Analysis on the Distribution of Bank Outlets and Its Influencing Factors

——Taking Sichuan Province as an Example

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Abstract: Based on the data of outlet distribution of different types of banks in 21 cities and prefectures in Sichuan Province from 2008 to 2021, this paper quantitatively studies the overall characteristics and evolution rules of outlet distribution, constructs 12 indicators affecting the layout of bank outlets in Sichuan Province according to four different types of outlet distribution areas by using the non-parametric maximum score method. The study finds that economic and financial development is still the key to determine the layout of outlets, and with the spread of IT applications, market distance no longer restricts the cross-regional operation of commercial banks; and banks with brand disadvantages have stronger motivation to expand their outlets, which can easily lead to waste of resources and requires stronger rational guidance.

Keywords: Outlet Layout; Regional Distribution; Economies of Scale; Influencing Factors

1. Introduction

Bank outlets are the basis for their business development. Since China lowered the market access standards in April 2009, bank outlets have been adjusted, which has also brought about problems. In order to study the changes in the layout of bank outlets in Sichuan Province and the influencing factors, this paper conducts a quantitative analysis, refines the key factors, and puts forward targeted optimization.

2. Regional distribution of bank outlets in Sichuan Province

2.1 Overall distribution

2.1.1 The total number of outlets has shown a marginal decreasing trend of first rising and then falling

Since 2014, the growth of the total number of outlets has shown a marginal decreasing trend, especially after 2017. The reason behind is that the development of financial technology, operating costs etc.

2.1.2 The distribution varies by bank type

From 2008 to 2021, the proportion of major state-owned banks, rural credit cooperatives has dropped by 2.35% , 1.97%. On the contrary, the joint-stock banks, city commercial banks has increased by 2.98% ,2.72%. In particular, new rural financial institutions have shown "explosive" growth.

2.1.3 The number of county-level bank outlets has grown rapidly

The number of county-level outlets outside prefecture-level urban areas has grown significantly . The main reasons are the re-layout of outlets by major state-owned and joint-stock banks, and the new outlets set up by new rural financial institutions.

2.2 Regional distribution

Based on the measurement, the bank outlets can be classified into four clusters: high medium-high, medium, and low clusters. Specifically, the high level cluster includes Chengdu; the medium-high level cluster includes 10 cities; the medium level cluster includes 7 cities; and the low level cluster includes 3 cities.To further analyze the concentration degree of outlets, used the Nondirected Valued Matrix. Based on the outlet distribution in 2008, 2013 and 2021, obtained by using the software Ucinet.6.

The spatial structure of bank outlet distribution varies greatly by area. First, Chengdu has an absolute advantage in the scale and density. Second, the density of outlets in small administrative divisions is high. Third, the layout of outlets is highly correlated with the level of

economic development. Fourth, the density of outlets in Ganzi, Aba and Liangshan has slightly increased, but to a limited extent overall.[1]

3. Factors influencing the distribution of bank outlets

3.1 Influencing factors

3.1.1 Regional economic

① Economic development level. Banking is an important part of the modern service industry and is affected by the local economic development level.

② Potential market size. This paper quantifies the potential market size by taking the deposit and loan scale and the financial development degree as important reference conditions.

3.1.2 Geographic environment.

① Infrastructure status. This paper draws on the analytical framework of Hannan Hanweck (2008) to measure the impact of infrastructure on outlet layout from several aspects such as administrative division, urban road construction, and Internet penetration.

② Geographic distance. The construction cost of bank outlets is affected by the core lies in the distance from the regional headquarters.

3.1.3 Market competition

① Bank brand effect. According to H. Dilara Keskin, Zehra et al. (2011), a bank's branding strategy is conducive to increasing customer loyalty and forming "brand barriers".

② Competitors' outlet layout. In the process of selecting outlet layout, identifying and collecting direct and potential competitors, and studying and judging their strategic intentions and tactics are key factors.

3.2 Sample selection and data sources

Based on the availability of data and the completeness of statistics, this paper takes the number distribution of banking outlets at the end of 2018 as the basic sample and the 21 prefecture-level cities in Sichuan Province as the independent analysis samples. Due to the prominent imbalance of regional economic development, differentiated analysis is conducted for four different types. In the selection of specific variable indicators, regional economic development indicators include economic and financial development level and potential market size (quantitative indicators: gross national product (GDP), per capita income of urban and rural residents (Income), number of enterprises above designated size (Enterprises), local deposit scale (Deposit), loan scale (Loan), and ratio of financial added value to gross national product (Depth); data sources: Statistical Yearbook of Sichuan Province and financial statistics of Chengdu Branch of People's Bank of China); geographical environment indicators include infrastructure status and geographical distance effect (quantitative indicators: number of administrative districts in counties (County), total road length (Road), total trunk length of cable broadcasting and television network (Network), and average distance from the most remote outlets to the branch offices (headquarters) in Sichuan Province; data sources: Statistical Yearbook of Sichuan Province and statistics from Google Maps); market competition indicators include bank brand effect and number of existing outlets of competitors (quantitative indicators: number of news reports on commercial banks by major media such as Sina Finance, Financial News and Sichuan Observer (Reputation), and number of bank outlets within the current market (Branch); data sources: online statistics and Financial Operation Report of Sichuan Province (2018) issued by Chengdu Branch of People's Bank of China).[2]

3.3 Model setting

Assume that I banks choose to set up branches in M mutually independent markets. The number of outlets set up by the i-th bank in the m-th market is recorded as $N_{i,m}$, where $i = 1, ..., I$ and $m = 1, ..., M$. Assume that all outlets are homogeneous. The potential profit of the outlet is recorded as $\pi_{i,m}$. Assume that the profit function is mainly composed of three factors: regional economic development, geographical environment factors and market competition effect, that is, assume that $\pi_{i,m}$ is in the following form:

$$\pi_{i,m} = \alpha_i Eeconmic_m + \beta_i Geography_m + \lambda_i Competitor_m \qquad \text{(Equation 1)}$$

According to the usual analysis model of econometrics, there is no multicollinear relationship between regional economic develop-

ment $Eeconmic_m$ and influencing factors GDP_m, $Incom_m$, $Enterprises_m$, $Deposit_m$, $Loan_m$ and $Depth_m$, and the influence can be directly expressed by a binary function; with reference to the economic geography model proposed by Porteous DJ (1995), there is mutual influence between $Geography_m$ and influencing factors $County_m$, $Road_m$, $Network_m$ and $Dis\tan ce_m$. In order to eliminate the autocorrelation between variables, this paper draws on the proposal of Berry (1992) and uses the nonlinear form of $\beta_i \ln(County_m + Road_m + Network_m + Dis\tan ce_m)$ to express the effect of economic geography radius on outlet layout; At the same time, according to Ellickson et al. (2010), with the increase in the number of bank outlets, the fixed cost can be apportioned so as to obtain the economies of scale; however, with the continuous decrease in the remaining capacity of the market and the increase in the cost of redundancy, the cost of operation and management of some remote outlets also increases. Therefore, drawing on this theory, this paper uses the nonlinear quadratic function $\lambda_i \ln \mathrm{Re}\, putation_m + \ln(Branch_m)^2$ to describe the diminishing economic effect of scale competition of outlets in the market. Based on the above analysis, the single profit impact function of outlet layout can be obtained:

$$\pi_{i\ m} = \alpha_i Eeconmic_m + \beta_i Geography_m + \chi_i Competitor_m$$

s.t. $Eeconmic_m = \alpha_{i,1}(GDP_m + Incom_m + Enterprises_m) + \alpha_{i,2}(Deposit_m + Loan_m + Depth_m) + \xi_m$

$$Geography_m = \beta_i \ln(County_m + Road_m + Network_m + Dis\tan ce_m) \quad \text{(Equation 2)}$$

$$Competitor_m = \lambda_i \ln \mathrm{Re}\, putation_m + \ln(Branch_m)^2$$

From Equation (1), we can see that in the m-th market, the i-th bank's total profit level is $N_{i,m}\pi_{i\ m}$, then the i-th bank's total profit in M markets is $\mathbb{Z}_i = \sum_{M=1}^{M} N_{i,m}\pi_{i\ m}$. In addition, the i-th bank's outlet layout result in M markets is recorded as the decision vector $N_i = [N_{i,1}, \dots N_{i,m}, \dots N_{i,M}]$. If and only if the i-th bank's profit in $N_{i,m}$ is greater than in $N_{i,m-1}$ and the overall profit remains positive, will the bank increase investment in outlets. According to this research hypothesis, the influencing factors that determine the layout of bank outlets can be further refined as:

$$\mathbb{Z}_i(N_i, N_{-i}) - \mathbb{Z}_i(N_i^+, N_{-i}) \geq 0$$

s.t. $N_1 = \arg \max \mathbb{Z}_1 = \arg \max \sum_{M=1}^{M} N_{1,m}\pi_{1\ m}$

$$N_i = \arg \max \mathbb{Z}_i = \arg \max \sum_{M=i}^{M} N_{i,m}\pi_{i\ m} \quad \text{(Equation 3)}$$

3.4 Estimation results and analysis

This paper uses the binary Logistic model to study the correlation between the profit scale of outlets and the 12 variables such as economy, geography and competitors, and carries out differentiation analysis according to 4 different market types.

Table 1: Statistics of separate estimation results of Logistic model

	Variable	Regional Market ①	Regional Market ②	Regional Market ③	Regional Market ④	Provincial Average
Eeconmic	GDP	5.04***(0.57)	3.17***(0.12)	1.37(1.78)	0.77(1.57)	0.48(1.4)
	Income	7.88***(0.08)	3.43***(0.46)	5.37 ***(2.4)	6.55(2.13)	1.53(1.91)
	Enterprises	7.51***(0.06)	3.98***(0.45)	6.97(10.1)	5.22(8.91)	4.90(7.95)
	Deposit	29.44***(0.08)	17.91*(0.47)	7.45(1.43)	6.82(1.26)	5.82(1.13)
	Loan	27.15***(0.07)	14.17***(0.49)	7.50***(0.68)	7.33***(0.60)	5.24***(0.54)
	Depth	-0.72***(0.14)	1.21***(0.43)	-0.19(0.45)	-0.36(0.40)	-0.47(0.35)
Geography	County	-3.90(0.72)	-4.40***(0.48)	-0.05***(0.01)	-0.71(0.007)	-0.074***(0.007)
	Road	8.76***(0.10)	5.50***(0.56)	5.01 (2.7)	3.44(2.39)	7.03(2.13)
	Network	21.00***(0.10)	14.22***(0.46)	17.39***(1.88)	13.82**(1.69)	10.26(1.51)
	Distance	3.57***(0.05)	1.47***(0.41)	4.83***(1.25)	3.82***(1.14)	1.54(1.02)
Competitor	Reputation	-15.31***(0.09)	-8.64***(0.49)	-1.65***(4.07)	-3.65***(3.78)	-2.95(3.38)
	Branch	17.15***(0.07)	-4.81***(0.49)	7.50***(0.68)	-6.33***(0.60)	-5.24***(0.54)
	φ^1	1.76***(0.05)	0.84***(0.51)	-	-	-
	φ^2	-3.21***(0.06)	-1.08***(0.50)	-	-	-
	η/ϖ	11.04***(0.07)	-3.08***(0.43)	-	0.10***(0.005)	0.12***(0.004)
	Constant/ ξ_m	-14.10***(0.09)	6.32***(0.49)	-72.67***(8.83)	-4.12(8.39)	15.43**(7.48)
	(Score /n) /adjR2	0.86	0.81	0.63	0.72	0.77
	AIC	-	-	7.33	7.07	6.84

Note: In parentheses are the 50-times Bootstrap estimates of the standard errors of the parameters; Score is the score after smoothing in Equation (3); the goodness-of-fit of the model is characterized using the score rate (Score/n).

3.4.1 Impact of regional economic.

The model analysis shows that the three variables of GDP、Income、Enterprises are all positive. Indicates that the level of economic and financial development is an important factor. Banks pay most attention to Income、Enterprises、GDP. The significance coefficients of Deposit、Loan are positive, indicating that the layout of banking outlets still pays close attention to the deposit and loan scale.[3]

3.4.2 Impact of geographical environment.

Among the three variables：County、Road、Network, the significance level of the first one is negative, while that of the latter two is positive. It shows that the banks gives priority to central cities with better transportation and network infrastructure. Banks are even more sensitive to Road、Network than economic and financial factors. The significance coefficient of Distance is positive, indicating that banks pay more attention to the distance effect. The correlation coefficient of Distance is low at the 3% significance level, indicating that banks do not fully consider the distance cost.

3.4.3 Analysis of market competition.

The results show that the brand awareness coefficients are all significantly negative, indicating that banks with brand disadvantages and low reputation are more inclined to expand outlets. Banks are cooperative in large markets and competitive in small and medium-sized markets.[4] In view of the prominent problem of unbalanced regional economic development, large markets are usually network centers for various social resources , and banks are prone to follow the cluster economy effect and expand.

4. Conclusion

First, scientifically make outlet plans and optimize the outlet distribution structure. It's advisable to establish a diversified system of outlets, and formulate scientific outlet plans by comprehensively considering multiple factors such as the economic , traffic convenience. It is advisable to coordinate social conditions such as administration and culture, as well as customer factors, and classify investment and manage-

ment according to different outlet types.

Second, create specialty outlets and improve the competitiveness of outlets. It's advisable to combine the current national economic, promote the construction of specialty outlets such as micro outlets, science and technology outlets based on financial service needs, and focus to make them a marketing frontier for comprehensive financial services.

Third, actively embrace financial technology and improve the intelligent level of outlets. It is advisable to improve the level of intelligent management; promote multi-channel integration to acquire customers, accurately recommend personalized financial products; and connect with neighboring stores and special services to build a multi-party linked financial ecosystem, so as to enhance customers' financial service stickiness and achieve win-win results.

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