Analysis of Net Profits of Chinese Fintech-Listed Enterprises Based on Multiple Linear Regression Model

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Keywords: Financial Technology, Listed Chinese Enterprises, Net Profit, Operating Income, Earnings Per Share.

Abstract: Internet finance and modern technology are in a state of deep integration, and fintech(financial technology) is gradually being applied to financial fintech products, especially in listed companies in China. The paper examines the factors influencing the net profitability of Chinese listed fintech enterprises and utilizes multiple regression models to analyze the impact of various fintech products among Chinese listed companies in recent years. In contrast, the research focuses on the interrelationship between fintech and listed Chinese companies. It also considers the size of listed banks on the development of fintech, filling the gap in the issue of fintech and the net profit of listed Chinese enterprises with multiple linear regressions.

1 INTRODUCTION

The rapid informatization and digitization of the Chinese economy have been accompanied by a gradual transformation of the traditional financial model into digital fintech, as evidenced by the use of high technology such as big data and artificial intelligence to drive the development of financial markets (Ashta, 2021; Herrmann, H, 2021). After the establishment of the Beijing Stock Exchange, the number of listed companies in China will continue to grow, especially as a large number of fintech companies with lower operating costs are joining the listings. Fintech uses big data to provide financial identity information, transaction records and credit history functions to financial institutions and e-commerce platforms, further helping Chinese listed companies to improve their product formats and revenue channels. Meanwhile artificial intelligence and internet technology can enable data transactions and provide services such as wealth management, securities and insurance. Finally, information security can ensure the safety of fintech products, further enhancing the security of financial products available to Chinese listed companies (Figure 1). At present, some of the Chinese listed companies are service-oriented or traditional finance companies, where fintech technology is in its infancy, while others are companies that are already using fintech products (Nelaturu, 2022; Du, 2022; Le, 2022). Both groups of Chinese listed companies are growing steadily under the influence of fintech, especially in terms of net profit, operating income and earnings per share.

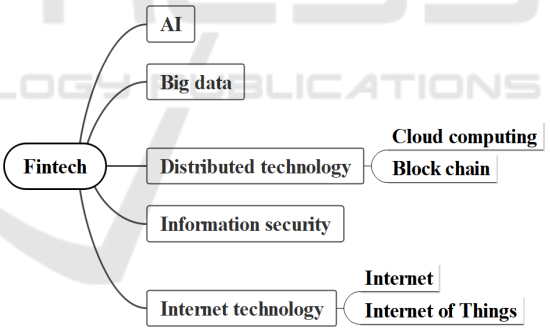

Figure 1: Key technologies of fintech.

The rapid informatization and digitization of the Chinese economy have been accompanied by a gradual transformation of the traditional financial model into digital fintech, as evidenced by the use of high technology such as big data and artificial intelligence (AI) to drive the development of financial markets (Ashta, 2021; Herrmann, H, 2021). After the establishment of the Beijing Stock Exchange, the number of listed companies in China will continue to grow, especially as a large number of fintech companies with lower operating costs are joining the listings. We can see the investment in fintech in China (Figure 1). At present, some of the

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Chinese listed companies are service-oriented or traditional finance companies, where fintech technology is in its infancy, while others are companies that are already using fintech products (Nelaturu, 2022; Du, 2022; Le, 2022). Both groups of Chinese listed companies are growing steadily under the influence of fintech, especially in terms of net profit, operating income and earnings per share.

2 LITERATURE REVIEW

Both Chinese listed companies and fintech are developing, and while fintech has enriched the profitability of Chinese listed companies, they also pose significant challenges. Pietronudo, M.C. et al. (2022) have shown that the convergence of Chinese listed companies and fintech requires technical expertise and strategic placement. The development of artificial intelligence and big data signifies that fintech can already be transferred from the offline market to the internet and even the mobile market (Stoica, E.A. et al. 2022). The development of fintech in Chinese listed companies has a constant impact on corporate value, including influencing factors such as net profit, operating income and earnings per share. Zhao, J., et al, (2022) argues that Chinese listed companies need to comply with government regulation of fintech, while also preventing the risk of financial spillovers. Fintechs also need a spirit of innovation to add more types of products to the microeconomy, and scholars have invested in areas related to the profitability, operating income and stock returns of fintech, mainly from investors (Carbó-Valverde et al, 2022). The innovation of fintech can help Chinese listed companies increase their revenue and improve their long-term growth. The literature review on fintech and Chinese listed companies is as follows (Table 1).

In addition, there are a variety of approaches to studying listed firms. Luo S, et al, (2022) utilize keywords and literature research methods to analyze how fintech affects business innovation. Keywords from the last five years were studied at the time of the research. Deep learning and computer algorithms are also the main methods used in the study of fintech innovation and Chinese companies (Wang, et al. 2022).

Table 1: Literature on Fintech and Chinese listed companies.

Fintech Essentials	Author/Researcher
Technical expertise, Big Data, Intelligent,	M.C. et al, (2022), Stoica, E.A. et al, (2022), Zhao, J., et al, (2022), Carbó-Valverde et al, (2022),
Algorithms, Quantitative, Listed enterprises	Wang, et al. (2022), Barrot, et al. (2022).

Besides qualitative analysis, quantitative analysis has also been involved in financial technology research before. (Barrot, et al. 2022). This study makes use of multiple linear regression to investigate the impact of listed firms and fintech, it is the research of listed firms and fintech in the Chinese context. The study aims to answer the following questions: (1) How do net profit, operating income and earnings per share of listed fintech companies in China affect each other? (2) How do multiple linear regressions analyze the impact of fintech on Chinese listed companies?

3 METHODOLOGY

The quantitative analysis method of multiple linear regression was used in this study. The data in the study was obtained from the financial statements of listed companies and the information of data was reliable and feasible. In building the model with multiple linear reviews care was taken to separate the relationship between the independent variables and the response variables, and the regression relationship was established by finding the maximum factor of the regression through stepwise regression. The linear relationship model is established in the regression equation (Formulate 1) and the regression variables are tested for variance and significance. The basic idea of using multiple regression linear prediction is to complete the model after establishing the relationship between the independent and the response variables, see Figure 2 for the specific steps.

The first step of data collection. The research data for this study was obtained from the financial statements of the banking segment of listed companies in the Chinese A-share market as disclosed on the Oriental Fortune website. Listed companies in China are supervised by the Securities Regulatory Commission, in which the listed companies' financial statements are audited every

quarter. Hence, the publicly available financial statements are authentic and reliable and they can be used for the study. The 10 listed banks were modelled using linear regression to determine the interdependence of the 10 variables, where A is the intercept, the number of units that affect the change in Z for each unit change in X_n.

$$Z=y_1X_1+y_2X_2+y_3X_3+...+y_{10}X_{10}+A \quad (1)$$

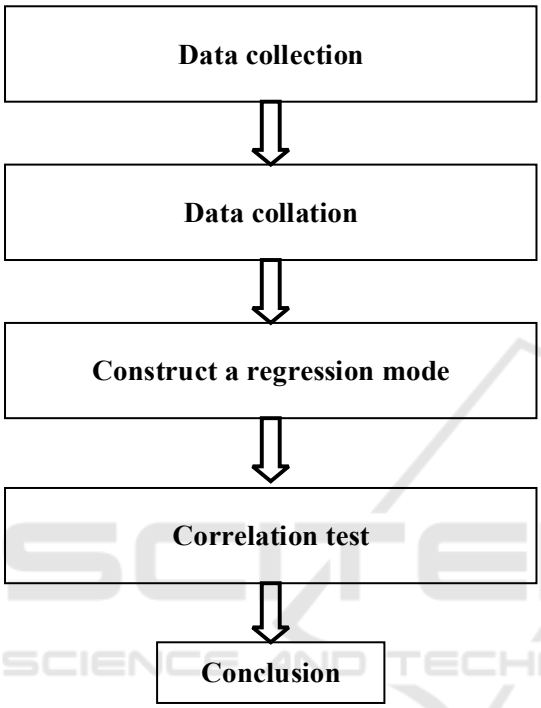

Figure 2: Literature review process.

The second step is to collate the data. The number of companies in the banking segment of China's A-share listed companies is 42. Listed banks with net profits of 150 billion yuan or more are selected and the number of extracts is calculated as 10 by applying the formula (Formulate 2). The findings of the research are within the 95% confidence range, the statistic of Z is 1.96, the estimated value is at is 0.5, and the value of N is calculated to be 10.3 within a reasonable margin of error, so the sample of listed banks is 10. Using EXCEL, the independent variable (net profit from 2017-2021) and the response variable (operating income in 2021 and stock return in 2021).

$$n=P(1-P)/(e^2/L^2+ P(1-P)/N \quad (2)$$

Notes: percentage precision value (E), confidence level (L), proportional estimate (P), overall sample size of N

The third step is to construct a regression model. Using EXCEL and multiple regression linear model to analyze, set the regression equation and determine the regression coefficient to complete the modelling of regression analysis.

Step four is correlation test. The review process is as follows, it needs to be tested with a t-test, from the results of the regression analysis can be seen, and the size of the t-test corresponds to the parameters of the variable p. $p<0.05$ means that there is a significant difference, and $p>0.05$ means that there is no significance between the variables.

The study hypothesises that the variables are not random variables and are independent of each other concerning the random variable errors. The independent and response variables are not affected by special circumstances and are able to maintain a linear relationship.

4 ANAYLYSIS AND RESULTS

The paper focuses on the analysis of the impact of FinTech on Chinese listed companies, mainly on 10 companies in the banking segment of Chinese listed companies. This study collates the net profits of these 10 listed companies in the banking sector for the five years from 2017 to 2021 in an EXCEL table and also summarizes the operating income and stock returns for 2021 in a separate table (Table 2). Multiple regression linear analysis relates the purpose of the study to multiple factors by the optimal combination of multiple independent variables together to predict the dependent variable.

Table 2: Net profit of FinTech listed companies.

(Unit: 100 million yuan)

No.	Name	2017	2018	2019	2020	2021
1	PSBC	477	523	609	642	762
2	CITIC	426	445	480	489	557
3	CCB	702	736	772	783	876

4	PAB	232	248	281	289	363
5	SPDB	543	559	589	583	530
6	CMB	702	805	928	973	1199
7	BOC	1724	1800	1874	1928	2166
8	ICBC	2860	29877	3122	3159	3483
9	BCM	702	736	772	783	876
10	ABC	1930	2027	2120	2159	2412

Notes: Postal Savings Bank of China(PSBC),
China International Trust and Investment Corporation(ITIC), China Constuction Bank(CCB), PingAn Bank (PAB), Shanghai Pudong China(BOC), China Merchants Bank(CMB), Development Bank(SPDB), Industrial and Commercial Bank of China(ICBC), Bank of Communications(BCM),
Agricultural Bank of China(ABC).

The data was collated using EXCEL based on the data collected. The study identified the net profit from 2017-2021 as the independent variable for the study, while the 2021 operating income and 2021 stock earnings were used as the dependent variables for the study, and regressions were calculated based on the formula. The regression analysis was also conducted using the EXCEL software and the regression analysis function in the SPSS software.

Table 3: Regression Statistics in operating income.

Multiple R	0.980241553
R Square	0.960873503
Adjusted R Square	0.911965382
Standard Error	843.7893199
Observations	10

Table 4: Regression Statistics in share price per.

Multiple R	0.833072649
R Square	0.694010039
Adjusted R Square	0.311522588
Standard Error	0.972882514
Observations	10

The regression statistical table can be completed after regression analysis, Multiple R is the correlation of performance multiple regression data, and Multiple R is greater than 75% showing a strong correlation trend, the Multiple R between the net profit of this study from 2017-2021 and the operating income in 2021 is 98% (Table 3), the two factors of net profit and operating income show a strong correlation The Multiple R between net profit in 2017-2021 and share price per in 2021 is 83.31% (Table 4), and the two factors of net profit and share price per share also show a strong correlation. Therefore, Chinese fintech has a positive correlation, i.e. a mutually reinforcing effect, on net profit, operating and share price revenue per share of Chinese listed companies.

In the regression analysis, this research can be derived from the ANOVA table (Table 5 and Table 6), from which it can be seen that the range of fluctuations between the variables in this study is not large and shows a trend of stable effects. The ANOVA table corresponds to a Significance F of 0.02, which is less than 0.05. A Significance F of less than 0.05 indicates that the overall regression model is significant. Looking at the regression coefficient table below again, the Coefficients coefficient is available in the error analysis table, which is the intercept in formulate (1) in part 3 in Table 7 and Table 8.

Table 5: ANOVA in operating income.

	df	SS	MS	F	Sig F
Regression	5	700	139	19.6	0.006
Residual	4	284	7		
Total	9	728			

Table 6: ANOVA in share price per.

	df	SS	MS	F	Sig F
Regression	5	8.59	1.72	1.81	0.29
Residual	4	3.79	0.95		
Total	9	12.37			

Table 7: Coefficients in operating income.

Intercept	799.8865083
2017	16.56962463

2018	0.023275674
2019	-25.46317054
2020	-0.62295762
2021	12.05858768

Table 8: Coefficients in share price per.

Intercept	0.768134965
2017	-0.02548449
2018	-2.6159E-05
2019	0.057321944
2020	-0.03389629
2021	0.000565444

The error in the multiple linear regression model is defined by

$$\hat{\sigma} = \sqrt{\frac{\sum_{i=1}^{n}\left(y_i - \hat{y}_i\right)^2}{n-(m+1)}} = \sqrt{\frac{V^T V}{n-(m+1)}} \quad (3)$$

The number of observations is, the number of parameters is, and the number of redundant observations is, so the denominator of the above equation is.

Finally, the study needs to test the significance of the above results, this study uses a t-test to test the net profit variable, operating income and earnings per share for the 5 years from 2017 to 2021 respectively, t-test p-value is calculated as 0.03. If $P < 0.01$, then the two groups are highly significantly different; if $0.01 < P < 0.05$, then the two groups are significantly different; if $P > 0.05$, then the two groups are not significantly different. Therefore, the net profit variable, operating income and earnings per share tests of listed companies in Chinese fintech are correlated. The normal split between operating income and earnings per share for 2021 is shown in Figure 3 and Figure 4.

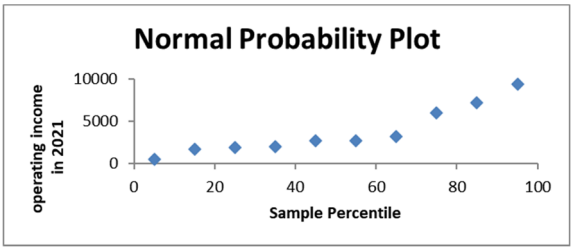

Figure 3: Normal Probability Plot in operating income.

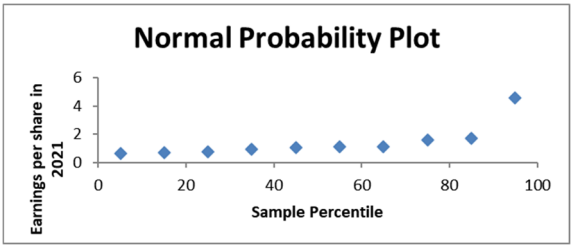

Figure 4: Normal Probability Plot in share price per.

5 CONCLUSIONS

The paper analyzes the banking sector among the listed companies in China's fintech and the following conclusions are obtained. net profit variables for the five years from 2017 to 2021, operating income and earnings per share are positively correlated. This means that as operating income grows, so do the net profit and earnings per share of the companies. The comparison suggests that the cost of the banking segment of Chinese listed companies is also manageable through the products of fintech.

Chinese fintech companies should focus more on fintech innovation on their development path. In an era of constantly updated financial products Chinese fintech listed companies need to be more innovative in technology and ideas. Secondly, in terms of fintech technology and management, Chinese listed companies need to see a broader perspective and attract more professionals and components of a good fintech team.

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