17	20	0%		0.40%	0,00181628	3.5		
18	20	0%		0.40%	0,00163465	3.5		
19	20	0%		0.40%	0,00147119	3.5		
20	20	0%		0.40%	0,00135349	3.5	0,004737222	
21	20	0%		0.40%	0,00124521	3.5	0,004358244	
22	20	100%		0.40%	0,00122031	3.5	0,004271079	

Calls(t) * Cost(t)

Exercise 4 – Telco

iii. Assess the contribution of call centre activities

Period	Price	Discount		Call probability	Calls	Cost	Stochastic cost	Discounted cost
				Call centre				
0	20	20%		1.50%	0,015	3.5	0,0525	0,0525
1	20	20%		1.50%	0,015	3.5	0,0525	0,051980198
2	20	0%		1.50%	0,01485	3.5	0,051975	0,050950887
3	20	0%		1.50%	0,0147015	3.5	0,05145525	0,049941959
4	20	0%		1.50%	0,01455449	3.5	0,050940698	0,048953009
5	20	0%		1.50%	0,01440894	3.5	0,050431291	0,047983643
6	20	0%		0.20%	0,01426485	3.5	0,049926978	0,047033471
7	20	0%		0.20%	0,00188296	3.5	0,006590361	0,006146949
8	20	0%		0.20%	0,00178881	3.5	0,006260843	0,005781783
9	20	0%		0.20%	0,00169937	3.5	0,005947801	0,005438311
10	20	0%		0.20%	0,0016144	3.5	0,005650411	0,005115243
11	20	0%		0.20%	0,00153368	3.5	0,00536789	0,004811367
12	20	0%		0.20%	0,001457	3.5	0,005099496	0,004525544
13	20	0%		0.20%	0,00138415	3.5	0,004844521	0,004256699
14	20	0%		0.20%	0,00124573	3.5	0,004360069	0,003793098
15	20	0%		0.40%	0,00112116	3.5	0,003924062	0,003379989
16	20	0%		0.40%	0,00201809			
17	20	0%		0.40%	0,00181628			
18	20	0%		0.40%	0,00163465			
19	20	0%		0.40%	0,00147119			
20	20	0%		0.40%	0,00135349	3.5	0,004737222	0,003882364
21	20	0%		0.40%	0,00124521	3.5	0,004358244	0,003536411
22	20	100%		0.40%	0,00122031	3.5	0,004271079	0,003431369

Stochastic cost(t) / $((1+DR)^t)$

Exercise 4 – Telco

iv. **Compute the overall CLV**

$$Overall\ CLV = CLV(MainService) + CLV(Churn) - CLV(CallCentre) =$$

$$102,80 + 59,59 - 0,38 = 162,01\ €$$

Exercise 4 – Telco

b) *Compute the CLV on a monthly base of the customer whose life is the 25th percentile.*

Exercise 4 – Telco

t	Price	M	RR	Cum_RR
0	20	4	1	100,00%
1	20	4	0,99	99,00%
2	20	8	0,99	98,01%
3	20	8	0,99	97,03%
4	20	8	0,99	96,06%
5	20	8	0,99	95,10%
6	20	8	0,99	94,15%
7	20	8	0,95	89,44%
8	20	8	0,95	84,97%
9	20	8	0,95	80,72%
10	20	8	0,95	76,68%
11	20	8	0,95	72,85%
12	20	8	0,95	69,21%
13	20	8	0,9	62,29%
14	20	8	0,9	56,06%
15	20	8	0,9	50,45%
16	20	8	0,9	45,41%
17	20	8	0,9	40,87%
18	20	8	0,9	36,78%
19	20	8	0,92	33,84%
20	20	8	0,92	31,13%
21	20	8	0,98	30,51%
22	20	-12	1	30,51%

Exercise 4 – Telco

Stochastic approach (crossed out)

t	Price	M	RR	REALCum_R	Cum_RR
0	20	4	1	1	100,00%
1	20	4	0,99	1	99,00%
2	20	8	0,99	1	98,01%
3	20	8	0,99	1	97,03%
4	20	8	0,99	1	96,06%
5	20	8	0,99	1	95,10%
6	20	8	0,99	1	94,15%
7	20	8	0,95	1	89,44%
8	20	8	0,95	1	84,97%
9	20	8	0,95	1	80,72%
10	20	8	0,95	1	76,68%
11	20	8	0,95	0	72,85%
12	20	8	0,95	0	69,21%
13	20	8	0,9	0	62,29%
14	20	8	0,9	0	56,06%
15	20	8	0,9	0	50,45%
16	20	8	0,9	0	45,41%
17	20	8	0,9	0	40,87%
18	20	8	0,9	0	36,78%
19	20	8	0,92	0	33,84%
20	20	8	0,92	0	31,13%
21	20	8	0,98	0	30,51%
22	20	-12	1	0	30,51%

Exercise 4 – Telco

Stochastic approach ~~(crossed out)~~

Penalty		Adjusted & Discounted P	
0			0
0			0
0			0
0			0
0			0
0			0
0			0
0			0
0			0
0			0
110			**98,59560893**
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
		SUM	98,59560893

Exercise 4 – Telco

Call prob	Calls	Costs	Adjusted Penalty	Adjusted & Discounted P
0,015	0,015	3,5	0,0525	0,0525
0,015	0,015	3,5	0,0525	0,051980198
0,015	0,015	3,5	0,0525	0,051465543
0,015	0,015	3,5	0,0525	0,050955983
0,015	0,015	3,5	0,0525	0,050451468
0,015	0,015	3,5	0,0525	0,049951949
0,002	0,002	3,5	0,007	0,006594317
0,002	0,002	3,5	0,007	0,006529026
0,002	0,002	3,5	0,007	0,006464383
0,002	0,002	3,5	0,007	0,006400379
0,002	0,002	3,5	0,007	0,006337009
0,002	0	3,5	0	0
0,002	0	3,5	0	0
0,002	0	3,5	0	0
0,002	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
0,004	0	3,5	0	0
				0,339630253

Exercise 4 – Telco

iv. **Compute the overall CLV**

$$Overall\ CLV = CLV(MainService) + CLV(Churn) - CLV(CallCentre) =$$

$$75,81 + 98,60 - 0,34 = 174,07\ €$$

Exercise 4 – Telco

The company is planning a campaign to support the launch of this new offer. There are two possible segments:

- Segment A: composed of 100.000 customers. The cost per contact is 10€. Response likelihood is 20%.
- Segment B: composed of 300.000 customers. The cost per contact is 8€. Response likelihood is 15%.

c) *Which segment would you choose to be the target of the campaign?*

Exercise 4 – Telco

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €				
B	300,000	15%	8.00 €				

From text

Exercise 4 – Telco

BEAR = CPC / CLV
.اگر به همه باید هزینه بدیم

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €	20,000			
B	300,000	15%	8.00 €	45,000			

Size * AR

Exercise 4 – Telco

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €	20,000	1,000,000		
B	300,000	15%	8.00 €	45,000	2,400,000		

Size * CPC

Exercise 4 – Telco

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €	20,000	1,000,000	3,256,200	
B	300,000	15%	8.00 €	45,000	2,400,000	7,326,450	

Acquisition * Overall CLV

Exercise 4 – Telco

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €	20,000	1,000,000	3,256,200	2.26
B	300,000	15%	8.00 €	45,000	2,400,000	7,326,450	2.05

(CLV – Total cost) / Total costs

Exercise 4 – Telco

Preferred Segment

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI
A	100,000	20%	10.00 €	20,000	1,000,000	3,256,200	2.26
B	300,000	15%	8.00 €	45,000	2,400,000	7,326,450	2.05

Exercise 4 – Telco

Preferred Segment

	Segment size	AR	CPC	Acquisition	Total cost [€]	CLV [€]	ROI	CPA [€]
A	100,000	20%	10.00 €	20,000	1,000,000	3,256,200	2.26	50
B	300,000	15%	8.00 €	45,000	2,400,000	7,326,450	2.05	53

Total cost / Acquisition

Exercise 5: Lifetime Estimation

05

Exercise 5 – Lifetime estimation

A company has the following CRM data:

- Avg margin per customer = 66 €/year
- Negligible DR
- RR(0) = 1
- RR(1 –2) = 0.85 ٠.٧٥
- RR(3-5) = 0.90 ٠.٨٥
- RR(6-8) = 0.95 ٠.٩٠

a) What is the expected lifetime of a newly acquired customer?
b) A customer experiences a bad service in Year 4 and complaints, threatening to leave. The threat sounds highly probably, so a recovery action is needed. What is a reasonable budget for such a caring activity?

Exercise 5 – Lifetime estimation

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Lifetime at Churn * Cumulated RR
0	1	1	0	0,5	0
1	0,75	0,75	0,25	1,5	0,375
2	0,75	0,5625	0,1875	2,5	0,46875
3	0,85	0,478125	0,08438	3,5	0,2953125
4	0,85	0,40640625	0,07172	4,5	0,322734375
5	0,85	0,345445313	0,06096	5,5	0,335285156
6	0,9	0,310900781	0,03454	6,5	0,224539453
7	0,9	0,279810703	0,03109	7,5	0,233175586
8	0,9	0,251829633	0,02798	8,5	0,237839098
				Total:	2,492636168

Underlying idea: Avg lifetime is the weighted average of the lifetime at churn of all the customers

Is this estimation correct?

اون ۲۵درصد اخر رو داریم اندازه نمیگیریم!

Exercise 5 – Lifetime estimation

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Lifetime at Churn * Cumulated RR
0	1	1	0	0,5	0
1	0,75	0,75	0,25	1,5	0,375
2	0,75	0,5625	0,1875	2,5	0,46875
3	0,85	0,478125	0,08438	3,5	0,2953125
4				4,5	0,322734375
5				5,5	0,335285156
6	0,9	0,310900781	0,03454	6,5	0,224539453
7	0,9	0,279810703	0,03109	7,5	0,233175586
8	0,9	0,25182963	0,02798	8,5	0,237839098
				Total:	2,492636168

No, we have censored data

Possible approaches to manage the situation:
1) (most prudential) let's assume all the customers will churn at T+1
2) The residulas are split on a reasonable timespan (10 more years?). The split may be homogeneous, exponentially smoothed, linear, etc.
3) RR(T) is retained for the years to come (for instance up until residuals go below 5%)

Exercise 5 – Lifetime estimation

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Lifetime at Churn * Cumulated RR
0	1	1	0	0,5	0
1	0,75	0,75	0,25	1,5	0,375
2	0,75	0,5625	0,1875	2,5	0,46875
3	0,85	0,478125	0,08438	3,5	0,2953125
4	0,85	0,40640625	0,07172	4,5	0,322734375
5	0,85	0,345445313	0,06096	5,5	0,335285156
6	0,9	0,310900781	0,03454	6,5	0,224539453
7	0,9	0,279810703	0,03109	7,5	0,233175586
8	0,9	0,251829633	0,02798	8,5	0,237839098
			0,25183	9,5	2,392381512
				Average lifetime	4,88501768

Possible approaches to manage the situation:
1) (most prudential) let's assume all the customers will churn at T+1
2) The residulas are split on a reasonable timespan (10 more years?). The split may be homogeneous, exponentially smoothed, linear, etc.
3) RR(T) is retained for the years to come (for instance up until residuals go below 5%)

Exercise 5 – Lifetime estimation

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Lifetime at Churn * Cumulated RR
0	1	1	0	0,5	0
1	0,75	0,75	0,25	1,5	0,375
2	0,75	0,5625	0,1875	2,5	0,46875
3	0,85	0,478125	0,08438	3,5	0,2953125
4	0,85	0,40640625	0,07172	4,5	0,322734375
5	0,85	0,345445313	0,06096	5,5	0,335285156
6	0,9	0,310900781	0,03454	6,5	0,224539453
7	0,9	0,279810703	0,03109	7,5	0,233175586
8	0,9	0,251829633	0,02798	8,5	0,237839098
9	0,9	0,22664667	0,02518	9,5	0,239238151
10	0,88889	0,201463706	0,02518	10,5	0,264421114
11	0,875	0,176280743	0,02518	11,5	0,289604078
12	0,85714	0,15109778	0,02518	12,5	0,314787041
13	0,83333	0,125914816	0,02518	13,5	0,339970004
14	0,8	0,100731853	0,02518	14,5	0,365152968
15	0,75	0,07554889	0,02518	15,5	0,390335931
16	0,66667	0,050365927	0,02518	16,5	0,415518894
17	0,5	0,025182963	0,02518	17,5	0,440701857
18		0	0,02518	18,5	0,465884821
				Average lifetime	6,018251027

Possible approaches to manage the situation:

1) (most prudential) let's assume all the customers will churn at T+1

2) The residulas are split on a reasonable timespan (10 more years?). The split may be homogeneous, exponentially smoothed, linear, etc.

3) RR(T) is retained for the years to come (for instance up until residuals go below 5%)

Exercise 5 – Lifetime estimation

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Lifetime at Churn * Cumulated RR
0	1	1	0	0,5	0
1	0,75	0,75	0,25	1,5	0,375
2	0,75	0,5625	0,1875	2,5	0,46875
3	0,85	0,478125	0,084375	3,5	0,2953125
4	0,85	0,40640625	0,07171875	4,5	0,322734375
5	0,85	0,345445313	0,060960938	5,5	0,335285156
6	0,9	0,310900781	0,034544531	6,5	0,224539453
7	0,9	0,279810703	0,031090078	7,5	0,233175586
8	0,9	0,251829633	0,02798107	8,5	0,237839098
9	0,9	0,22664667	0,025182963	9,5	0,239238151
10	0,9	0,203982003	0,022664667	10,5	0,237979003
11	0,9	0,183583802	0,0203982	11,5	0,234579303
12	0,9	0,165225422	0,01835838	12,5	0,229479753
13	0,9	0,14870288	0,016522542	13,5	0,22305432
14	0,9	0,133832592	0,014870288	14,5	0,215619176
15	0,9	0,120449333	0,013383259	15,5	0,207440517
16	0,9	0,108404399	0,012044933	16,5	0,198741399
17	0,9	0,097563959	0,01084044	17,5	0,189707699
18	0,9	0,087807564	0,009756396	18,5	0,180493325
19	0,9	0,079026807	0,008780756	19,5	0,171224749
20	0,9	0,071124126	0,007902681	20,5	0,162004955
21	0,9	0,064011714	0,007112413	21,5	0,152916872
22	0,9	0,057610542	0,006401171	22,5	0,144026356
23	0,9	0,051849488	0,005761054	23,5	0,135384775
24	0,9	0,046664539	0,005184949	24,5	0,127031246
				Average lifetime	5,541557767

Possible approaches to manage the situation:

1) (most prudential) let's assume all the customers will churn at T+1
2) The residulas are split on a reasonable timespan (10 more years?). The split may be homogeneous, exponentially smoothed, linear, etc.
3) RR(T) is retained for the years to come (for instance up until residuals go below 5%)

Exercise 5 – Lifetime estimation – Part b)

T	RR	Cumulated RR (t)	Churn(t)	Lifetime at Churn	Resized Churn (t)	Lifetime at Churn * Cumulated RR
0	1,00	1	0	0,5	0	0
1	0,75	0,75	0,25	1,5	0	0
2	0,75	0,5625	0,1875	2,5	0	0
3	0,85	0,478125	0,08438	3,5	0	0
4	0,85	0,40640625	0,07172	4,5	0,15	0,675
5	0,85	0,345445313	0,06096	5,5	0,1275	0,701
6	0,90	0,310900781	0,03454	6,5	0,07225	0,470
7	0,90	0,279810703	0,03109	7,5	0,065025	0,488
8	0,90	0,251829633	0,02798	8,5	0,0585225	0,497
9	0,90	0,22664667	0,02518	9,5	0,05267025	0,500
10	0,89	0,201463706	0,02518	10,5	0,05267025	0,553
11	0,88	0,176280743	0,02518	11,5	0,05267025	0,606
12	0,86	0,15109778	0,02518	12,5	0,05267025	0,658
13	0,83	0,125914816	0,02518	13,5	0,05267025	0,711
14	0,80	0,100731853	0,02518	14,5	0,05267025	0,764
15	0,75	0,07554889	0,02518	15,5	0,05267025	0,816
16	0,67	0,050365927	0,02518	16,5	0,05267025	0,869
17	0,50	0,025182963	0,02518	17,5	0,05267025	0,922
18		0	0,02518	18,5	0,05267025	0,974
					Average lifetime	10,205
					Residual lifetime at 4	6,205

Underlying idea: we have to calculate the probability of churn given the fact that the customer has survived 4 years. So we have to rescale future churn probabilities given such probabilty

استوکستیک اپروچه و فرمولش رو باید دوباره گوش بدم
اما میگه داره ری اسکیل میکنه

: ریسایزد اکشن
چرن شده ها که حاصل منهای دوتای متوال بود رو تقسیم کرد به کومولیتیو چرن
ریت قبلی

Exercise 5 – Lifetime estimation – Part b)

Residual lifetime: 6,205 years
Residual CLV: 6,205*66 = 409,52€

باید مقایسه بشه با این budget * success rate

هزینه ی ساکس مثلا ۱۰ درصد باشه و باجت ما باید ۴۰۹.۵۲ باید ضربدر ۱۰ بشه که میشه ۴۰ یورو حالا اگر بیشتر باشه نمیصرفه
اگر کمتر باشه ما باید بریم سراغش

پتانسیل لایف تایم ولیوش چند میشه