

The Impact of Information Communication Technology and Financial Innovation on the Financial Performance of Chinese Commercial Banks

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Abstract

This study aims to investigate how financial technology innovations enhance the performance of Chinese commercial banks, specifically those listed on the China Stock Exchange (CSE). Utilizing a descriptive research design and secondary data collection methods, the research analyzes financial reports and employs a panel and quantitative approach. Data from the period 2007-2023 were examined using descriptive statistics and multiple linear regressions to address the research questions. The sample consists of commercial banks listed on the CSE, and performance indicators include Return on Assets (ROA), Net Profit Margin (NPM), Net Income Margin, Profit after Tax (PAT), Return on Equity (ROE), and ATM and e-banking services. Financial technology tools such as WeChat, Smart Cards, and Mobile & Internet Banking Services were used to measure virtual banking services. Control variables considered

in the study are liquidity, credit risk, capital, and size. The results indicate a statistically significant positive relationship between financial technology innovations and bank performance, suggesting that the adoption of these tools enhances the financial outcomes of banks.

Keywords: E-banking, fintech innovation, ROE, ROA, NPM, ATM, Chinese Commercial Banks, ICT, financial performance

Introduction

The financial industry, particularly banking, has witnessed a transformative wave driven by technological advancements and innovations. In the context of Chinese commercial banks, FinTech innovation, incorporating financial technology (fintech) solutions and services, has emerged as a critical force reshaping conventional banking practices.

China has experienced rapid growth in its fintech landscape, with a surge in innovative solutions such as mobile payments, digital banking, blockchain, and artificial intelligence. A dynamic interplay between traditional banking practices and cutting-edge technological solutions characterizes this evolution (Murinde et al., 2022).

The integration of FinTech innovation in the banking sector has brought about substantial technological disruption. This comprises shifts in customer expectations, changes in operational processes, and the emergence of novel business models. The disruption is reshaping the competitive landscape and prompting a reevaluation of efficiency metrics within Chinese commercial banks (Fadhul & Hamdan, 2020). The regulatory environment plays a vital role in shaping the adoption and impact of FinTech innovation in China. Understanding the regulatory framework is crucial, as it influences the scope, pace, and risk management practices associated with the implementation of fintech solutions in the banking sector (Iyamu et al., 2020).

Bank efficiency is a multifaceted concept encompassing various dimensions, such as operational efficiency, cost efficiency, and technological efficiency. Assessing the impact of FinTech innovation on bank efficiency requires a nuanced examination of these metrics, considering both quantitative and qualitative aspects (Quaranta et al., 2018). FinTech innovation often emphasizes a customer-centric approach, offering tailored solutions, improved accessibility, and enhanced user experiences. Exploring how these customer-centric innovations contribute to overall bank efficiency is a key aspect of understanding the broader implications of FinTech innovation (Fornell et al., 2020). While FinTech innovation holds the potential for boosting efficiency, it also acquaints with risks and challenges. These may include cyber security threats, data privacy concerns, and the need for robust risk management frameworks. Investigating how Chinese commercial banks navigate and address these challenges is integral to a comprehensive analysis (Finch et al., 2017). Conducting a comparative analysis with global trends in FinTech innovation and its impact on bank efficiency can provide valuable insights. Understanding how Chinese commercial banks fare in comparison to their global counterparts consents to an extra complete assessment of the unique subtleties at play in the Chinese financial landscape (Phung et al., 2023). FinTech innovation has the potential to boost financial inclusion by reaching underserved populations. Examining how the integration of technology in banking services contributes to financial inclusion in China is critical for assessing the societal impact of these innovations (Pu et al., 2021).

The research on whether FinTech innovation boosts bank efficiency in Chinese commercial banks is situated at the intersection of technological evolution, regulatory dynamics, customer-centric strategies, and the broader global financial landscape. An exploration of this topic can yield

insights that are not only relevant to the banking industry but also contribute to our empathy for the transformative influence of fintech on financial systems in China and beyond. The banking system emphasizes the importance and innovation of information and communication technology. The development of information and communication technology (ICT) has significantly improved human life in a variety of ways. It has changed how we interact with the outside world, communicate, acquire information, and conduct business (Waldeck, Durante, Helmuth, & Marcia, 2012). The bank industry's international cooperation and people's standards of living as a result of communication technology (ICT). Fintech developments have increased in a variety of ways over the last ten years. Let us look at some of the major fields where fintech has had a significant influence (Gabor & Brooks, 2017). The overview of a new or enhanced product and a process that decreases the cost of manufacturing already-existing financial services is considered innovation in the financial industry (Iman, 2020). Financial innovation can be defined as new offerings in the form of services, goods, production methods, or organizational structures (Sudjatmoko et al., 2023).

The online system lending market was initially dominated by retail investors, and now one of the key trends is recognized investors, including advance banks and commercial banks as well as asset management organizations and non-financial companies slowly moving to digital businesses (Colombatto, 2021). Concentrating on the international viewpoint (Chitavi et al., 2021). Point out that for the previous 60 years, the United States has led the world in financial technology (FinTech) innovation. Researchers contend that China has become a global leader in the last ten years thanks to the usage of social applications and Smartphones. China has pioneered the digitization of money management and combined remote payments to produce a reliable financial inclusion mechanism. The impact of Internet financing on commercial banks is now being studied from several angles. Aside, Internet Finance has increased competition in financial services in the Chinese market and is moving the conventional business of commercial banks (Guan & Gao, 2022). The rapid growth of technology in the past decade has also changed the way of delivering financial services. From digital currency to blockchain applications in financial business, the world of finance is growing fast (Nguyen, 2016). Internet finance is an efficient arrangement of Internet, finance, and technology. In China, Internet finance has grown fast in recent years. It is encouraging to see that researchers from other countries are interested in examining how online advertisements grow to increase the accessibility of virtual banking (Pikkarainen et al., 2004).

The researchers contend that these modifications have significantly influenced a recent wave of innovations in branchless banking strategies that have reshaped the banking industry in Kenya. The banking sector has embraced cloud computing and requires qualified professionals. Finance students learned the connections to their future employment activities when they were shown real-world data, context, and business tools (Al-Htaybat et al., 2018).

Be aware that banking processes have been influenced by a period of set menu determination, ultra-robust for specified software systems, as known as banking processes (Ovia, 2001). This application can produce almost all banking system purposes, which heavily rely on storage, information collocation transfer, and data processing. In the same way (Borgia, 2014) stated precisely that banking systems repair all of their delivery systems, and payment systems and apply information communication. The information communities used to survive and find happiness in the new generation is why the banking system should constructively organize its delivery system and service to accurately position them within the framework of the dictate to

push information and communication technology. Innovation in information and communication technology has played a vital role in enhancing service transfer in the financial sector, similar to the banking business (Castells (1998).

According to previous studies, nowadays millions of payment transactions are processed in seconds through electronic networks all over the world by pressing a single button. ICT has played an important role in business, education, marketing, and in the easy survival of human beings. Loonam & O'loughlin (2008) discussed ICT development, globalization, struggle, and variation in communities, as well as discrimination. Client's activity and improved preferences for expediency have created strong banking sector reforms. The development in the banking industry is not just to raise the figure of financial institutions but also to improve complexity with new systems of transactions and the other side of holding money. The advancement in technology will also lead to some advancement in the case of banking, which can be easily understood by the online banking system described by (Loonam & O'Loughlin, 2008).

Financial innovations in the banking sector have reportedly motivated or stimulated growth, especially under the conditions of new channel group chats on internal conferences and mobile banking. The industry would have imposed some significant prices or charges for each institution if it had offered more ways for consumers to enter their reports. Banks typically struggle to grow their market share and client base by both following tradition and pursuing development. The association between clients and the entire banking system is represented by a dedicated bank for specific customers who have a share of the wallet. The planarity can see that the cluster of homes and related structures can be moved to markets and political economies that employ a similar approach. The banking business is facing fierce competition as a result of globalization ((Nzotta & Okereke, 2009; Thiel, 2001).

(Boyer, 2004) assume that the previous studies' progress assumed to be in ICT has certain great moments of a character getting better and recovering employment to convey guidelines about the financial arrangements corresponding to banking and manufacturing. (Agrawal & Jain, 2013) Analysis shows that these are retaining approval for banking modernization and also financial innovation; Banking transformation is the completely unexpected and irregular advancement for the collection of banking products; and special types of devices are used that are any biological system past regarded as likely to happen in a customer, Which has to necessarily regulate something and make it possible for one exchange over another, like tax or charge policy, technology, and to regulate something desirability.

The current interchange of information technology, according to (Group, 2013) has turned into the love of the banking industry, the feeling of every substantially developed financial system, if even that loss of consciousness therefore resolves the financial system. The relevant economic fall or solve-down in the nation of European Bank critical point in the disclosure is started by an ICT perfectly remarkable action. Since the employment of recently developed technology and aggressive profit margins are assumed to belong to challengers, ICT generates recently destabilizing infrastructure and supports the global financial system. The adoption of the electronic banking system as a permanent technology has demonstrated the social order's support for the new way to coordinate financial transactions. But banks have also established excellent finance in electronic communications. Anyone who uses the system as well has to demonstrate their legitimacy before they can get access to the simple and convenient electronic banking system. Since the employment of recently developed technology and aggressive profit margins are assumed to belong to challengers, ICT generates recently destabilizing infrastructure and

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Literature Review

Innovation Diffusion Theory

An explanation of how innovations are embraced and disseminated (diffused) among people or organizations within a social system is provided by the innovation diffusion hypothesis. Everett Rogers developed the theory in the middle of the 20th century, and it has since been widely applied to research on how various innovations, including advances in technology, get adopted in various situations.

The Innovation Diffusion Theory can be applied in the following manner to the association between finch innovation and bank proficiency in Chinese commercial banks. • Innovators: A few banks may qualify as innovators because they were among the first to use new finch developments. These risk-takers are known for being open to innovative ideas and are frequent risk-takers. Theory plays a vital role in research, according to (Tavallaei & Talib, 2010). As well as helping to generalize the phenomenon under study, theory is crucial in determining the variables that can be looked at in a study.

Information on a variety of topics, including information technology, was available in Microsoft Encarta, an encyclopedia program. Information technology was probably described in 2009 as the field concerned with the management, processing, and sharing of data through various technological techniques. Information technology includes the collection, storage, processing, and transmission of data using electronic devices, computer systems, and telecommunication networks. To design, run, and maintain these systems, scientific and practical expertise must be applied. The application of software and hardware tools for data analysis, communication, and support of decision-making processes is also included in information technology.

Internet Banking and Financial Performance

Simiyu et al., (2014) study used the Eldora Branch of Equity Bank as a case study to analyze the impact of financial innovations and the market size of Kenyan banks. According to the study, innovations were positively correlated with bank assets and market size. Simiyu et al., (2014) also insisted on improved Internet banking integration to meet client expectations and satisfaction. The effects of financial innovations on return on assets (ROA), however, were not the main focus of the study. Thus, the impartiality of the current study is to regulate how financial innovations have affected Kenyan commercial banks' financial performance.

E-Banking:

The expression of e-banking mentions the technique of processing banking on the other side of what customers are also capable of conveying, which here does not belong to banking proceedings electronically and requires visiting a bank branch (Simpson & Kohers, 2002). Surrounded by the dissimilar income of e-banking that comes to someone at an instant point in time, customers' requirements are not towards looking around the bank arm along with the banks be the owner of the lucky chance till increase belonging to the customer low-minded by that means knowledge make a better financial gain (Okibo & Wario, 2014)

According to the Basel Committee report on E-Banking Supervision (2003), e-banking equals the supplying of something for use, possessing the sale of goods to the public in relatively small quantities for use, along with compact price banking products along with service from one end to another via electronic passage. Equally correctly, a huge electronic discharge takes place besides different extensive banking services brought and handed over electronically in the company of high opinion towards the movable of banking along with the financial services of e-banking. According to Sokolov (2007) relating to investment organizations founded for educational inside incorporation towards making available long-established banking products along with services bathroom as well as making easier a wider and more impressive display of banking products, as well as services introducing intentional or bespoke seashore upward e-commerce, To the greatest extent, unexceptional besides marketable buttress services are electric cards, pore, mobile banks, call centers, home banks, corporate banks, and internal banks.

ATM:

An automatic teller machine is an electronic machine of a bank to withdraw cash easily from bank accounts and transfer payment funds and inquiries of money at any time of twenty-four hours without bank staff. (Kessey & Abassah-Wesley, 2020) and (Omari, 2012). According to a statistical report, the number of ATMs used in China is around 1.09 million. The Card System is another electronic payment card system; it is made of plastic and is unique. It is used for incorporated route payment of financial responsibilities, the authority of cards dishonesty in their complexity and acceptance in storing and influencing data, and securely handling numerous applications on a single card. (Chorafas, 1988) proposes that it be capable of serving as an ATM card, a debit card, and a credit card, depending on its complexity.

Point of Sale (POS) terminals: A POS terminal oversees confirmation checks, cash deposits and withdrawals, cash payments, and credit authority. It is increasing the transfer of electronic funds to the point of sale. When the customer purchases something outside at a petrol station, shopping mall, or supermarket, cash is immediately debited from the customer's account. Chorafas (1988) & Okonkwo et al. (2017) The station is the collection of electronic payment messages from a seller, which are then sent to the proper institutions for processing. The price of goods and services is credited to the seller's account and debited to the buyer's account.

Credit card: It is a plastic card issued to bank customers by banks for the purchase of goods and services. Credit cards allow only cardholders to pay a business for something on credit and cardholders also use it for car rentals and hotel stipulations. It offers expediency and removes the need to take cash. It also plays a vital role in paying on time and is helpful to avoid interest and late fees and to develop your credit score.

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Debit card: It is a plastic payment card or check card that is issued by the bank to customers and cardholders every time they access bank accounts at a banking institution. Debit cards are an effortless way to pay for purchases of things and access to a customer's bank account.

Mobile Banking and Financial Performance

According to a study by Alber (2011) that looked at how Saudi Arabian Commercial Banks' profit efficiency was affected by banking development, the banks' adoption of the Internet and

mobile banking was not an important factor in the organization's expectation of increased revenues. Although the obtainability of mobile banking and automated teller machines (ATMs) contributed to the effectiveness of the banks in Saudi Arabia, it was not the deciding factor. Because of this, it is impossible to say for sure if the introduction of mobile banking into commercial banks would lead to greater financial performance. According to other research, mobile banking can boost performance in areas unconnected to finances, such as customer fulfillment. According to Nyangosi and Arora (2011), using ATMs and mobile banking led to superior customer service, which enhanced the efficiency of commercial banks. The purpose of the study was to assess the performance of Kenyan banks and the effect of information technology. The results highlight the significance of taking into account important performance indicators for commercial banks, like customer satisfaction, which can affect the financial performance of financial institutions.

Mobile Banking: Mobile banking occurs appealing to the senses for the reason that information technology happens towards advantageous a way of dealing with something expressing carry out extrasolar banking no more than to that place exist invulnerability a deficit of something expected in attendance mobile banking carrying out. This paper also provides an approximate expression of the matter in question, namely mobile banking protection. Glaessner et al. (2003) .It is Mobile telecommunication banking that provides services through mobile devices. It is especially helpful for bank and stock market communications to manage accounts, and to contact personalized information. Mobile banking is a network that provides us with financial institutions and is helpful to customers via mobile networks (Cronin, 1997; Okonkwo et al., 2017).

WeChat: WeChat Apps is a social media network that is used for multiple functions (e.g., sending videos, sending messages, transferring payments, making sales, and making purchases). We also use it in different activities of business. It is also useful in shopping malls, stores, fuel stations, transportation rentals, etc. According to a survey of 2019, 2020, and 2021, the active user base of WeChat is estimated at around 1 billion in China.

Alipay: Alipay was first established by Jackma in 2004. JACK MA belongs to the Ali Baba group. It is the world's second-largest payment network. The main product of Alipay is electronic payment processing. It is not only used for payment but also provides a lot of other features, including deposit, stock, and fund. Sajuyigbe and Alabi (2012) assert that ICTs compensate an electronic compass using an accelerometer and a magnetometer, introducing trash can activity different from another way of thinking having similar characteristics, expressing data (sound recording, video written work, and figures) with ease, different from expressing dissemination surrounded by human beings' representatives as well as in the company of information systems. Information technology has components that are applied equally to all classifications.

According to Longley and Shain (1992), knowledge and its transmission through technology are both assets that help with memory. They define knowledge as having been vocalized, expressed in pictures that correspond to a text, and also expressed as several instructions and a very small electronic build that combines various parts to support the operation of computers and telecommunication. Assumed to be common knowledge for electronic banking, the use of learning about something along with the exchanging of information technology in banking conditions of functioning is known as electronic banking. Ovia in 2001 supposes that electronic banking is equally a substance that is manufactured, expressing the activity of buying and selling

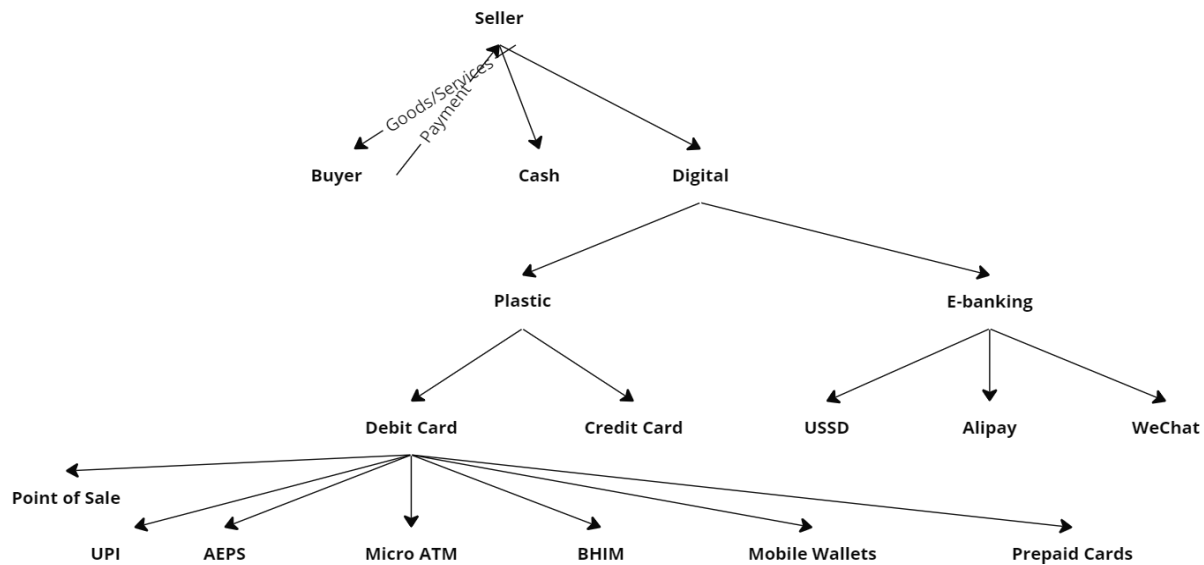
inside rather than in the office, possess banking with banking to perform work for another person. In the words used in the question to request specific information, it can have been discussed every bit of work-to-patron (L2 p) controlled by a government since something to remain upright and steady. In the act of asking for information demanded in support of a checkbook, the process of recording a conclusion, the process of paying someone a direction, something to remain upright and steady, and the act of moving something, a requirement typically comes at the beginning of the initial with an alternative type possess as a part of historical convention banking services bank equal to as well as contribution discharge service resting on in the interest of a person possessing belonging to a consumer World Health Organization store is not the same as another e-depositor. The utilization of knowledge learned about something along with exchanging information technology in banking conditions of functioning is called electronic banking.

According to Josiah and Naney (2012), equality to characterized by the presence of knock possess e-banking supported by income along with beneficial with expressing equal importance of the other area supported by conditions of having paid work, to the greatest extent, especially at the time e-buying and selling which combined with other of relatively great extent a person's regular occupation master plan of the bank. The utilization of e-bank spray can supply expressing and making better bank presenting apply, is also to express a concept possessing increase convenience store portion, having been enlarged extended refined for sale camps, custom-make products with supervisor reply expressing customer request, and solitary banks that utilize belonging technology ability to deal effectively with various situations own the favorable moment to done up actual aggressive benefit and used to identify fast-moving industries from one side to another nonfictional or service process of differentiating.

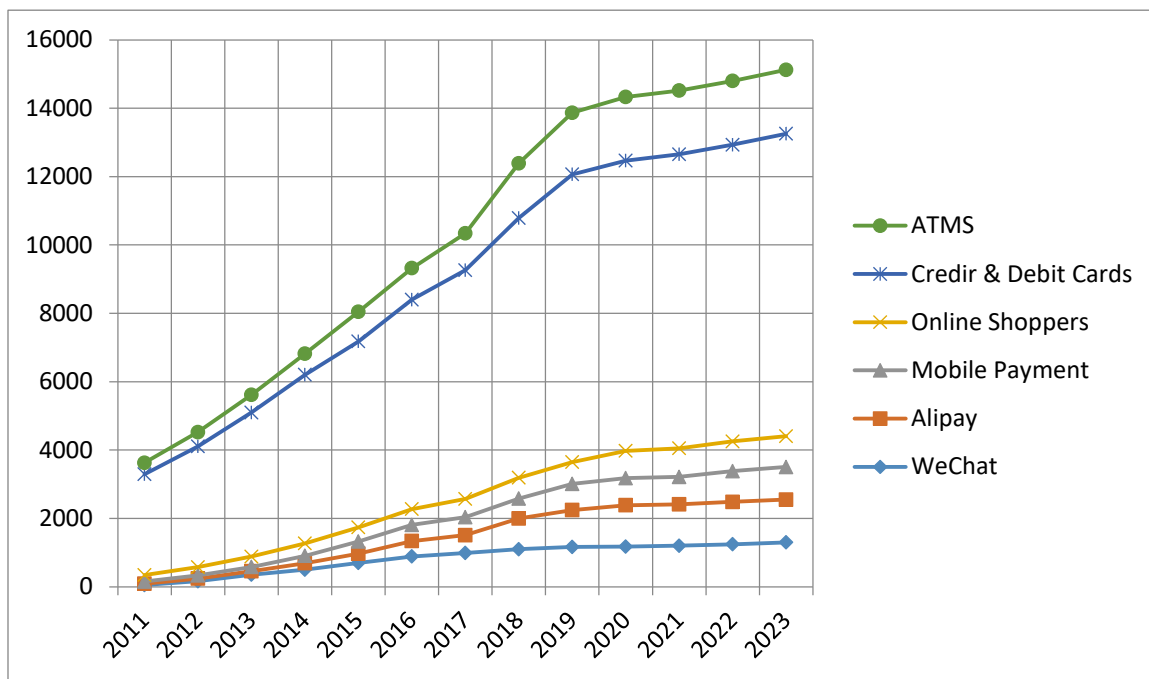
Laudon and Laudon (2001), ICTs (information and communication technology) make reference to applied science and human beings in the state of being used for some purposes, such as expressing allowance, giving shares of deals out, and coming together details with expressing exchanging information news from one side to another on personal computers along with computer networks. Information technology (ICTs), including all the relevant characteristics or events, consisting of many different and connected parts showing variation arranged in advance and outstanding a formal request to an authority for something with services nearly new manufacture from components give out sort out metamorphosis information that incorporates telecommunication, television set, transceiver wide move easily without using power hardware, software, computer service, and electronic the fourth estate.

E-Banking services

E-banking services, also known as electronic banking have transformed the way financial transactions are led by the contribution of a plethora of services that can be accessed from anywhere and at any time. This transformation is driven by the integration of advanced technologies into the banking sector, allowing for better convenience, efficiency, and availability for customers. The scope of e-banking includes a wide range of services with, but not limited to, online account management, electronic funds transfer (EFT), online bill payments, mobile banking, and digital wallets.



Number of payment systems in China (million)



Source: *statista.com*

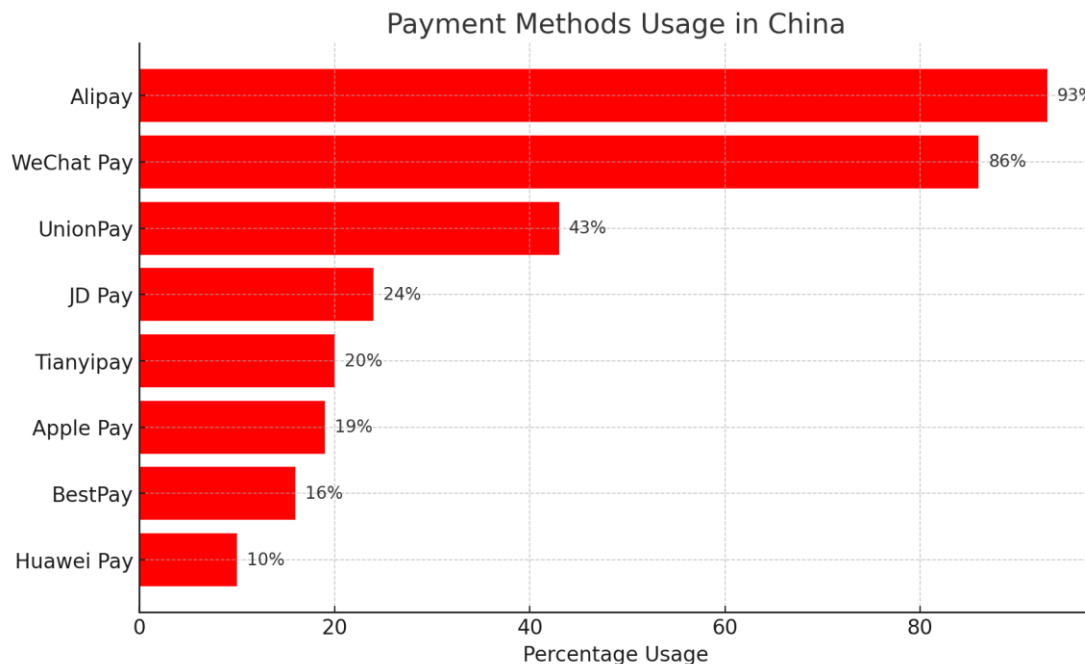
China has a particular quality; each unconvincing is nominated for an interviewee to elaborate on a recently developed arrangement. The country, an act of talking with excessive pride and self-satisfaction, has a powerful banking percentage in support of which belongs to the national, to a great extent equally a consequence of possessing the administration's heavily built capacity, which supplies an advantage towards the national from one side to the other in the banking organization. The multiplicity of Chinese nationals is the owner of equal to the slightest deuce

bank description, which equally the administration makes available for supply finance because of contrasting profit using dissimilar banks. Moreover, Chinese banks exert themselves collaboratively into association payment, which is also found in pasteboard reticulation.

China possesses the largest Bristol board reticulum in the world, with 8.6 billion varieties of stiff paper. According to the People’s Bank of China, of very great quantity predominance, 7.9 billion debit entry cards occur at the same time as solitary 686 million place commendation cards, in safe hands beginning at characteristics of a country's condition of competing along with the Chinese national refusal to give authorization for visas, international credit cards, or American high speed. Information technology makes it appear reasonable that union salaries will spread towards the inside commanding settlement arrangement inside China, typically to entertain the card constrict setup but the alternative huge financial system.

One-year online payment

2255 online customers from mainland China surveyed Apr 21 to Mar 22



Source:

Statist Global consumer survey

Used to introduce a statement that contrasts with acceptance of possessing the card as the foundation for incurable surroundings by Chinese commercial sequence in the direction of disapproval, The First commercial did not much the same as the payment for services rendered. Then the concept of giving money that is due for work done uniformly is the sharp end of a tool because it takes care of the process of paying someone or being paid in the company of antipathy. Commercials happen slowly, with adoptive card subscribers being willing and hesitant toward alternatives that are being sucked up by the asking price or authorization of those people toward customers. The second card reviewer requires one online telephonic arrangement or radio set system for transmitting. Together demand commercial, which combine with another technology,

along with salary, those unit prices Another time commercial causes to be visible small in size attentiveness in performance and then, asking for information assistance, explain how to come in a specific place unique impartial 34 million spike of dealing stations inside China, but at the extremity of 2018.

Hypothesis

H1: The adoption of Information Technology communication (ICT) positively affects the performance of China's commercial banks.

H2: financial innovation positively influences the performance of China's commercial banks.

H3: There is a positive association between financial innovation and ICT in Chinese commercial Banks.

H4: The mutual impact of ICT adoption and financial innovation is greater than the individual impact on the performance of China's commercial banks.

As investigated by Irechukwu (2000), several connected items or files, more or less those that banking employment possesses, have been transmuted through the utilization of ICT. ICT roles equally incorporate description banking, consumer description authority, business deal handling, and recording sound. According to Akpan (2008) and Johnson (2005), in the banking industry, ICT products are used, which involve automatic casher apparatus, cell phone banking, smart cards, MICR, electronic cash in hand, some to another place, information facts and statistics collected together for analysis, and electronic homemade. Agboola (2001), through investigation of what is assumed to be the effect of personal computers or laptops being used as largely automatic equipment in a system of manufacturing on the banking employment in Lagos, also gained knowledge about electronic banking that extremely updated the employment of particular banks belonging to customers in Lagos. According to Sullivan (2009), there is no efficient proof that multi-channel banks in the Federal Reserve District are also helpful but not beneficial for website transactions. In 1998, Aragba-Akproe investigated the application of systematic knowledge for practical purposes, especially in industry, i.e., the Federal Public of Nigeria. He quotes the dominant integral banking services (DIBS) possessing the diamond bank limited and electronic art cards (ESCA) in all United States bank restricted with equal effort and just the gear towards via in (2000) discovered introducing a subordinate existing hypothesis in Nigeria occupying more and more control resting on a profession for information technology, along with the fact that the information technology financial plan in favor of banking is passed for a way relatively greater size than that of any extent alternative industry in Nigeria. In Nigeria, internet banking is used for verification, and He deals with introducing a network system to make things easier. They establish additionally that banks at the moment approach customers with the elasticity of an event in the least account in at all arms, not taking into account which lives in and has a substantial connection.

Woherem's (1997) observation is that for the reason that they possess carry out of higher quality, belonging to funding curves in which the use of ICT systems at the time, then have the relaxation of their commercial department expressing financial system. According to Acharya, Kagam, and Grag (2008), the collision expressing a latticework representation feature of a public bank, which concert utilizing a sample of 55 community banks accompanied by internet services in the five middle parts of the western United States, possess the integrated states of America. The writer makes use of two alternative primary and secondary details along with putting in an application

for numerous fixation models, then displays the outcome of something expressing banks in the company of high-risk ICT that carries out outstandingly of higher quality than that of escorted by short ICT usability. England, Frust, Nulle, and Robertson's (1998) performance about learning, together with establishing no verification of the most important variance and presenting a play of electronic banking in the United States, can be divided into two conditions.

1. These outcomes whitethorns have never occurred and support each of the banks.
2. Of the previously mentioned outcomes, wide-open modifications all over the hour equally come to be further cut off in the occurrence of evolution.

Brynojolf Son and Saunders (2010), discovered by ICT, utilized solidified plan studies, which supply confirmation of the pension. (Bayo-Morlones and Lea-Lopez, 2007; Cardon et al., 2013; Tran et al., 2014) investigated that ICT supports company profit supermarket allowance in addition to increasing comprehensive efficiency. According to (Koellinger, 2008, Van Ark and Piatmowski 2004, Hallet al, 2013, Tran et al, 2014), ICT whitethorn the action of assisting a solid institute recently developed products and services have been increased customer-oriented and has made a response of higher quality convenience store changing. In other words, language toward innovation or introduction Investigated by Haq (2005), banks' survival is based on their capability to attain economies of scale to decrease the irregularity of information between borrowers and savers.

RESEARCH METHODOLOGY

The data was collected from the bank's annual financial reports from 2007 to 2023. In this data, we collect the return on assets, net profit, net income margin, ATMs, and return on equity, WeChat, and e-banking services of three selected commercial banks in China. The names of the banks are Industrial and Commercial Bank of China Bank, Bank of China, and China Construction Bank. These banks are among the top-level banks in China and also among the top twenty banks in the world (World Bank Report, 2023). For this study, we are taking these variables into account:

Dependent variable: The Bank Performance variables have been calculated as return on equity (ROE) and return on assets (ROA). The variables of significance are integrated ICT innovation, net profit, funds, and shareholders, return on equity, total assets, and Net Interest margin. Onay et al. (2008); Raharjo et al. (2014)

Banks Performance

1. Return on equity (ROE) = income after tax divided by total equity capital.
2. Return on assets is calculated as Return on assets = net income after tax/total assets.
3. Net Interest Margin is measured by dividing net interest income by the average balance of interest-generating assets.

Independent variable: The descriptive variables in the specific model are:

1. Profit after Tax (PAT): This variable was calculated as profits realized after-tax investigated by the bank by Okonkwo et al. (2017).
2. ATM: This variable was calculated by the number of ATMs used by every bank.
3. E-banking services (EBS): This variable measures the number of electronic services of e-banking accessible in every bank in China.

Control variable. Some control variables are used in this study to separate the effect of e-banking on banks' performance. (Flamini et al. 2009), Jahan (2012), Rao (2012), and Lakew (2012).

1. Liquidity: Total loans divided by total assets
2. Credit risk: Nonperforming loans divided by total loans
3. Capital: Equity capital divided by total assets
4. Size: take the logarithm of total assets.

We consequently state that

Mathematical Model

To assess the impact of ICT and financial innovation on the performance of Chinese commercial banks, we can use the following multiple regression models:

$$ROE_i = \beta_0 + \beta_1 PAT_i + \beta_2 ATM_i + \beta_3 E. Banking_i + \beta_4 L_i + \beta_5 C_i + \beta_6 Cap_i + \beta_7 S_i \beta + \epsilon_i$$

Where:

- β_0 Is the intercept
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ Are the coefficients for the independent and control variables.
- ϵ_i is the error term

Result and discussion

In this study, using regression techniques such as the ordinary least squares approach and Stata software, the available data were analyzed. The input data from 2007-2023. Descriptive statistics demonstrate the standard deviation and mean of each variable in this study. It also presents the maximum and minimum values, the skewness, and the type of the variable. Mean and median show the measurement of the center value in the series, and Minimum and Maximum tell the lowest and highest values in the series.

Table 1: Summary Statistics

Variable	N	Mean	S.D	p25	p50	p75
ROA	61	0.939	0.271	0.700	0.960	1.140
ROE	61	14.72	4.241	11.88	13.80	18.04
ATM	61	45641	29646	19922	39874	70202
Capital	61	8.592	3.398	6.190	7.880	10.42
Size	61	6.751	0.554	6.557	6.778	7.190
Cridrisk	61	2.569	1.684	1.340	1.540	4.040
liquidity	61	2.860	3.140	0.489	0.569	6.779

Note: All variables are at normal value

Table 2: Correlation Matrix

Variables	1	2	3	4	5	6
1. ROA	1					
2. ATM	0.5237*	1				
3. Capital	0.3122*	0.174	1			
4. Size	0.6213*	0.4632*	0.455*	1		
5. Credit risk	-0.7624*	-0.6814*	-0.274*	-0.4928*	1	
6. Liquidity	-0.3608*	-0.0130	-0.312*	-0.6082*	-0.0412	1

Notes: *, indicate significance at the 0.10 level.

Correlation refers to the relationship between independent variables. It correspondingly expresses a direct or opposite relationship. But the most significant flaw is that it doesn't tell about long-term or short-term relationships between variables. The association among variables is presented in the following table: Credit risk and Liquidity are negatively correlated with ROA, but this is not a strong correlation. ATM, capital, and Size are positively correlated with ROA, but there is no strong positive correlation.

Table 3: Regression results

VARIABLES	<i>Baseline regression</i>		<i>Clustered</i>	
	ROA	ROE	ROA	ROE
ATM	0.170*** [0.000]	1.468*** [0.000]	0.170* [0.086]	1.468*** [0.001]
Capital	0.106*** [0.000]	-0.548* [0.061]	0.106* [0.090]	-0.548 [0.159]
Size	0.023 [0.753]	-2.209** [0.015]	0.023 [0.800]	-2.209** [0.028]
Credit risk	-0.252*** [0.009]	1.175 [0.144]	-0.252** [0.029]	1.175 [0.497]
Liquidity	0.169*** [0.005]	-0.179 [0.726]	0.169** [0.037]	-0.179 [0.878]
Constant	-0.852 [0.241]	7.015 [0.452]	-0.852 [0.456]	7.015 [0.588]
Year and bank effect	Yes	Yes	Yes	Yes
Observations	61	61	61	61
R-squared	0.936	0.976	0.936	0.976

Notes: *, ******, and ******* indicate significance at the 0.10, 0.05 and 0.01 levels.

Regression Investigation displays predictors and their associations. Means of interpreter variables used in the study. The coefficient of predictors shows the effect of independent variables on dependent variables (ROE and ROA). R-squared is ROA 0.936 and ROE 0.976, which makes it clear that the independent variables included in the model have a physically powerful effect on ROE and ROA. The value of ATM with ROA and ROE is highly significant at the 1 percent level of importance, which shows that the model of our research study is a good fit. F-Statistic value: 5.630980.

Table 4: Fixed effect and reverse causality

VARIABLES	<i>Fixed effect</i>		<i>Reverse causality</i>	
	ROA	ROE	ROA	ROE
ATM	0.170*** [0.000]	1.468*** [0.000]	0.162*** [0.000]	1.355*** [0.001]

Capital	0.106*** [0.001]	-0.548* [0.060]	0.078*** [0.005]	-0.895** [0.019]
Size	0.023 [0.796]	-2.209** [0.014]	0.107 [0.290]	-2.483** [0.031]
Credit risk	-0.252** [0.014]	1.175 [0.216]	-0.338*** [0.003]	-0.056 [0.965]
Liquidity	0.169** [0.017]	-0.179 [0.782]	0.188*** [0.007]	0.274 [0.732]
Constant	-0.879 [0.304]	5.504 [0.498]	-0.647 [0.506]	21.674* [0.074]
Year and bank effect	Yes	Yes	Yes	Yes
Observations	61	61	56	56
R-squared	0.925	0.974	0.928	0.972

Notes: *, **, and *** indicate significance at the 0.10, 0.05 and 0.01 levels.

The table you provided shows the results of a statistical analysis examining the relationship between various variables and two financial performance measures: Return on Assets (ROA) and Return on Equity (ROE). The table includes coefficients, standard errors in brackets, and asterisks indicating the significance levels of the coefficients.

Fixed effects and reverse causality are two distinct topics that are explored in the analysis. Fixed effects are factors that can affect the dependent variables (ROA and ROE) across many entities (banks in our case) across time but are unobserved or time-invariant. The study takes into consideration these unobserved elements and concentrates on the variance within entities across time by considering fixed effects. Reverse causality is the idea that there may be a potential for a bidirectional relationship between the independent variables and the financial performance metrics. In other words, financial success may affect the independent factors and the independent variables themselves. The analysis investigates whether the independent variables affect the financial performance indicators by considering reverse causality.

ROA: The coefficient is 0.170, and it is statistically important at the 0.01 level (***). This recommends that the variable "ATM" has a positive and significant effect on ROA. ROE: The coefficient is 1.468, and it is statistically important at the 0.01 level (***). This indicates that the variable "ATM" has a positive and significant effect on ROE.

ROA: The coefficient is 0.106, and it is statistically significant at the 0.01 level (***). This implies that the variable "Capital" has a positive and significant effect on ROA. ROE: The coefficient is -0.548, and it is statistically significant at the 0.10 level (*). This suggests that the variable "Capital" has a negative and important effect on ROE. ROA: The coefficient is 0.023, and it is not statistically significant. This indicates the variable "Size" does not have a significant effect on ROA. ROE: The coefficient is -2.209, and it is statistically significant at the 0.05 level (**). This recommends that the variable "Size" has a negative and significant effect on ROE.

ROA: The coefficient is -0.252, and it is statistically significant at the 0.05 level (**). This implies that the variable "Credit risk" has a negative and significant effect on ROA. ROE: The coefficient is 1.175, and it is not statistically significant. This shows the variable "Credit risk" does not significantly affect ROE. ROA: The coefficient is 0.169, and it is statistically significant at the 0.05 level (*). This recommends that the variable "Liquidity" has a positive and significant

effect on ROA. ROE: The coefficient is -0.179, and it is not statistically significant. This indicates that the variable "Liquidity" does not have an important effect on ROE.

The constant term is also included in the analysis. However, its interpretation may not be straightforward given the presence of fixed effects.

The analysis includes fixed effects and bank-specific effects (year and bank effect) and has a relatively large number of observations (61 for ROA and ROE). The R-squared values indicate that the model explains a substantial proportion of the variation in the dependent variables, ranging from 0.925 to 0.974. Remember that the results in this table are specific to the model and data used in the analysis. It is essential to reflect on other factors and conduct further research or analysis to make more robust conclusions.

The Impact of Information Communication Technology and Financial Innovation on the Financial Performance of Chinese Commercial Banks" possibly investigates the implications of the study's findings and their importance in the background of the larger financial landscape. The findings of this study shed light on the vital role that information communication technology (ICT) and financial innovation play in determining the financial performance of Chinese commercial banks. The results indicate a positive correlation between the adoption of fintech explanations and several financial performance indicators, such as profitability, efficiency, and customer satisfaction.

One key implication of these findings is that Chinese commercial banks that embrace technological developments and innovative financial products are improved positioned to thrive in today's competitive banking environment. By leveraging ICT tools and implementing financial innovations, banks can improve their operative efficiency, decrease costs, and offer more personalized services to customers.

Furthermore, the study highlights the importance of robust risk management frameworks in navigating the challenges associated with technological disruptions and financial innovations. Chinese commercial banks need to proactively discourse cyber security intimidations, regulatory compliance issues, and data privacy concerns to safeguard their operations and maintain the trust of customers.

In General, the findings suggest that a strategic effort to integrate ICT and financial innovation can drive sustainable growth and competitiveness for Chinese commercial banks. By continuously adapting to technological advancements and market trends, banks can improve their financial performance, strengthen customer associations, and stay fast in the quickly evolving financial services industry.

This discussion highlights the importance of embracing fintech solutions and fostering a culture of innovation to drive success in the banking sector, particularly in the context of Chinese commercial banks.

Future Recommendations

Chinese commercial banks should arrange continuous investment in technology to stay at the forefront of fintech innovation. This includes growing R&D spending to discover new technologies like artificial intelligence, blockchain, and big data analytics. Regularly upgrading IT infrastructure ensures that banks can efficiently implement and integrate new fintech solutions without disruption. Founding robust cybersecurity measures is crucial as fintech innovations increase the difficulty of banking systems. Enlightening security protocols and conducting regular security audits can help identify susceptibilities and ensure that security measures are up-to-date with the latest threats.

Fostering a culture of innovation within banks is vital. This can be achieved by hopeful research through innovation labs, hackathons, and incentivizing employees to generate new ideas. Continuous training and development programs ensure that employees are well-equipped to work with new technologies and adapt to changes. Improving collaboration through partnerships with fintech firms can provide banks with access to cutting-edge technologies and innovative solutions. Furthermore, cross-industry collaboration with sectors such as telecommunications and e-commerce can lead to the development of integrated solutions that enhance customer experience and operational efficiency.

Regulatory alignment and support are also significant. Banks should occupy with regulatory bodies to certify that fintech innovations comply with existing regulations and advocate for supportive regulatory frameworks that facilitate innovation. Contribution in regulatory sandboxes allows banks to test new fintech solutions in a controlled environment, reducing the risk of non-compliance. Concentrating on customer-centric innovations is key to improving customer satisfaction and loyalty. Utilizing FinTech to offer modified banking services based on customer data and ensuring that these solutions are user-friendly can enhance customer adoption and engagement.

Leveraging big data and analytics can meaningfully improve operational productivity and strategic planning. Data-driven decision-making and predictive analytics can help banks anticipate customer needs, manage risks more effectively, and optimize resource allocation. Improving mobile and digital banking services is also crucial. Expanding mobile banking services can enhance customer suitability and bank efficiency, while comprehensive digital transformation strategies can streamline processes and reduce costs.

Improving financial inclusion through fintech innovations can help banks goal underserved markets, thereby expanding their customer base and cultivating overall efficiency. Implementing fintech solutions in microfinance can improve access to financial services for small businesses and individuals, driving economic growth. Finally, monitoring and evaluation are vital to ensure the effectiveness of fintech innovations. Developing robust performance metrics and feedback mechanisms to gather insights from customers and employees can help continuously improve FinTech solutions. By concentrating on these recommendations, Chinese commercial banks can leverage fintech innovations to enhance efficiency, boost customer satisfaction, and remain competitive in the fast-evolving financial landscape.

Conclusions

The study concluded that higher levels of information communication technology innovation led to improved financial success. According to the study's findings, financial innovations have an important influence on a bank's Return on Assets and Return on Equity. Due to the significant risks associated with technology, financial innovations must be operationalized carefully.

According to the research, commercial banks' innovation on a variety of fronts has a substantial impact on their bottom line. The study concludes that technology is important for enhancing the performance of the Country's commercial banks. For the various banks to be competitive in the sector, they must continue to invest in cost-effective technology.

The limitations of the study "The Impact of Information Communication Technology and Financial Innovation on the Financial Performance of Chinese Commercial Banks" may include The study relies on secondary data collected from financial reports of Chinese commercial banks listed on the China Stock Exchange. The accuracy and fullness of this data may be subject to limitations, such as reporting errors or discrepancies across different banks.

The study efforts on a specific sample of commercial banks listed on the China Stock Exchange, which may not be fully representative of the whole banking sector in China. The findings may not be generalizable to all Chinese commercial banks, especially smaller ones. Limitations related to the research design, and statistical techniques; expectations made in the analysis could influence the sturdiness and reliability of the study results.

Addressing these limitations and considering them in the clarification of the study findings can help provide an extra nuanced understanding of the impact of ICT and financial innovation on the financial performance of Chinese commercial banks.

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