Business School and Department of Computer Science

Data Analytics for Strategic Decision-Making
Individual Report

Report Title: Individual Report

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The attached work is my own.
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I have neither sought nor used the services of any professional agencies to produce this work.
This work has not been submitted previously for any other assessed unit for this or other degree courses.

Individual Report

I. Introduction

This report investigates a managerial problem that I have encountered during my internship in "FinX" (anonym) in 2019. For this assignment, the problem was formulated with a decision model, and a hypothesis was made. Then, real data were applied to this model, and obtained results were used to test the hypothesis. Finally, a recommendation is given for the problem.

i. Company introduction

"FinX" is a Chinese fintech company with the core of big data sharing in the financial industry. FinX helps loan institutions to do pre-loan reviews and reduce bad debts by showing customers' private loan situation and personal real debt ratio. FinX has only one product called "Xcredit", which is an exclusive personal credit inquiry platform for FinX's member only. To become a member, each loan institution will need to pay 30,000 yuan annually. Each member will have 375 free inquiry opportunities to check personal loan information on Xcredit. After these free inquiries are used up, each additional inquiry will cost 40 yuan.

The customers of FinX are mainly the following seven types of companies: private loan, mortgage, car loan, P2P (peer-to-peer) loan, microloan, online loan (small), and online loan (medium) company.

ii. Problem introduction

In 2019, a significant number of customers, mainly small online loan companies, complained about the price of the membership fee. As a result, the company decided to perform an investigation on this case and review on the price of the membership fee. For this problem, I made a hypothesis that the membership fee was, in fact, reasonable.

II. Model formulation

Pricing is a complicated job, and there is no pricing model that is guaranteed better than the others. For this pricing problem, I decide to consider the problem from the following three perspectives: the company (FinX), customers and market competition. First, the company wanted to retain as many customers as possible without a big change in its current profit. From the customers' point of view, FinX's service not only needs to be affordable but also needs to avoid significant bad debts. Finally, FinX's product also needs to have sufficient market competitiveness, for example, have higher cost performance than it competitors.

Based on these perspectives, I performed the following analyses to evaluate the price of the membership:

1. Finding out the break-even point of this project.
2. Estimating the impact on profits after reducing membership fee.
3. Analysing the cost performance of Xcredit to customers.
4. Analysing the competitiveness of Xcredit in the market.

i. Break-even point of the project

To calculate break-even point, total revenue and total costs will need to be known. FinX's revenue can be calculated according to the following equations:

Eq 1. $total\ revenue = membership\ fee\ income + additional\ inquiries\ income$

Eq 2. $membership\ fee\ income = Total\ number\ of\ members * membership\ fee$

Eq 3. $additional\ inquiries\ income = total\ number\ of\ additional\ inquiries * 40$

An assumption was made in this section that each institution used Xcredit to query the loan information of each person who consults for their loan services.

ii. Impact on profits after reducing membership fee

The impact of membership fee reduction on profit is evaluated based on the percentage of profit loss (PPL). The equation of the percentage of profit loss (PPL) is as follows:

Eq 4. $PPL = \frac{original\ profit - new\ profit}{original\ profit}$

Eq 5. $profit = total\ revenue - total\ cost$

In equation 4, original profit refers to the profit when membership fee is 30,000 yuan, and new profits refers to the profit when membership fee is reduced. For this project, total cost is mainly operational cost which includes expenses such as employees salary and server fee.

iii. Cost performance analysis of Xcredit to customers

In the case of Xcredit, cost performance is evaluated based on two aspects: the estimated amount of bad debt that can be avoided (EABD) comparing to the cost of using Xcredit and the improvement on the bad debt rate of each institution. Because different types of institutions have varying amounts of loan products and different lending standards, the risk control capability and bad debt rate vary according to the type of the institution. For instance, online loan companies typically have the characteristics of fast lending, and their target customers are normally those who need a loan of hundreds to thousands of yuan. Therefore, the lending standards for online loan companies are generally very loose, and not much personal information needs to be provided for each of their customers, which results in a generally high bad debt rate for online loan companies. Based on these facts, the evaluation was performed separately for each type of institution based on the following equations:

Eq 6. $cost - bad\ debt\ ratio = \frac{cost\ of\ using\ Xcredit}{EABD}$

Eq 7. cost of using Xcredit=membership fee+ 40 * number of additional inquiries

Eq 8. $EABD = risk\ avoided\ rate * annual\ average\ bad\ loan\ amount$

Eq 9. *annual average bad loan amount = average number of loan consultations per year *application approval rate * bad debt rate * per capita loan amount*

Eq 10. *improved percentage on bad debt rate = (1-risk avoided rate) * bad debt rate*

The risk avoided rate in equation 8 is a rough figure estimated according to experience rather than a concise data.

iv. Market competitiveness analysis of Xcredit

For this section, the analysis focused on the price comparison between Xcredit and competitors' products of similar grade. For private credit inquiry platforms, the product grade depends on various aspects such as the size of database and the maturity of data technology.

III. Results analyses

i. Analyses from the view of FinX

Institution type	Number of institutions	Average number of loan consultations per year	Loan application approval rate	Bad debt rate	Per capita loan amount	Annual average bad debt loan amount	Additional enqury number	Additioanl query income
private loan	289	4500	0.28	0.22	¥ 255,000	¥ 42,411,600	4125	¥ 165,000
mortgage	32	1500	0.7	0.05	¥ 5,050,000	¥ 159,075,000	1125	¥ 45,000
car loan	45	2750	0.6	0.99	¥ 525,000	¥ 514,552,500	2375	¥ 95,000
P2P	9	1875	0.45	0.275	¥ 515,000	¥ 71,697,656	1500	¥ 60,000
microloan	6	1250	0.5	0.12	¥ 2,650,000	¥ 119,250,000	875	¥ 35,000
online loan(small)	29	137500	0.1	0.5	¥ 2,000	¥ 8,250,000	137125	¥ 5,485,000
online loan(medium)	2	762500	0.3	0.35	¥ 3,000	¥ 144,112,500	762125	¥ 30,485,000

Table 1. Summary of the collected data.

Fixed Inputs			**Outputs**	
risk avoided rate	0.8		total number of institution(customers)	412
price of each additional query	¥ 40			
operational costs (e.g. employee salary, server fee and website promotion fees)	¥ 30,000,000			
Variable inputs			**Model of revenue, costs, and profit**	
membership fee	¥ 30,000		Total Revenue	¥ 38,954,700
			Total cost	¥ 30,000,000
			Profit	¥ 8,954,700

Figure 1. Model of profit calculation.

Membership fee	Profit	Profit loss percentage
¥ 30,000	¥ 8,954,700	0.00%
¥ 29,000	¥ 8,542,700	-4.60%
¥ 28,000	¥ 8,130,700	-9.20%
¥ 27,000	¥ 7,718,700	-13.80%
¥ 26,000	¥ 7,306,700	-18.40%
¥ 25,000	¥ 6,894,700	-23.00%
¥ 24,000	¥ 6,482,700	-27.61%
¥ 23,000	¥ 6,070,700	-32.21%
¥ 22,000	¥ 5,658,700	-36.81%
¥ 21,000	¥ 5,246,700	-41.41%
¥ 20,000	¥ 4,834,700	-46.01%
¥ 19,000	¥ 4,422,700	-50.61%
¥ 18,000	¥ 4,010,700	-55.21%
¥ 17,000	¥ 3,598,700	-59.81%
¥ 16,000	¥ 3,186,700	-64.41%
¥ 15,000	¥ 2,774,700	-69.01%
¥ 14,000	¥ 2,362,700	-73.61%
¥ 13,000	¥ 1,950,700	-78.22%
¥ 12,000	¥ 1,538,700	-82.82%
¥ 11,000	¥ 1,126,700	-87.42%
¥ 10,000	¥ 714,700	-92.02%

Table 2. Summary of different profits and profit loss percentage by varying membership fee.

Table 1 summarises the data collected from FinX in 2019, and figure 1 shows the decision model built on Excel for calculating the project's profit. By using "Goal Seek" function of What-if-Analysis, the break-even point is found at membership fee equal to 8,265 yuan, which suggests that there was a relatively large room for membership fee to adjust. However, referring to table 2, it can be seen that the profit of this project was very sensitive to the change in membership fee. For instance, reducing membership fee to one-third of its original value (30,000 yuan) will result in a loss of nearly half of the original profit. This suggests that the pricing was within a fairly reasonable range from the perspective of FinX.

ii. Analyses from the view of customers

Figure 2. Plot of improved percentage on bad debt rate and the ratio of service cost against bad debt avoided.

According to figure 2, first, it can be seen that both car loan and small online loan companies had at least 10% of improvement on their bad debt rates. Whereas, the other types of companies had relatively small improvement. Furthermore, since bad debts are generally hard to chase back, the amount of bad debts avoided through Xcredit can be treated as a 'saving' on the company's operational cost. In this sense, Xcredit demonstrated great cost performance on all kinds of companies except online loan companies, according to the cost-bad debt ratios demonstrated in figure 2. Nevertheless, considering that getting online bad debts back is normally the most difficult as online loans are typically small in amount and large in quantity, the cost performance of Xcredit was not terribly bad for online loan companies. In summary, Xcredit showed a fairly good overall cost performance for most customers.

iii. Analyses from the view of competitors

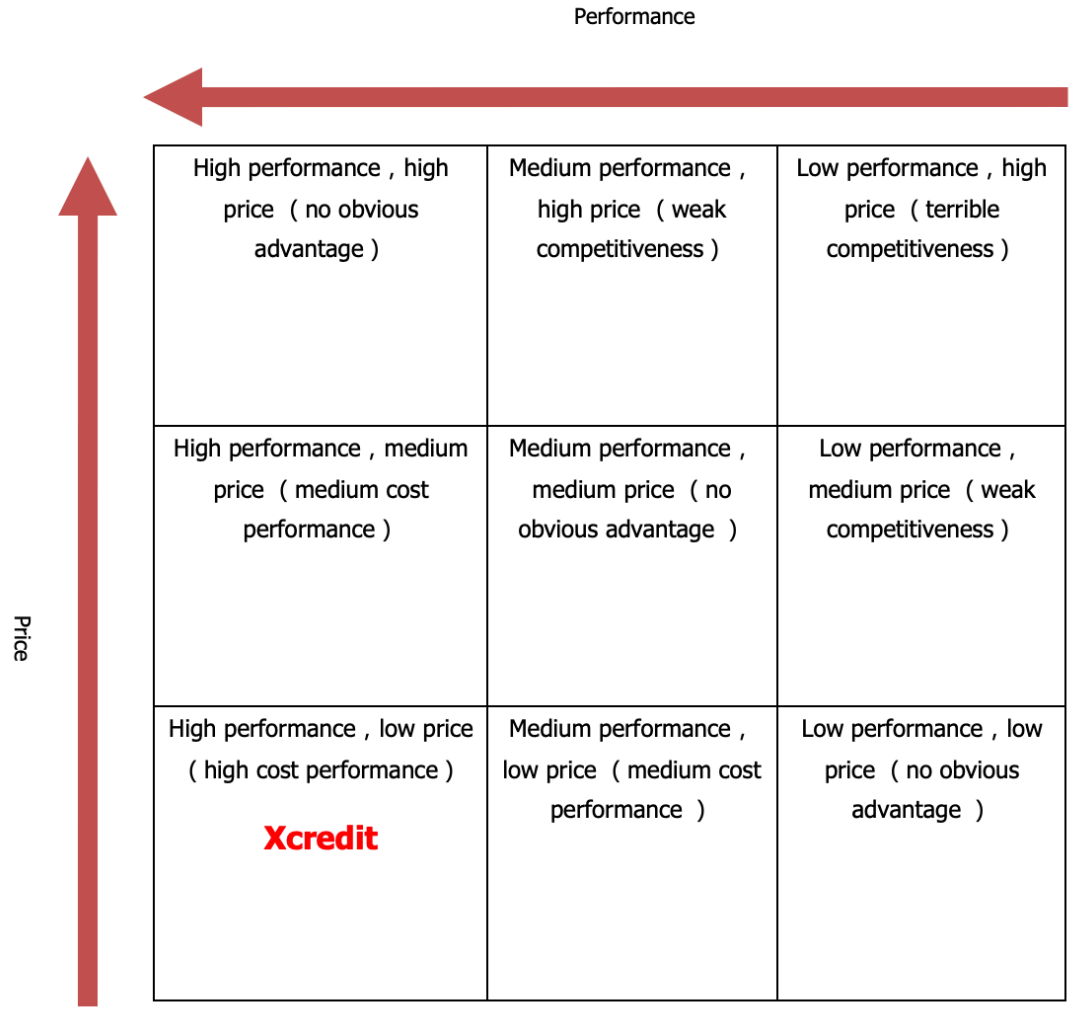

Figure 3. Market competitiveness analysis of Xcredit.

An investigation was done on the market prices (annual membership fee and additional inquiry price) of personal credit inquiry platforms. Due to the difficulty of obtaining price information of other competitors' products, the investigation was only a rough estimation. According to this investigation, both membership fee and additional inquiry price of Xcredit were relatively cheap comparing to many other competing products, providing that Xcredit had an excellent performance. For many competitors, Xcredit demonstrated strong competitiveness.

iv. Further analyses and discussion on the encounter problem

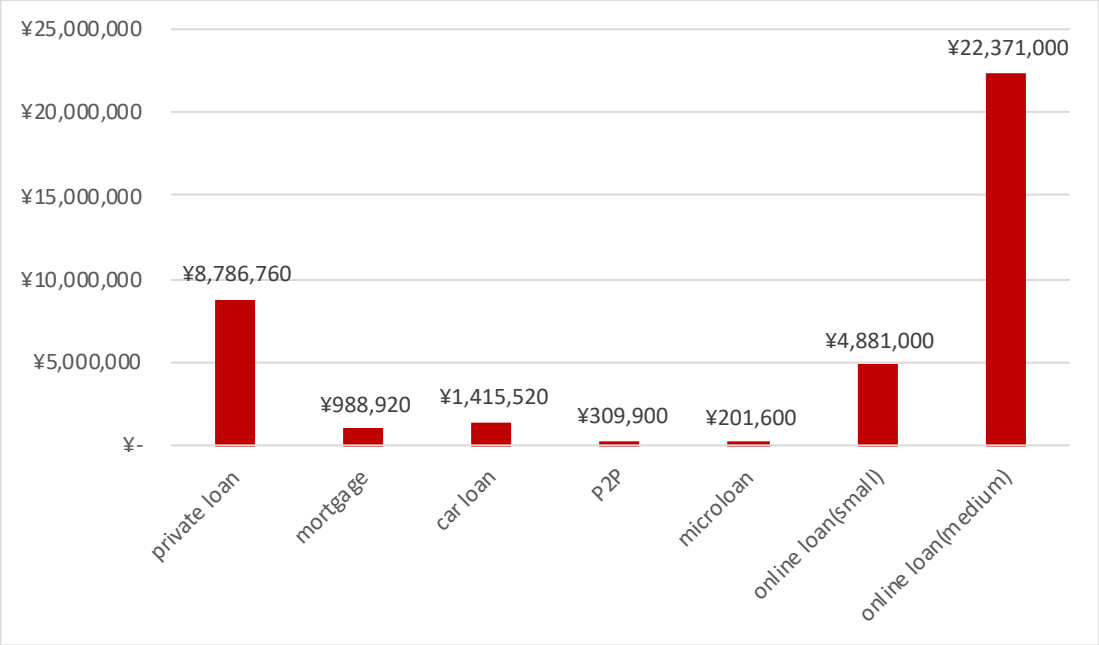

Figure 4. Total product revenue from different types of institutions.

Recall that most complaints made were from small online loan institutions. It can be seen from figure 4 that the total product revenue from small online loan companies was the third largest product revenue for FinX, accounting approximately 12.5% of FinX's overall product income. Therefore, to avoid losing these customers, the company may need to make some adjustments regarding to these companies' complaints on the membership price. However, based on the analyses from the previous sections, the price of FinX's membership was fairly reasonable and had significantly good cost performance, which proves the hypothesis. In overall, FinX can choose to reduce its membership price but no need to make a big concession.

IV. Critique of model and future work

The main problem of the model is the estimation of the risk avoided rate. Since Xcredit, as a platform, only provides personal loan information, no judgement is made on the inquired person' debt situation. Therefore, the risk avoided rate is, in fact, an indirect measurement and not precise. Furthermore, different companies have different risk controlling abilities, the risk avoided rate should not be a certain value but a variable that may be formulated with an equation. This requires further works to look in.