

Preparation questions:

1. Why does Lifetime Customer Value vary with BK score? Why does Lifetime Customer Value vary with product? (See Exhibit 2 in answering these questions.) (3 points)

Customer Lifetime Value (CLV) varies with the bankruptcy (BK) score because the higher the BK score, the more likely the customer is to default (aka a higher churn rate), and therefore there is a lower CLV.

CLV varies with Product because the expected profit varies with these product variables. For instance, with a fixed-rate, the company is subject to lower profit with interest rate increases. Similarly, with the presence of an annual fee, the company can increase profit by way of direct payment. And with the last variable, APR, the case states that although avoidable customers frequently end up paying interest on their credit cards and so the higher APR, the higher the expected profit for the credit card company.

2. Are predictive models on the basis of historical data applicable in this case? If so, why? If not, why not? (4 points)

To an extent, yes, predictive modeling based on historical data must be used in this case. It is only with the existing data from previous mailings, and/or data captured during an initial mailing of our design, that outcomes can be observed and used for making observations. We need these historical data in order to predict how the available variables could affect our future profits.

With that being said, in this case, the accuracy of the historical data provided from past mailings by PFG may not be reliable enough to be trusted for predictions. The case makes it clear that times and exogenous variables have changed since these previous mailings, and so there is reasonable doubt as to whether predictions using those data are applicable. If this stance is taken, then only a new test mailing should be relied upon for predictions.

3. Is there a “best product” which works for all customers? (3 points)

If one defines “best product” as the product with the highest relative profit across all 3 scored customer bankruptcy segments, then the product would be the 19.8% APR, fixed-rate, \$0 fee product. It has a relatively high response rate of ~2% and high CLV scores for all 3 segments.

That being said, the response rate from the data given to us is a blended rate of ~2% across customers with bankruptcy scores of 200 and 250. The likely response rate from customers of bankruptcy score 150 would likely be much lower, but we don't have this data. However, even with a much lower response rate, the product would still be profitable in the 150 BK segment. If you had to choose a product to send to all 3 customer segments, it would be the 19.8% APR, fixed-rate, zero-fee product (see appendix Exhibit 2 for supporting detail).

4. Describe and justify your testing strategy (10 points)

Our goal was simple: massage the existing data into a format to run a partial factorial analysis to predict the most profitable deal to run for each customer segment.

First, we grouped the previous marketing campaign results by product combinations (APR, fixed/variable, and fee) and summarised the response rate and weighted average BK scores. Second, we created a full factorial design for the 12 possible product combinations and merged it with the partial results from step 1. Third, we used regression analysis to predict what the response rate would be for the missing product marketing campaigns. Fourth, we created a similar table of the CLV estimates that were given to us in Exhibit 2 and merged them into our partial factorial design with predicted response rates. We then estimated the profitability of a single customer in each segment by multiplying the predicted response rate x CLV and chose the product within each customer segment with the highest profit.

For the first mailing, we chose the following (Appendix Exhibit 1):

- BK Score 150:
 - Most profitable: 16.8% APR / Fixed / No Fee
 - Close & need data: 14.9% APR / Fixed / No Fee
- BK Score 200:
 - Most profitable: 16.8% APR / Fixed / No Fee
 - Close & need data: 16.8% APR / Variable / No Fee
- BK Score 250:
 - Most profitable: 19.8% APR / Fixed / No Fee
 - Close & need data: 19.8% APR / Variable / No Fee

There were a few shortcomings to this approach - mainly, the bankruptcy scores were blended and excluded from the regression model, so we knew we needed to test similar-performing segments that we didn't have data on. The worry was that certain product response rates were inflated by higher bankruptcy score customer segments. So, we chose the two best-performing

campaigns in each customer segment (150/200/250) and applied an ~80/20 split between most profitable and the product that we needed data on to make our model better for the second round of mailings.

It turns out, we were right - the best-performing product from the original analysis (16.8% APR / Fixed / \$0 fee) did have inflated response rates for the 150 BK score customer segment. So, we included the data from the first mailing in the analysis, reran the profitability calculations, and adjusted our mailings. The 150 BK group was elevated to 14.9% APR / Fixed / \$0 fee product and we had more success in the second mailing.

We believe our approach was solid. We used historical data to make rational decisions that fit with the reality of tailoring our products to our customers. We knew and identified the shortcomings of the analysis and baked into the mailing campaign a strategy to tease out the shortcomings of the data, so the second round of mailings would be better performing.

Appendix:

Exhibit 1 - Mailing Predictions (Round 1)

APR	Type	Fee	Resp_Rate	Pred_Resp_Rate	BK_150	BK_200	BK_250	BK_150_Profit	BK_200_Profit	BK_250_Profit
14.9	Fixed	20	2.35%	2.35%	83	63	33	\$145,162	\$98,135	\$27,594.59
14.9	Variable	20	1.69%	1.69%	93	73	43	\$106,916	\$73,171	\$22,552.73
14.9	Fixed	0	4.90%	4.90%	52	32	2	\$204,904	\$106,864	-\$40,196.00
14.9	Variable	0	NA	3.54%	62	42	12	\$169,709	\$98,835	-\$7,475.62
16.8	Fixed	20	1.04%	1.04%	103	83	53	\$56,666	\$35,954	\$4,886.44
16.8	Variable	20	NA	0.74%	113	93	63	\$33,654	\$18,848	-\$3,361.14
16.8	Fixed	0	3.71%	3.71%	72	52	22	\$216,893	\$142,756	\$31,550.68
16.8	Variable	0	NA	2.67%	82	62	32	\$168,974	\$115,566	\$35,453.26
19.8	Fixed	20	0.43%	0.43%	131	111	81	\$6,301	-\$2,295	-\$15,188.20
19.8	Variable	20	NA	0.31%	141	121	91	-\$6,756	-\$12,890	-\$22,091.04
19.8	Fixed	0	2.14%	2.14%	100	80	50	\$163,692	\$120,954	\$56,846.15
19.8	Variable	0	NA	1.53%	110	90	60	\$118,570	\$87,921	\$41,947.23

Exhibit 2 - Mailing Predictions (Round 2)

APR	Type	Fee	Resp_Rate	Pred_Resp_Rate	BK_150	BK_200	BK_250	BK_150_Profit	BK_200_Profit	BK_250_Profit
14.9	Fixed	20	2.35%	2.35%	83	63	33	\$145,162	\$98,135	\$27,594.59
14.9	Variable	20	1.69%	1.69%	93	73	43	\$106,916	\$73,171	\$22,552.73
14.9	Fixed	0	4.90%	4.90%	52	32	2	\$204,904	\$106,864	-\$40,196.00
14.9	Variable	0	3.46%	3.46%	62	42	12	\$164,272	\$95,152	-\$8,528.00
16.8	Fixed	20	1.04%	1.04%	103	83	53	\$56,666	\$35,954	\$4,886.44
16.8	Variable	20	NA	0.86%	113	93	63	\$46,961	\$29,799	\$4,057.65
16.8	Fixed	0	2.53%	2.53%	72	52	22	\$132,077	\$81,500	\$5,634.50
16.8	Variable	0	2.05%	2.05%	82	62	32	\$117,936	\$76,976	\$15,536.00
19.8	Fixed	20	0.43%	0.43%	131	111	81	\$6,301	-\$2,295	-\$15,188.20
19.8	Variable	20	NA	0.33%	141	121	91	-\$3,039	-\$9,700	-\$19,691.55
19.8	Fixed	0	2.03%	2.03%	100	80	50	\$152,602	\$112,081	\$51,300.81
19.8	Variable	0	1.54%	1.54%	110	90	60	\$118,960	\$88,240	\$42,160.00

Exhibit 3 - Simulation Results

<div> <div>⏮ Analyze</div> <div>⏮ Final Results</div> </div>			
Round 1 Results			
Solicitation Development	\$14,000	Round 1 Number Sent	375,000
Mailing Costs	\$800	Round 1 Number of Responses	6,913
Cost of Pieces Mailed	\$187,500	Total Response Value	\$396,966
Total Cost of Mailing	\$202,300	Total Profit	\$194,666
Round 2 Results			
Mailing Costs	\$800	Round 2 Number Sent	375,000
Cost of Pieces Mailed	\$187,500	Round 2 Number of Responses	10,957
Total Cost of Mailing	\$188,300	Total Response Value	\$527,808
		Total Profit	\$339,508
Cumulative Results			
Solicitation Development	\$14,000	Round 1 Number of Responses	6,913
Mailing Costs	\$1,600	Round 2 Number of Responses	10,957
Cost of Pieces Mailed	\$375,000	Total Response Value	\$924,774
Total Cost of Mailing	\$390,600	Total Profit	\$534,174