

Analysis and Improvement Strategy for Profit Contribution of Bank Customer Under Big Data Background

Yi Jinping

Economics and management school of Wuhan University, Hubei 430072, China
Jecounushetiri@hotmail.com

Abstract—Our research takes the bank's data as the object, and performs an intensive analysis model of bank customer profit contribution, under the guidance of big data theory and data mining method. Then, based on the profit contribution of the asset class business, the profit contribution of the liability business and the profit contribution of the intermediate business class, as well as the basic model of the customer profit contribution evaluation are constructed. Finally, certain assets data of a subordinate branch of a state-owned commercial bank are used, and an improved empirical analysis of customer profit contribution model and cluster analysis method is carried out. The strategy proposed in this paper is verified to be in line with the actual needs of enterprises. On one hand, it improves the loyalty of customers to banks; on the other hand, it can further expand the banking customer base and provide effective support for potential value mining of customers.

Keywords- contribution; bank customer; big data; profit

I. INTRODUCTION

The banking industry is the main body of China's financial system. The current market-oriented reform of the financial industry is accelerating, and a multi-subject, multi-level, multi-field comprehensive financial market structure is gradually forming its shape. The rapid development of big data, cloud computing, and Internet of Things technology have greatly changed the channels and tools of finance. Driven by new technologies, customers' business models, development models, and financial needs will undergo continuous and profound changes. The structure of analytical CRM in China's commercial banks generally consists of the following aspects: through the large concentration of data, collecting daily business data of banks and customer-related letters, a customer-centric central data platform is formed; based on this platform, the system establish a variety of decision analysis tools to analyze the data and measure the customer value; the analysis results of the decision analysis tool are fed back to the relevant bank users in a certain form of presentation, and the users adjust the market policies and business objectives according to the feedback results. Customer profit contribution should be at the decision analysis tool level throughout the CRM system. Like other tools, it obtains the profit contribution of customers through the analysis and calculation of customer transaction data collected by banks, and makes customers distinguish customer value according to this contribution.

The purpose of this study is that the banks can meet customer needs and gain their own interests, to find the contributing customers from huge customer transaction data, and to satisfy their needs and obtain greater profits. In view of the fact that the original corporate customer profit contribution model can not meet the requirements, this paper improves the corporate profit contribution model in three aspects from the actual situation of the bank, and constructs a new customer profit contribution model to further enhance the effectiveness of the model. Then, the improved model is applied to the customer evaluation process of the bank company, and the difference of customer profit contribution is obtained through the calculation results, and the difference is analyzed to show the effect of the model. The results show that the improved customer profit high contribution model is of great significance to the improvement of bank management and operation.

II. PROFIT CONTRIBUTION ANALYSIS OF BANK CUSTOMERS

In financial industry, different kinds of customers have different economic driving factors and influence variables, so banks need to integrate customer life cycle value chain elements, grasp customer personalized needs and expectations, and help customers realize asset value-added while maximizing customer profit contribution. Customer profit contribution calculation is a dynamic interactive process, requiring banks to participate in customer management and service departments to cooperate actively in customer development and service processes, strictly control data quality, with data standards related provisions, and business development caused by business rules changes and business numbers. According to the changes, timely information sharing and synchronous updating are needed to ensure the accuracy of the calculation results and the scientificity of decision-making information.

Private banking customers need to analyze the value of their customers and tailor-made financial products and services. Private bank customers are characterized by large-scale assets, high contribution to bank profits, high level of service, strong ability to select banks and strong bargaining power. In customer relationship management, banks should fully embody their financial professional ability, comprehensive and specialized financial products such as financial management and investment for these customers, which realizes the preservation and appreciation of their assets, increase their customers' understanding and trust of banks, and eventually cultivate loyal customers of banks.

High-end customers need to prevent customer churn, and gradually excavate and enhance the value of those customers. They establish a relatively long period of customer life cycle

development planning, through the analysis of historical data to predict if the customer has realized the lifetime value. According to the value of the order, it is combined with the matching degree of bank resources, and selected as many as possible customers with greater value, as the key development object. To consider the customer's current profit contribution, we can also pay attention to and predict the customer's potential value, and do a good job of customer resource reserve for the maximization of bank's future profit.

Potential customers should pay attention to their value enhancement. The development and cultivation of potential customers by banks can effectively control the marketing cost, which is the future profit growth point of high quality. Taking the existing high-value customer profit contribution as the reference system to evaluate the potential customer profit contribution. The paper positions the promotion of customer profit contribution on the basis of historical data analysis, and measures it from the perspective of sustainable and dynamic development. Although the current customer contribution is not great, for potential customers, and from a strategic height, flexible use of customer profit contribution to customer lifetime value analysis is needed.

Customer Profit Contribution = (Interest Revenue - Capital Cost) + (Capital Value - Interest Expenditure) + (Procedure Revenue - Procedure Expenditure + Exchange Net Income and Loss) - Business Tax - Cost - Risk Cost

In above equation, the cost of capital is based on a single transaction, and the cost of the use of funds such as loans and investments is calculated according to the interest rate of the capital market; the value of capital is calculated according to the use of different accounting rules for different bank products, and its value contribution to the sources of funds such as deposits; the cost calculation is based on the principle of gradual apportionment, according to the principle of gradual apportionment. The accrual basis is allocated to each product and every customer. Risk cost is the sum of expected losses and capital costs in credit risk, market risk, and operational risk. Capital cost = economic capital * capital expected return, and cost is the sum of direct and indirect costs.

III. COMPREHENSIVE PROFIT CONTRIBUTION CALCULATION MODEL FOR BANK CUSTOMERS BASED UNDER BIG DATA BACKGROUND

A. Model Analysis Based on Account Profit Contribution

In the calculation of the profit contribution of certain foreign banks, account based calculation is often adopted. It collects all transaction costs and benefits of the same account as well as the various operating costs and risk preparations that should be allocated to the account. Then it calculates the contribution in line with the actual situation of the account, and finally aggregates the contribution to the customer level, and calculates the total contribution of the account owned by the same customer, that is, the profit of the customer. Since different businesses may exist in the same account, the contribution to the profits of the account should be the sum of the contributions to the profits of all

businesses. We choose the most common deposit, loan and card consumption as the main business of calculating the profit contribution of the account, then the expression of the profit contribution of the account is depicted as follows:

$$P_{At} = P_{Dt} + P_{Lt} + P_{Mt} \quad (1)$$

Where P_{At} is account profit contribution; P_{Dt} is contribution of deposit business; P_{Lt} is contribution of loan business and P_{Mt} is intermediate business contribution.

To compute the contribution, for each kind of transaction, we will divide it into three factors: direct cost, indirect cost and other income. Then, the profit contribution of each business can be expressed as

$$P_{Bt} = R_{It} + R_{Ot} - C_{Dt} - C_{It} \quad (2)$$

where P_{Bt} is business profit contribution; R_{It} is net profit contribution; R_{Ot} is other income; C_{Dt} is direct cost and C_{It} is indirect cost. The relation between these factors is depicted as the following figure:

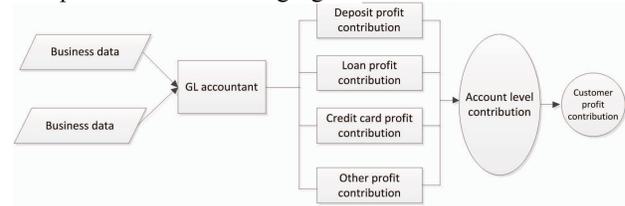


Figure 1. Computation model of customer profit contribution

B. Profit Contribution Calculation of Bank Liabilities Products

Customer debt products income is mainly deposit products income. Because the amount of each deposit may be different. We consider bank deposits from the average balance and the income generated in the process of the transfer of funds within the customer namely, that is:

$$E_{Li} = \sum_{j=1}^n P_j \times L_j \quad (3)$$

E_{Li} is the income generated by liabilities of banks of customer i ; P_j is corresponding internal price of the j_{th} deposit in computation period; L_j is average balance of the j_{th} deposit in computation period.

The cost of debt products is divided into two parts: On the one hand, the bank, as an enterprise, needs to pay operating costs; on the other hand, the customer deposits in the bank, and the bank needs to pay interest to the customer according to the interest rate stipulated by the People's Bank of China, namely:

$$Cl_i = \sum_{j=1}^n R_j \times L_j + Al_i \quad (4)$$

where Cl_i is the cost generated by the i_{th} customer of load products ; R_j is the interest rate of the j_{th} deposit in computation period; L_j is average balance of the j_{th} deposit in computation period; Al_i is apportionment cost of basic operating cost of load products for the i_{th} customer.

The profit contribution of liabilities products is the difference between the cost and revenue corresponding to the liabilities of the customers, that is

$$Vl_i = El_i - Cl_i \quad (5)$$

C. Profit Contribution Calculation Model of Bank Assets Products

We focus on the calculation of customer loan business income of asset business. The type of loans is divided into fixed assets loans, liquidity loans, according to the situation, including different uses and maturities. We calculate the main part of the bank loans according to the average balance of the customer in the month and the loan rate agreed during the loan term., that is,

$$E_{ai} = \sum_{j=1}^n R_j \times A_j \quad (6)$$

where E_{ai} is the income generated by asset product of the i_{th} customer in computation period; R_j is agreed fixed rate or floating rate of the j_{th} loan in recomputation period; A_j is average loan balance of a day in computation period.

The cost of customer assets is also the first consideration of the apportionment of the bank's basic operating costs. Because of the risk of bank loans, we should also consider the risk cost of occupying capital and the expected cost of loss. At the same time, the bank will generate business tax and accessories after the loan is put into operation.

$$C_{a_i} = T_{a_i} + A_{a_i} + Cf_i + Cr_i + Cc_i \quad (7)$$

where C_{a_i} is cost generated by banking institutions through asset products business in appointed time;

T_{a_i} is business tax and business tax payable by banks in accordance with the tax law for the i_{th} customer when dealing with asset business; A_{a_i} is basic operating cost of commercial banks for the i_{th} customer when dealing apportionment of asset products; Cf_i is transferring price opportunity cost occupied by internal funds of banks in appointed period; Cr_i is expected return requirements for bank economic capital occupation for the i_{th} customer.

According to the profit contribution model and cost contribution model above, the profit contribution value of a customer's asset business product in a bank is the difference between its profit and cost, that is

$$V_{a_i} = E_{a_i} - C_{a_i} \quad (8)$$

D. Profit Contribution Calculation Model of Bank Intermediate Business Products

Because of the complexity of intermediary business, it is necessary to analyze the contribution of intermediary business according to different situations. But for all the intermediary businesses, we can calculate it according to the following equation:

$$V_{m_i} = E_{m_i} - C_{m_i} \quad (9)$$

where E_{m_i} is the comprehensive income of the i_{th} customer to dealing with bank intermediate business products, and t is the comprehensive tax rate prescribed by the tax department.

$$A_{m_i} = \sum_{j=1}^n Dm_j \times Rm_j \quad (10)$$

Dm_j is unit consumed cost for the i_{th} customer to dealing with bank intermediate business products in appointed interval; Rm_j is the motivation of the i_{th} customer when dealing with the j_{th} work of bank intermediate business products.

$$C_{m_i} = Tm_i + Am_i \quad (11)$$

C_{m_i} is the total cost of the i_{th} customer when dealing with bank intermediate business products in appointed time; Tm_i is business tax and additional tax payable by the bank in accordance with the tax law for the i_{th} customer; Am_i is generated bank basic operation cost sharing for the i_{th} customer when dealing with bank intermediate business products in appointed time.

E. A Comprehensive Profit Contribution Model for Bank Customers

In reality, each customer often has one or more bank accounts. For bank customers, they open accounts in the bank with identity numbers for identification management. For individual customers, the customer ID number will be the only identification of the customer. Therefore, accounts with the same identity card number can be classified as the same customer. After introducing the contribution degree of account profit, it is easy to get the equation of the contribution degree of customer layer profit, that is, the contribution of customer profit is the sum of the contribution of the same customer account:

$$V_i = Vl_i + Va_i + Vm_i \quad (12)$$

IV. EMPIRICAL ANALYSIS

To better illustrate the calculation of the customer profit contribution model, the paper takes a company of a bank as an example. Guangzhou A Investment Co. Ltd. is a public customer of Bank B, Guangzhou Branch. The business data in 2016 are shown in table 1:

Table 1. Bank business data of an investment bank in Guangzhou in 2016

	Ending balance	Daily balance	Full bank balance
Liability business	25,330	25,220	702,558
Asset business	45,000	29,000	540,551
Intermediate business	10		
Marketing cost	7		1,836

The client's deposit is a one-year fixed deposit with interest rates rising by 10% or 3.33% of the central bank's benchmark interest rate; the loans term is three-year, with a yield of 7.36% and a deposit certificate of 50% pledge; the loans in 2016 is averaged 280 million yuan a day, with no additional provision for impairment. Business tax and surcharge rate are 5.5%. According to the inquiry of internal transfer price, one-year FTP is 5.25%; three-month FTP is 4.84%; three-year FTP is 5.96%. Deposit reserve ratio is 18% and interest rate is 1.62%; economic capital coefficient is 10.4%; capital return rate is set by head office to 12%, and indirect expenses that should be shared among company customers is 18.25 million yuan.

The customer's profit contribution: deposit profit contribution = $(5.28\% - 3.30\%) \times 25230 - (4.84\% - 1.62\%) \times (25230 \times 18\%) = 499.55 - 146.23 = 3.533$ million yuan

Loan profit contribution = $(7.38\% - 5.93\%) \times 28000 - 28000 \times 7.38\% \times 5.5\% = 406 - 113.65 = 292.35$ thousand yuan

Intermediary Profit Contribution = $10 - 10 \times 5.5\% = 94,500$ Yuan
 Cost Shared = $7 + 1,825 \times 40\% \times (25,230 - 702,235) + 1,825 \times 60\% \times (28,000 - 540,553) = 899,500$ Yuan

Capital cost = $(28000 - 28000 \times 50\%) \times 10.5\% \times 16\% = 235.200$ thousand yuan

The customer's profit contribution is = $353.32 + 292.35 + 9.45 - 89.95 - 235.20 = 329.97$ thousand yuan.

The profit contribution rate of the customer is = $329.97 / (89.95 + 235.20) = 1.05$

From the analysis of above customer's profit contribution, the customer's profit contribution to the bank in 2016 was 3.299 million yuan, and the profit contribution rate is 1.05, indicating that the customer is the high-quality customer that the bank should strive for.

According to the calculation method of the above model, ten company customers are extracted to calculate the company's profit contribution, and the final data are depicted as follows:

Table 2. Customer contribution measurement of ten corporations

	E_{Li}	E_{ai}	V_{m_i}	V_i	Contribution rate(%)
1	353.34	292.33	89.94		1.01
2	30.38	72.11	60.77	253.20	-0.45
3	545.41	-	27.05	285.33	20.35
4	-	60.41	30.54	211.54	-0.37
5	79.21	-1.85	11.02	-	5.91
6	100.32	-	21.60	-	3.31
7	64.80	169.24	85.65	131.42	0.07
8	13.15	252.81	51.02	-	4.41
9	63.35	212.33	45.69	159.66	0.35
10	840.21	-186.65	168.39	85.69	1.75

From the above results, we can get the following conclusions:

(1) Customers who only have loans and deposits are less profitable than those who have deposits. As loans require capital costs, a 5.7% reduction in business tax, and the allocation of operating expenses is also biased towards the proportion of loans, so winning customer deposits is the guarantee of increasing profit contribution.

(2) Risk mitigation of loans has a greater impact on profit contribution. From the calculation of the cost of economic capital in the profit contribution model, it can be seen that if there is no risk mitigation, the profit contribution needs to deduct 1.67% of the economic capital cost of the loan principal, i.e. The capital cost of the loan of 100 million yuan needs to be deducted by 1.68 million yuan. Therefore, a loan with a qualified risk mitigation tool has a greater impact on profit contribution.

(3) When calculating profit contribution, the average daily balance of deposits and loans is taken as the base, which weakens the influence of the balance of deposits and loans concentrated at the end of the accounting period on the calculation of profit contribution. Therefore, the calculation of profit contribution can only be influenced by long-term stable growth of business.

V. CONCLUSIONS

With the business scale and business scope of bank expanding, the original simple customer profit contribution has been unable to meet the needs of bank development. Through the analysis of bank customers and business structure, this paper focuses on the profit contribution of 90% of bank's corporate customers. According to the constituent elements of the bank's profit, this paper studies the profit contribution model from assets, liabilities and intermediary business, and distributes the operating cost and capital cost reasonably, to improve the bank's profit contribution model. Finally, through empirical analysis, we summarize the difficulties that may be encountered in the application of the model, and the application effect of the enhanced customer profit contribution model in the actual calculation.

REFERENCES

- [1] Glykas M. Fuzzy cognitive strategic maps in business process performance measurement. *Expert Systems with Applications*, 2013, 40(1):1-14
- [2] Özlem Bedre-Defolie, Calvano E. Pricing Payment Cards. *American Economic Journal Microeconomics*, 2013, 5(3):206-231
- [3] Chiu W Y, Tzeng G H, Li H L. A new hybrid MCDM model combining DANP with VIKOR to improve e-store business. *Knowledge-Based Systems*, 2013, 37(2):48-61
- [4] Inderst R, Wey C. Buyer power and supplier incentives. *Cepr Discussion Papers*, 2003, 51(3):647-667
- [5] Sridharan S, Maltz E, Viswanathan M, et al. Transformative Subsistence Entrepreneurship: A Study in India. *Journal of Macromarketing*, 2014, 34(4):486-504