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The Influence of Financial Technology Application Depth on Small and Medium-sized Banks' Risk-Taking Level and Research on Operating Decision Optimization——Empirical Research Based on Text Analysis Method

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Abstract: *This paper will use text analysis method to collect original data of commercial banks' financial technology application degree which exist in China. And it strengthens etymological screening with the help of textual analysis to enhance the authenticity of data crawl results, assuring that it can truly reflects on financial technology information implemented actually by commercial banks. Meanwhile, this paper will refer to technology intersection complexity, patent number corresponding to technology and other factors of existing financial technology to define synthetically financial technology application depth (financial technology low, financial technology middle, financial technology high). Meanwhile, this paper will estimate impact difference of financial technology application depth on small and medium-sized banks' risks and revenue through constructing measurement model. The model takes financial technology application depth(FinTech) as core explaining variable. It takes Risk level index of small and medium-sized banks(RiskCA) and revenue target(NPR) as explained variables. It takes eight indexes as control variables, including bank scale, bank growth capacity, cost-income ratio and capital structure,etc. At last, this paper will find correlation rule between small and medium-sized banks and some deep financial technology application on the basis of empirical analysis results. According to them, it will propose differentiated small and medium-sized banks' digital transformation strategies and suitable business policies with pertinence.*

Keywords: *financial technology; small and medium-sized bank; operating decision optimization*

1. Estimation of Banks' Financial Technology Based on News Text

1.1 Financial Technology Index and Its Construction Method

This research takes the development level of inclusive finance as well as financial technology or Internet finance as the first grade indexes. And it further divides them into five secondary indexes, including macro-policy layout, the allocation of intelligent resource, intelligent risk management, intelligent network channel and digital payment.

The data of the study mainly comes from reports and data statistics which are related to financial technology and Internet finance published domestically and internationally, such as National Internet Finance Association of China, People's Bank of China official website,Peking University Digital Finance Research Center,China bond network, Hexun website[1], Ant Financial official website,etc. After finding and searching for data through Baidu search engine and determining the weight of each secondary index using analytic hierarchy process, we can ultimately compound comprehensive indexes.(As shown in table 1)

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Table 1. Representative Financial Technology Indexes and The Construction Method

Key Word/ Index	Type of Index	Data Sources	Measure Method	Frequency and Extent	Literature Source
The Development Level Of Inclusive Finance	Macro-Policy Layout	Baidu Search Engine	Use Search Engine to Search for the Number of News Related to Key Words and Use Analytic Hierarchy Process to Compound Comprehensive Indexes.	Quarterly Internet Finance Indexes at the National Level from 2009 to 2015.	Zhan Ming hua, Hu Jun,etc.
The Development Level Of Financial Technology Or Internet Finance	The Allocation of Intelligent Resource	Iresearch, ZOT Data，Etc.	Adapt Method Which Combines Subjective and Objective Ways to Confirm the Weight of Indicators at All Levels. And Do Weighed Sum Level by Level.	Annual Internet Finance Index at the National Level from 2003 to 2016.	Shen Yue and Guo Pin，Guo Pin and Shen Yue.
	Intelligent Risk Management	Baidu Search Engine		Financial Technology Development Index at the Province Level from 2011 to 2016	Li Chuntao，etc.
	Intelligent Network Channel	“Hexun” Internet News Text	Conduct Dimensionless Processing on Each Index. Adapt Method Which Combines Subjective and Objective Ways to Confirm the Weight of Indicators at all Levels. And Do Weighed Sum Level by Level.	Monthly Internet Finance Development Indexes at the Province Level and the Prefecture-Level City from January 2011 to March 2016	Digital Finance Research Center of Peking University: Guo Feng,Etc.
	Digital Payment	Ant Financial Services Group		Annual Financial Technology Development Index at the Province Level from 2011 to March 2018	Sheng Tianxiang, Fan Conglai

1.2 Graph of Lexicon

This research looks up a lot of literature to construct text analysis lexicon, mainly referring to research method about using text analysis method to construct financial technology index by Hu Jun,etc. After discussion and artificial screen, We select some key words by Baidu search engine and referring to a large number of literature. In the key words, first level indicator of financial technology has 58 key words. Inclusive finance development level has 48 key words. The lexicon has 116 key words. The concrete key words lexicon are shown in table 2 and table 3.

Table 2. Construction of Financial Technology Lexicon

Development Level of Financial Technology or Internet Finance (58)					
Direct Address （15）	Resource Allocation （6）	Risk Management （10）	Internet Channel （10）	Technical Depth （8）	Digital Payment（19）
Financial Technology	Face Identification	Risk Control	Online Banking	Big Data Analysis	Digital Currency
Finance of Science and Technology	Speech Recognition	Credit Risk	FinTech Platform	Machine Learning	Cryptocurrency
Internet Finance	Credit Score	Trade Risk	E-Commerce Social Media	Blockchain Technology	Alipay
Inclusive Finance	Risk Assessment	Anti-Fraud	Wechat Official Account	Unmanned Technology	Wechat Pay
Digital Finance	Automation Investment Adviser	Data Privacy Safety Technology	Mobile Application	Natural Language Processing	Virtual Credit Card
New Finance	Quantitative Investment	Real Name Authentication	Network Marketing	Quantum Computation	Cloud-Linked Payment
The Innovation of Financial Technology		Risk Control System	Cross-Border Payment	Data Mining	Payment Gateway
Intelligent Finance		Digital Identity	Online Wealth Management	Virtual Reality	Online Payment
Future Finance		Insurance Technology	Financial Innovation		Mobile Payment Third Party Payment
Financial Technology Platform					Swipe Bank Cards
Science and Technology Bank					E-Wallet
Blockchain					Credit Card Payment
					POS Machine

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Artificial Intelligence Big Data Cloud Computing					Mobile Payment Fast Payment Internet Banking Payment Mobile Banking Service Withholding Service

Table 3. The Construction of Inclusive Finance Development Level Lexicon

The Development Level of Inclusive Finance (48)			
Coverage Breadth (12)	Use Depth（12）	Degree of Digitization（14）	Degree of Service（10）
Financial Inclusion Financial Popularizing Rate Financial Services for Small and Micro Businesses Rural Financial Service Strategic Emerging Industry Financial Service Financial Service for Medica Financial Service for Education Financial Service for Minority Financial Service for Poverty-Stricken Area Consumer Financial Service Public Domain Financial Service Cross-Border Financial Service	Financial Products Innovation Financial Market Openness Intensity of Financial Regulation Integration Degree of Financial Business Innovation Degree of Financial Technology Service Ability of Financial Institution Financial Assets Management Ability Financial Investment and Financing Efficiency Financial Risk Management Ability Financial Digital Transformation Degree Financial Talent Cultivation Ability Financial Operation Management Capability	Financial Technology Application Mobile Internet Finance Artificial Intelligence Finance Blockchain Finance Big Data Finance Cloud Computing Finance Internet of Things Finance Finance Robot Self-Service Bank Digital Banking Digital Insurance Digital Securities Digital Credit Digital Wealth Management	Financial Consultation Internet Loan Credit Assessment Financial Lease Financial Planning Stock Exchange Risk Control Finance Insurance Congregation Raised Service Renting and Purchasing Service

2. Analytic Hierarchy Process on Calculating The Weight of Financial Technology Index

This research will divide the financial technology index system into five sub-indexes, including Macro-policy layout, the allocation of intelligent resource, intelligent risk management, intelligent network channel and digital payment. For these five sub-indexes, this research adapts totaling method to calculate the scores of indexes in every dimension. At last, this research will obtain the comprehensive application situation of macroscopic bank financial technology.

We divide the index into three index systems which include FinTech low, FinTech middle and FinTech high. Then we conduct judgment matrix construction on them respectively and apply Analytic Hierarchy Process(AHP) to analyze. AHP is a kind of quantitative analysis method which can be used to deal with multilevel hierarchy structure and extract weight information from the structure. This research uses AHP contrast judgment matrix to calculate in order to obtain the weight value of every sub-index in three main effect variables(FinTech low, FinTech middle and FinTech high)[2].

The concrete analysis procedure using analytic hierarchy process is as follows:

2.1 Construct Hierarchical Structure

We divide every index in different dimensions into five categories and add up the data. Regarding five indexes as the first grade indexes, by statistics, we obtain comprehensive application situation of

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macroscopic bank financial technology and construct hierarchical structure.
In the hierarchical structure, the numbers represent the occurrence frequency of indexes of key words, as the following table 4 shows:

Table 4. Sub-Index Hierarchy of Bank Financial Technology Application Evaluation

Rank	The Secondary Indexes of Financial Technology Application	Average Frequency in Total
1	Intelligent Network Channel	886
2	Macro-Policy Layout	734
3	Digital Payment	6345
4	Intelligent Risk Management	529
5	Intelligent Resource Allocation	178

2.2 Construct Judgment Matrix

First, we need to construct judgment matrix to confirm the relative weight between every index. This research applies comparative judgment matrix of FinTech low, FinTech middle and FinTech high to proceed constructing. As the following tables 5-7 show:

Table 5. FinTech Low Judgment Matrix

Index	Intelligent Network Channel	Macro-Policy Layout	Digital Payment	Intelligent Risk Management	Intelligent Resource Allocation
Intelligent Network Channel	1	10	10	10	10
Macro-Policy Layout	0.1	1	1	1	1
Digital Payment	0.1	1	1	1	1
Intelligent Risk Management	0.1	1	1	1	1
Intelligent Resource Allocation	0.1	1	1	1	1

Table 6. FinTech Middle Judgment Matrix

Index	Intelligent Network Channel	Macro-Policy Layout	Digital Payment	Intelligent Risk Management	Intelligent Resource Allocation
Intelligent Network Channel	1	0.5	0.25	0.5	1
Macro-Policy Layout	2	1	0.5	1	2
Digital Payment	4	2	1	2	4
Intelligent Risk Management	2	1	0.5	1	2
Intelligent Resource Allocation	1	0.5	0.25	0.5	1

Table 7. FinTech High Judgment Matrix

Index	Intelligent Network Channel	Macro-Policy Layout	Digital Payment	Intelligent Risk Management	Intelligent Resource Allocation
Intelligent Network Channel	1	1	1	1	0.1
Macro-Policy Layout	1	1	1	1	0.1
Digital Payment	1	1	1	1	0.1
Intelligent Risk Management	1	1	1	1	0.1
Intelligent Resource Allocation	10	10	10	10	1

Numbers in the tables represent relative importance between two indexes. For example, while constructing FinTech middle, we think macro-policy layout is more important than intelligent network channel, so we set the weight of macro-policy layout as two times of the weight of intelligent resource

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allocation. In this process, we refer to a lot of literature. We discuss in group and do weight allocation according to literature as well as experience and judgement of previous experts.

2.3 Calculate Weight

Then, we need to apply SPSS to proceed AHP analysis. In SPSS, we need to import constructed judgment matrix to proceed calculating next. SPSS will calculate the weight of every index and consistency ratio(CR) automatically.

According to comparative judgment matrix, we can calculate the weight of every index as following tables 8-10 show:

Table 8. Low, Middle and High Weight Results of FinTech

Item	Low Weight Value(%)	Middle Weight Value(%)	High Weight Value(%)
Intelligent Network Channel	71.429	10	7.143
Macro-Policy Layout	7.143	20	7.143
Digital Payment	7.143	40	7.143
Intelligent Risk Management	7.143	20	7.143
Intelligent Resource Allocation	7.143	10	71.429

Table 9. Middle Weight Results of FinTech

AHP Analytic Hierarchy Results				
Item	Feature Vector	Weight Value(%)	The Largest Eigenvalue	CI Value
Intelligent Network Channel	0.574	10		
Macro-Policy Layout	1.149	20		
Digital Payment	2.297	40	5	0
Intelligent Risk Management	1.149	20		
Intelligent Resource Allocation	0.574	10		

Table 10. High Weight Results of FinTech

AHP Analytic Hierarchy Results				
Item	Feature Vector	Weight Value(%)	The Largest Eigenvalue	CI Value
Intelligent Network Channel	0.631	7.143		
Macro-Policy Layout	0.631	7.143		
Digital Payment	0.631	7.143	5	0
Intelligent Risk Management	0.631	7.143		
Intelligent Resource Allocation	6.31	71.429		

2.4 Consistency Check

To assure the reliability of AHP calculation result, this research proceeds consistency check on every dimension in order to guarantee the consistency and accuracy when expert group proceeds comparison and judgement. In consistency check, the research use Consistency Ratio(CR) to guarantee the consistency of expert group. If CR value ≤ 0.1, it indicates that expert group has relatively high consistency level when it comes to comparison and judgement. In this research, CR value is 0.037 which is far less than 0.1. This shows that the weight results are reliable. Concrete data is shown in table 11.

Table 11. FinTech Low, Middle and High Weight Results

Consistency Check Results					
Index	The Largest Eigenvalue	CI Value	RI Value	CR Value	Consistency Check Results
FinTech Low	5	0	1.11	0	Pass
FinTech Middle	5	0	1.11	0	Pass
FinTech High	5	0	1.11	0	Pass

2.5 Weight Assignment

To sum up, by means of AHP method calculation, this research obtain five sub-indexes' weight belong to three core indexes(FinTech low, FinTech middle and FinTech high) which represent financial technology depth. At last, we assign original variable on obtained weight to form core explanatory variables of this research. These explanatory variables can be used to evaluate comprehensive

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application situation of bank financial technology and optimize banking industry's performance in digital transformation.

3. The Enabling Effect Test of Financial Technology Application Depth

3.1 Data Sources

The sample period of this paper is 2013−2022, not only this period includes main time periods in which banking business and external agencies go to cooperation from competition, but also it includes impact of many policies by China's government which promote cross-border cooperation between banks during the period of 2015-2016. Study objects of this paper are 411 banks, including state-owned commercial banks, joint-equity commercial banks, city commercial banks, rural commercial banks, village banks and private banks. The number of banks is 219 after matching because we eliminate a portion of bank samples whose data missing is severe. To alleviate the impact of extreme value, this paper winsorizes all the continuous variables at the standard of 5%. To control potential problem related to cross-section, this paper imposes cluster in bank dimension on standard error in all regression process[3].

In terms of variables, this research constructs banks' financial technology foreign cooperation index(FinTech variable) and refer to existing research at the same time. Sample variables also include variables which are related to personal loan, fiduciary loan, bank profitability, features of scale, cost-income ratio, index of overall development level in financial technology and other control variables.

The bank data in this paper mainly comes from wind database; macro-economic data comes from CEInet database; data of overall development level in financial technology comes from digital inclusive finance combined index at provincial level compiled by PKU-DFIIC; core variable （FinTech data) comes from Baidu Information board of Baidu database. This research searches through matching banks' names for technology key words (for example, "ICBC"+"big data"). and we use technologies such as Selenium, BeautifulSoup and so on which belong to python web crawler technology. Besides, This research improves speed of data crawl combining multithreading technology to obtain annual news search results during the period of 2013-2022. After counting the number of annual news which contains specific key words in Baidu database, this research obtains 245098 pieces of data. The text crawl data is obtained after manual adjustment and screening.

3.2 Variables and Models

3.2.1 Theoretical Assumption

Based on previous correlation theory, this research proposes the following assumptions:

$\mathbf{H_{1a}}$: Financial technology application can improve the income level of commercial banks(small and medium-sized banks)

$\mathbf{H_{1b}}$: Financial technology application can lower the risk level of commercial banks(small and medium-sized banks)

In hypothesis above, we can't eliminate the possibility that bank risk-taking appears nonlinear variation influenced by financial technology. In other words, both the cost and dominance expansion produced by banks' applying technology and accumulation of risks may exist at the same time. The Internet Finance's influence on bank risk-taking reduces at first and increases subsequently. At preliminary stage, banks alleviate risk-taking because they benefit from improvement of technology and decrease of management cost. But in the end, risk-taking level will intensify because of the increase of capital cost. Meanwhile, there is another opinion(Wang Sheng, 2021)[4] which views the relation between Internet finance and commercial bank risk as "inverted U-curve". that is to say, at earlier stage, Internet finance and commercial bank risk compete with each other to raise level of bank risk-taking. In later period, Internet finance and commercial bank risk fuse together to decrease the level of bank risk-taking. So, we propose this hypothesis to explore in which stage small and medium-sized banks' usage of financial technology nowadays are. Also, we measure the impact of small and medium-sized banks' usage of financial technology nowadays .[5]

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Under the hypothesis of H_{1a} and H_{1b}, we will further discuss the impact of financial technology on small and medium-sized commercial banks on different levels. That is:

$\mathbf{H_2}$: the impact of different levels of financial technology application on small and medium-sized banks has otherness.

3.2.2 Model Building

This paper will use panel data analysis to do empirical research.

3.2.2.1 Data Selection

In empirical research, data of explained variables and control variables comes from financial statement disclosed by small and medium-sized commercial banks' audit from 2013 to 2022 and local governments' statistic yearbooks of banks' location from 2013 to 2022.

In empirical research, data of core explanatory variables comes from notification announcement published by small and medium-sized commercial banks, informative text related to financial technology cooperation between FinTech companies and Individual banks and industry research report published by investment banks.

3.2.2.2 Measurement Model

The project has two explained variables: bank risk level and bank income level.

Bank risk level. The paper select risk assets ratio as proxy variable of banks' individual risk level. Meanwhile, this paper selects core tier-one capital as proxy variable of bank risk-taking ability. Because the larger the core tier-one capital is, the stronger the bank risk-taking ability is and the lower the risk level is. Out of consideration of situation, the paper takes the reciprocal of risk assets ratio and measures bank individual risk with "total assets/risk-weighted assets".

Net profit rate (NPR). Bank profitability is the ratio of bank profit to bank's own capital. Bank profit is the remaining sum of all kinds of bank income minus all kinds of outcome and tax. To measure bank profitability, the paper selects net profit rate of bank individual as measure index of bank profitability.

The core explaining variable is: financial technology application depth(FinTech).

Financial technology application depth. The paper divides financial technology application depth into three layers of low, middle and high. Then we name them respectively FinTech L, FinTech M and FinTech H. The paper uses them to measure the different influence,which possibly exists, that is produced by financial technology in different layers on the same bank.

Other explaining variables and control variable are shown in the following table 12.

Table 12. Explaining Variables and Control Variables Table

Type of Variable	Variable Name	Variable Symbol	Variable Description
Explained Variable	Net Profit	*NPR*	Owned Capital of Bank Profit
Core Explaining Variable	Financial Technology Application Depth	*FinTech L*	Low Financial Technology
		FinTech M	Middle Financial Technology
		FinTech H	High Financial Technology
Dummy Variable	Bank Scale	*S*	If This Bank Is a Big Bank, Assign 1; Otherwise, Assign 0
Control Variable	Total Assets Scale	*tasset*	Take Natural Logarithm of Total Assets Size
	Growth Ability	*growth*	Asset Size Growth
	Operating Efficiency	*costinc*	Cost Income Ratio
	Capital Structure	*struc*	Equity Capital/ Total Assets
	Economic Development Level	*GDP*	Nominal GDP Growth×100
	Inflation Level	*CPI*	Consumer Price Index

To test hypothesis, the paper construct the following regression models:

$$\mathrm{Core}_{it} = \alpha + \beta_1 \mathrm{FintechL}_{it} + \beta_2 \mathrm{FintechM}_{it} + \beta_3 \mathrm{FintechH}_{it}$$
$$+\beta_4 S_i \times \mathrm{FintechL}_{it} + \beta_5 S_i \times \mathrm{FintechM}_{it} + \beta_6 S_i \times \mathrm{FintechH}_{it}$$

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$$+\gamma \sum \text{Controls}_{it} + u_i + \varepsilon_{it} \quad (1)$$

$$\text{NPR}_{it} = \alpha + \beta_1 \text{FintechL}_{it} + \beta_2 \text{FintechM}_{it} + \beta_3 \text{FintechH}_{it}$$
$$+\beta_4 S_i \times \text{FintechL}_{it} + \beta_5 S_i \times \text{FintechM}_{it} + \beta_6 S_i \times \text{FintechH}_{it}$$
$$+\gamma \sum \text{Controls}_{it} + u_i + \varepsilon_{it} \quad (2)$$

In the models, β_1, β_2, β_3 represent respectively that under the control of other conditions, the overall impact of low, middle and high financial technology application degree on bank risk level and bank profitability. α is intercept term, u_i is random error term. Subsequently, the paper conducts statistical tests on each coefficient according to research hypothesis. Meanwhile, $RiskCa_{it}$ will be replaced by core tier-one capital($core$) to do robustness test.

3.3 Descriptive Statistics

According to the results of descriptive statistics (see Table 13), the minimum values of the degree of banks using financial technology(FinTech low, middle and high) are 0.000. three core explaining variables of maximum values are different, FinTech low is 55, FinTech middle is 94, FinTech high is 8. In terms of mean value, after quantification, the mean value of FinTech low of bank financial technology application in every dimension is 8.153, FinTech middle is 12.705, FinTech high is 0.952. Minimum value corresponds to the situation in which key words of certain bank's searching for the five fields and the number of annual news of this bank are zero. From 2013 to 2022, both maximum value and mean value of bank deep financial technology development level (Fintech high) are lower than that of FinTech low and FinTech middle dramatically. This shows that overall, bank's investment on financial technology and usage of financial technology mainly are mid-low end technological tools.

Table 13. Descriptive Statistics of Main Variables

VarName	Obs	Mean	SD	Min	Median	Max
NPR_w	1496	20.682	2.038	15.335	20.733	24.729
Fintech_low_w	1507	8.153	14.604	0.000	1.000	55.000
Fintech_mid_w	1507	12.705	24.138	0.000	3.000	94.000
Fintech_high_w	1507	0.952	2.104	0.000	0.000	8.000
tasset_w	1507	25.629	1.959	20.775	25.642	29.530
costinc_w	1224	33.624	7.782	18.460	32.475	54.690
struc_w	1507	0.082	0.023	0.044	0.078	0.145
GDP	1507	6.509	1.644	2.350	6.950	8.110
cpi	1507	101.958	1.119	100.200	101.800	104.460

3.4 Empirical Result

This research does BP test and Hausman test. According to BP test, its P value is close to zero which means rejecting null hypothesis. On the basis of it, random effect's result is better than mixture regression. From Hausman test, its P value is less than 0.05 which means rejecting null hypothesis. That is to say, the result of fixed effects model is better than random effect model. Hence, this research ultimately chooses fixed effects panel data regression to analyze heterogeneous effect of financial technology application degree on bank income and risks.

After analyzing the regression data, we find: low financial technology application which includes constructing independent online banking, e-commerce platforms through media such as Wechat official accounts and so on has no significant influence on bank net profit revenue. Middle financial technology application which is represented by intelligent risk management, digital payment and so on has significantly negative influence on bank net profit. That is to say, middle financial technology application has erosion effect on bank net profit revenue to some extent. However, high financial technology application which is represented by intelligent risk assessment, intelligent investment adviser, quantitative investment and other technology has significantly positive influence on user net profit. The high financial technology application can improve bank income level effectively. (As shown in Table 14)

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Table 14. Heterogeneous Effect of Financial Technology Application Degree on Bank Returns

NPR_w	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Fintech_low_w	0	.002	0.00	.998	-.005	.005	
Fintech_mid_w	-.004	.002	-2.25	.024	-.007	0	**
Fintech_high_w	.028	.014	2.00	.046	0	.055	**
SFL_w	.002	.008	0.25	.801	-.014	.018	
SFM_w	.002	.003	0.46	.645	-.005	.008	
SFH_w	-.018	.066	-0.28	.781	-.148	.111	
tasset_w	.6	.045	13.19	0	.511	.69	***
costinc_w	-.028	.003	-8.93	0	-.035	-.022	***
struc_w	2.607	1.321	1.97	.049	.015	5.2	**
GDP	.028	.008	3.37	.001	.012	.044	***
cpi	.007	.011	0.58	.559	-.016	.029	
Constant	5.331	1.593	3.35	.001	2.205	8.457	***
Mean dependent var	20.925		SD dependent var		2.055		
R-squared	0.254		Number of obs		1218		
F-test	31.772		Prob > F		0.000		
Akaike crit. (AIC)	1025.805		Bayesian crit. (BIC)		1087.065		

*** p<.01, ** p<.05, * p<.1

4. Conclusion

Through constructing financial technology application degree indexes(FinTech low, FinTech middle, FinTech high), we test the impact of financial technology application on small and medium-sized commercial banks' profit. In terms of innovation, we use Python assembly algorithm as well as manually check, deletion and addition on the basis of text crawling keywords to realize textuality semantic check, reprocessing and obtain more complete, more specific, more real information. Besides, we divide financial technology into different layers to analyze financial technology application degree from new research perspective. We find that middle financial technology application has significantly negative influence on small and medium-sized banks net profit revenue. While deep financial technology application has significantly positive influence on small and medium-sized banks net profit. It can significantly improve bank income level.obviously, for small and medium-sized banks, digitization at earlier stage will face cost pressure. But after the investment of huge capital, deep financial technology application will help banks to profit in the long term. Facing plans of financial technology and cost of investment, small and medium-sized banks should make more cautious decision.

The core explaining variables still have non-significant part. We will take more indexes into consideration or optimize the weight of analytic hierarchy process, assign core explaining variables more scientifically to further optimize models.

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