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ANALYZING AFFINITY CREDIT CARD

CUSTOMER SEGMENTATION

Total customers = 1000

Assumptions:

1. **50%** customers pay the bill within the credit-free period
2. **25%** customers pay 30 days after the last due date
3. **14%** customer pay 45 days after the last due date
4. **11%** customer pay 60 days after the last due date (Such customers are discontinued after 60days, i.e., from March)

CUSTOMER SEGMENTAION		
TOTAL: 1000		
Customers who pay the bill within the credit-free period	50%	500
Customers paying 30 days after the last due date	25%	250
Customers paying 45 days after the last due date	14%	140
Customers paying 60 days after the last due date	11%	110

SCENARIO 1

STEPS TO CALCULATE CREDIT CARD INTEREST^[1]:

- 1. Look Up the APR on Your Credit Card:** The interest rate (known as APR) you pay on your credit card is part of your monthly bill. It is calculated on a daily basis, so your APR must be converted to a daily rate. The math equation for that is $\text{annual percentage rate (APR)} \div 365$ (number of days in the year). Let's say your APR is 16%. OK, so we go 0.16 (your APR) \div by 365 . That gives us a daily periodic rate of 0.00044 .
- 2. Calculate Your Average Daily Balance:** Interest is assessed on your average daily balance. The math on that is $\text{total billing amount} \div \text{number of days in billing cycle}$. To figure that out, look back at your statement. Start with the unpaid balance (the amount of money carried over from the previous month's statement). Add up each debit entry and divide it by the number of days in your credit card's billing period. That's the average daily balance.
- 3. Multiply Your Daily Periodic Rate by the Average Daily Balance:** The math on this one is $\text{daily period rate} \times \text{average daily balance}$. Let's say your average daily balance was \$1,200. So, we go 0.00044 (daily periodic rate) \times \$1,200 (average daily balance) and that equals \$0.53.
- 4. Multiply by the Number of Days in Your Billing Cycle:** If it's a 30-day billing cycle, that's \$0.53 multiplied by 30 and it equals \$15.90. So, you will be charged \$15.90 in interest for this billing cycle.

Annual percentage rate (APR)	15%
Daily percentage rate (DPR)	0.00041
Average daily balance	1,000.00
Interest (Daily)	0.41
Interest (Monthly)	12.33

ASSUMPTIONS:

Late penalty: Rs.100/30 days
Membership fee: Rs 20 (Monthly)
Operation cost: Rs 25 (Monthly)
Affiliation fee: Rs 10 (Monthly)
Cost of funds: 6.5% (Paid Yearly)
Loss rate: 3% (of the borrowers default on their entire balance)

Q1: How much profit % is generated in 1 year?

A1: The total profit generated in 1 year = Rs 42,58,080

% Profit = **51.08%**

EXPLANATION:

Profit = Revenue - Cost

% Profit = (Revenue - Cost) / Revenue

Revenue is generated by:

1. Interests given by customers
2. Membership fee given by customers
3. Penalty given in case of late payments

Costs are incurred from:

1. Card operating cost
2. Affiliation fee
3. Cost of funds
4. Loss rate due to borrower's default

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	120000	210000	-90000
250	12.3	100	396900	105000	291900
140	18.45	150	316596	58800	257796
110	24.6	200	53812	7700	46112
				TOTAL	425808

Profit = 425808

%Profit = $425808 / 833496 = 51.08\%$

Q2: If the average balance is increased to Rs 2000, what happens to the loss?

A2: The loss increases by 200%, or **doubles** up, if the average balance is increased to Rs 2000.

EXPLANATION:

Loss = 3% of borrower's default on entire balance
= $0.03 * \text{average card balance} * \text{no. of defaulters}$

1. When average balance is Rs 1000
Loss = $0.03 * 1000 * 500 = 15000$
2. When average balance is Rs 2000
Loss = $0.03 * 2000 * 500 = 30000$

Avg. Daily balance	1000	2000
Loss	15000	30000

Q3: Is a borrower with a low balance more or less likely to default than a borrower with a high balance? Why? Explain clearly.

A3: A borrower with a low balance is **more likely** to default than a borrower with a high balance.

EXPLANATION:

A report by The Urban Institute^[2], a non-profit research institute, researched the trends seen with borrowers who are more likely to default and clearly reported that most defaults occur on lower balances.

The report showed that there is a 32% default rate for balances of \$5,000 or less and a 15% default rate for balances of more than \$35,000. However, the majority of borrowers fall into the low balance category.

Q4: The group company has now become unhappy with the credit card provider. It wants to start its own credit card. But for that, it will need to purchase the customers from the current credit card company. If the affiliated group offered Rs 20 per account to purchase all the customers from the credit card company, what would their profit be? (Assume that we are only talking about 1 year)

A4: Profit = **Rs. 5,25,808**

EXPLANATION:

The profit gained by the affiliated group will be the profit gained by the credit card company from the customers, subtracting the cost of purchasing customers. Extra profit will also be generated because the affiliated group does not have to pay the affiliation fee to anyone, unlike the credit card company.

PROFIT MINUS PURCHASING COST PLUS AFFILIATION COST			
(Since they don't have to pay affiliation fee to anyone)			
PROFIT = 425808 - (20*1000) + (10*1000*12)			
PROFIT	525808		

Q5: What numbers can the financial institution change to convince the affiliated group not to want to purchase, while still not going into a loss?

A5: The institution can **increase the affiliation fee** by 50%, i.e., to Rs.15 from Rs. 10 to convince the affiliated group not to purchase customers. The institution will continue to gain profit regardless.

EXPLANATION:

If the affiliation fee is increased to Rs 15, the profit reduces by Rs 54,500 while still making a positive gain of Rs 3,71,308.

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	120000	240000	-120000
250	12.3	100	396900	120000	276900
140	18.45	150	316596	67200	249396
110	24.6	200	53812	8800	45012
				TOTAL	371308
				Profit reduced by	54500

Q6: What is the extra cost (if any) company will have to incur if the customer delays the payment of the credit card bill after the due date?

A6: The company does not incur any extra costs due to late payments. In fact, the company gains profit from late payments.

EXPLANATION:

The company does not incur any extra costs due to late payments as if when the borrower delays, there are charges that apply regardless, like the penalty, membership fee and interests that is greater than any the operating cost of the card.

Operational cost (Monthly)	25
Interest (Monthly)	12.33
Late penalty (Monthly)	100
Interest + Penalty - OC	87.33

Q7: Is it beneficial for the company if the customer pays the credit card bill after the due date?

A7: Yes, it is **beneficial** for the company if the customer pays the credit card bills after the due date.

EXPLANATION:

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	120000	210000	-90000
250	12.3	100	396900	105000	291900
140	18.45	150	316596	58800	257796
110	24.6	200	53812	7700	46112

Profit/ Customer-

Segment 1: 0

Segment 2: Rs 1167.6

Segment 3: Rs. 1841.4

Segment 4: Rs. 419.2

INSIGHTS:

1. Customers who pay during credit-free period do not bring any profits to the company
2. Maximum profit is gained from the customers who pay after 60 days of last due date

SCENARIO 2

STEPS TO CALCULATE COMPOUND INTEREST:

$$CI = A - P = P\left\{\left(1 + \frac{r}{100}\right)^{4n} - 1\right\}$$

P	Average card balance
r	15%
n	1 month

MONTH	AVG. CARD BALANCE	INTEREST	Quarter	INTEREST (DAILY)
January	1000	12.346926	Q1	Q1
February	1050	12.9642723		
March	1102.5	13.61248592	38.92368422	0.43
April	1157.625	14.29311021	Q2	Q2
May	1215.50625	15.00776572		
June	1276.281563	15.75815401	45.05902995	0.50
July	1340.095641	16.54606171	Q3	Q3
August	1407.100423	17.3733648		
September	1477.455444	18.24203304	52.16145955	0.58
October	1551.328216	19.15413469	Q4	Q4
November	1628.894627	20.11184142		
December	1710.339358	21.11743349	60.38340961	0.67
	TOTAL	15917.12652		

ASSUMPTIONS:

Late penalty: Rs.100/30 days
Membership fee: Rs 20 (Monthly) (Increases 5% every month)
Operation cost: Rs 25 (Monthly)
Affiliation fee: Rs 10 (Monthly)
Cost of funds: 6.5% (Paid Yearly)
Loss rate: 3% (of the borrowers default on their entire balance)

MONTH	MEMBERSHIP FEE
January	20
February	21.00
March	22.05
April	23.15
May	24.31
June	25.53
July	26.80
August	28.14
September	29.55
October	31.03
November	32.58
December	34.21
	TOTAL 318.3425304

Q1: How much profit % is generated in 1 year?

A1: The total profit generated in 1 year = Rs 24,43,305.197
 % Profit = **59.62%**

EXPLANATION:

Profit = Revenue - Cost

% Profit = (Revenue - Cost) / Revenue

Revenue is generated by:

1. Interests given by customers
2. Membership fee given by customers
3. Penalty given in case of late payments

Costs are incurred from:

1. Card operating cost
2. Affiliation fee
3. Cost of funds
4. Loss rate due to borrower's default

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	1910055.182	210000	1700055.182
250	196.5275833	100	1304159.487	105000	1199159.487
140	294.791375	150	828086.2436	58800	769286.2436
110	25.94912282	200	55874.40351	7700	48174.40351
				TOTAL	2443305.197

Profit = 24,43,305.197

%Profit = $2443305.197 / 4098175.317 = 59.62\%$

Q2: If the average balance is increased to Rs 2000, what happens to the loss?

A2: The loss increases by 200%, or **doubles** up, if the average balance is increased to Rs 2000.

EXPLANATION:

Loss = 3% of borrower's default on entire balance
= $0.03 * \text{average card balance} * \text{no. of defaulters}$

AVG. CARD BALANCE	AVG. CARD BALANCE
1000	2000
1050	2100
1102.5	2205
1157.625	2315.25
1215.50625	2431.0125
1276.281563	2552.563125
1340.095641	2680.191281
1407.100423	2814.200845
1477.455444	2954.910888
1551.328216	3102.656432
1628.894627	3257.789254
1710.339358	3420.678716
TOTAL	TOTAL
15917.12652	31834.25304

1. When average balance is Rs 1000
Loss = $0.03 * 15917.12652 * 500 = 238756.8978$
2. When average balance is Rs 2000
Loss = $0.03 * 31834.25304 * 500 = 477513.7956$

Avg. card balance	1000	2000
Loss	238756.8978	477513.7956

Q3: Is a borrower with a low balance more or less likely to default than a borrower with a high balance? Why? Explain clearly.

A3: A borrower with a low balance is **more likely** to default than a borrower with a high balance.

EXPLANATION:

A report by The Urban Institute^[2], a non-profit research institute, researched the trends seen with borrowers who are more likely to default and clearly reported that most defaults occur on lower balances.

The report showed that there is a 32% default rate for balances of \$5,000 or less and a 15% default rate for balances of more than \$35,000. However, the majority of borrowers fall into the low balance category.

Q4: The group company has now become unhappy with the credit card provider. It wants to start its own credit card. But for that, it will need to purchase the customers from the current credit card company. If the affiliated group offered Rs 20 per account to purchase all the customers from the credit card company, what would their profit be? (Assume that we are only talking about 1 year)

A4: Profit = **Rs. 25,43,305.197**

EXPLANATION:

The profit gained by the affiliated group will be the profit gained by the credit card company from the customers, subtracting the cost of purchasing customers. Extra profit will also be generated because the affiliated group does not have to pay the affiliation fee to anyone, unlike the credit card company.

PROFIT MINUS PURCHASING COST PLUS AFFILIATION COST			
(Since they don't have to pay affiliation fee to anyone)			
PROFIT = $2443305.197 - (20*1000) + (10*1000*12)$			
PROFIT	2543305.197		

Q5: What numbers can the financial institution change to convince the affiliated group not to want to purchase, while still not going into a loss?

A5: The institution can **increase the affiliation fee** by 50%, i.e., to Rs.15 from Rs. 10 to convince the affiliated group not to purchase customers. The institution will continue to gain profit regardless.

EXPLANATION:

If the affiliation fee is increased to Rs 15, the profit reduces by Rs 54,500 while still making a positive gain of Rs 23,88,805.19.

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	1910055.182	240000	1670055.182
250	196.5275833	100	1304159.487	120000	1184159.487
140	294.791375	150	828086.2436	67200	760886.2436
110	25.94912282	200	55874.40351	8800	47074.40351
				TOTAL	2388805.197
				Profit reduced by	54500

Q6: What is the extra cost (if any) company will have to incur if the customer delays the payment of the credit card bill after the due date?

A6: The company does not incur any extra costs due to late payments. In fact, the company gains profit from late payments.

EXPLANATION:

The company does not incur any extra costs due to late payments as if when the borrower delays, there are charges that apply regardless, like the penalty, membership fee and interests that are greater than any the operating cost of the card.

Operational cost (Monthly)	25
Interest (Monthly)	12.97456141
Late penalty (Monthly)	100
Interest + Penalty - OC	87.97456141

Q7: Is it beneficial for the company if the customer pays the credit card bill after the due date?

A7: Yes, it is **beneficial** for the company if the customer pays the credit card bills after the due date.

EXPLANATION:

NO. OF CUSTOMERS	INTEREST	LATE PENALTY	REVENUE	COST	PROFIT
500	0	0	1910055.182	210000	1700055.182
250	196.5275833	100	1304159.487	105000	1199159.487
140	294.791375	150	828086.2436	58800	769286.2436
110	25.94912282	200	55874.40351	7700	48174.40351

Profit/ Customer-

Segment 1: Rs. 3400.11

Segment 2: Rs 4796.63

Segment 3: Rs. 5494.90

Segment 4: Rs. 437.94

INSIGHTS:

1. Customers who pay during credit-free period bring least amount of profits to the company
2. Maximum profit is gained from the customers who pay after 60 days of last due date

Q: Which information variables you will use to calculate the credit card limit and the risk associated with it for an individual customer? Also, give the reason for your choice. (Example-Bureau score)

Variables to determine credit card limit and risk associated with it:

1. Applicant's credit score
2. Applicant's income level

CREDIT SCORE

Credit scoring developed by FICO is used in more than 90% of U.S. lending decisions,³ and is undoubtedly the dominant scoring model.

Of your total score:^[3]

- **35% is your payment history.** It reflects whether the borrower has paid their creditors on time.
- **30% is what you owe.** This is determined by credit utilization, meaning how much of the available credit has been used. It is suggested to use 30% or less of the available credit for a good score.
- **15% is the length of your credit history.** It's based on how long the account has been open, and the timing of the most recent account transactions. A longer credit history gives a higher score.
- **10% is your credit mix.** It considers the means taken to borrow money, such as credit cards, installment loans, mortgages, retail accounts, etc.
- **10% is your new credit.** It constitutes the credit inquiries made and the new accounts that are opened. A lot of activity in this category will lower credit score.

Simply put, **Credit scores indicate whether or not the applicant is responsible.**

Credit score evaluates almost all the attributes that are necessary for risk assessment.

INCOME LEVEL

A report by Robert Hiltonsmith^[4] examined the repayment status of loan borrowers, analyzing the nature of loan defaults and delinquencies.

The key findings showed that:

1. Lower-income borrowers have higher default rates. Nearly 20 percent of borrowers earning less than \$25,000 per year were in default, more than double the 9 percent default rate among borrowers earning more than \$100,000 annually.

2. Borrowers in default or serious delinquency have generally struggled for years to repay their loans. Half of all borrowers in default have been in repayment for more than 3 years; half of all borrowers in serious delinquency have been in repayment for more than 4 years.

Thus, it is necessary to evaluate the applicant's income in order to predict their ability to to manage debts and deal with financial crises.

REFERENCE

1. <https://www.debt.org/credit/cards/interest/>
2. https://www.urban.org/sites/default/files/publication/98884/underwater_on_student_debt.pdf
3. <https://www.americanexpress.com/en-us/credit-cards/credit-intel/what-is-a-credit-score/>
4. 'Small Loans, Big Risks' , Robert Hiltonsmith