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AI for Financial Inclusion: Bailing out the Unbanked in China

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Abstract: The purpose of this study is to explore the role of artificial intelligence (AI) in promoting financial inclusion for the unbanked population in China. Based on reviewing the literature related to theories of financial inclusion and AI in financial inclusion, this study adopted a quantitative research methodology to carry out an online questionnaire survey on 62 valid participants, including bank staff, unbanked individuals, and banking users to understand their perceptions of AI-driven financial services, AI's impacts on financial access for the unbanked population, and challenges in adopting AI for financial inclusion. The findings show that most participants recognised the convenience of AI-driven financial services, the ease of use of AI-driven banking applications, the security of AI systems in handling financial transactions, and AI-driven financial services' protection of personal data privacy. In addition, AI-driven financial services made the Chinese unbanked population easily access banking services at low costs, get loans through AI-driven credit evaluation, and offer personalised financial products. However, financial institutions faced a digital divide, lack of digital literacy, privacy and security challenges, and ethical challenges when adopting AI for financial inclusion.

1. Introduction

Although China has achieved a certain degree of economic growth and technological progress in recent years, financial exclusion is still a major challenge it currently faces. It hinders the individuals' economic opportunities and negatively affects China's economic and social development. China's unbanked population faces some barriers (such as remote geographical location, limited credit history, high costs, etc.) to achieving financial inclusion [1], which are prominent in the vast rural areas of China. Artificial intelligence (AI) may extend financial services to the unbanked population and solve long-standing financial exclusion issues. In China, financial institutions represented by banks have improved customers' access to financial services using mobile payment or digital platforms [2]. However, fewer scholars have studied the potential of AI to satisfy the needs of the unbanked population. Very few researchers have studied the impact of AI-driven financial services on the Chinese unbanked population and potential risks or challenges to financial inclusion, let alone quantitative studies on this topic. Hence, this study aims to explore how AI can be used to promote financial inclusion to bail out the unbanked population in China. Its significance lies in bridging the

research gaps and providing implications for financial inclusion policies and practices in China. This study is composed of five sections. After the introduction, Section 2 will critically review the relevant literature on the definition, significance, and barriers to financial inclusion, theoretical foundations of financial inclusion and AI adoption, and AI in financial inclusion. Section 3 will justify the methodology, involving the quantitative research design, sampling strategy, and data collection method. Section 4 will analyse the quantitative data collected and discuss the findings. Section 5 will summarise the key findings and make recommendations for future research.

2. Literature Review

2.1 Definition, significance, and barriers to financial inclusion

The World Bank [3] provided a classical definition for financial inclusion, which means that the individuals and enterprises can obtain useful and affordable financial products and services (such as savings, credit, insurance, payment, etc.) that meet their needs by responsible and sustainable means. Financial inclusion plays an important role in promoting economic growth [4], enhancing social inclusion [5], and reducing poverty [6]. Scholars roughly divide barriers to financial inclusion into two types, namely supply-side barriers and demand-side barriers. For supply-side barriers, Fungáčová et al. [7] believed that insufficient physical infrastructure is an important barrier to financial inclusion, especially in vast rural and remote areas of China. For demand-side barriers, financial illiteracy and insufficient awareness of financial knowledge [8], cultural and social norms and high costs related to keeping bank accounts [5] are major barriers to financial inclusion.

2.2 Theoretical foundations of financial inclusion and AI adoption

Financial inclusion theories focus on the improvement of the penetration and accessibility of financial services, especially for vulnerable groups. Diamond's [9] financial intermediation theory lays the foundation for understanding financial institutions' role in handling information asymmetry and high transaction costs. Sen's [10] capability approach also helps to understand financial inclusion. It highlights the significance of improving personal capabilities to live the life they cherish. In academia, there are two major theoretical models that may be used to explain the adoption of AI in finance. One is the technology acceptance model (TAM). In this model, Davis [11] put forward two determining factors of users' adoption of a new technology, namely perceived usefulness and perceived ease of use. TAM is effective in explaining user adoption of a new technology (such as AI, etc.) and has high utility in research. The other is the unified theory of acceptance and use of technology (UTAUT). It considers individual and environmental factors, and adds social influence and facilitating conditions [12]. Thus, UTAUT offers a comprehensive framework for this study to know AI adoption for financial inclusion.

2.3 AI in financial inclusion

The studies of many scholars [1, 13] have shown that AI has been widely used in the finance field. It has greatly changed traditional banking businesses and promoted financial inclusion. A major application of AI is credit score and risk evaluation. According to Óskarsdóttir et al. [13], AI algorithms help analyse a large amount of data (such as transaction data, mobile phone usage, etc.) to evaluate creditworthiness, particularly for those with little credit history. This is likely to increase the access of unbanked individuals to credit. Yanting et al.[1] believed that AI-driven chatbots and virtual assistants can quickly handle customers' various inquiries, provide them with personalised financial advice, and help them engage in basic banking businesses to make financial services more accessible

and usable. This is favourable for individuals who have insufficient financial knowledge or are not used to the traditional banking interface.

In addition, some scholars [14, 15] have studied the role of AI in promoting financial inclusion. Swamy [15] considered that with AI technologies, financial institutions can greatly improve their operating efficiency and well satisfy the needs of unbanked population. Bapat [14] believed that AI helps promote financial education and literacy. The AI-driven adaptive learning system may offer customers personalised financial education and customised learning experiences according to their personal needs. This can largely draw close the knowledge gap, which might deter the unbanked population from accessing to and using required financial services. Moreover, the predictive ability of AI also plays a major role in promoting financial inclusion [16].

3. Methodology

This study adopted a positivist research paradigm to solve the research question of how AI technologies can be effectively used to promote financial inclusion to bail out the unbanked population in China. This paradigm holds that reality does exist independently of researchers and can be measured objectively by scientific methods [17]. It helped the researchers to quantitatively study the relationship between the adoption of AI and financial inclusion. Under this research paradigm, this study used the questionnaire to collect the quantitative data. This method enabled the researcher to collect standardised data from a large number of samples to test the role of AI in financial inclusion [18]. The questionnaire included 14 closed-ended questions (see Appendix), using the 5-point Likert scale to measure participants' perceptions of AI-driven financial services, impacts of AI on financial access for the unbanked population, and challenges in adopting AI for financial inclusion. This method was helpful for statistical analysis and could draw generalised findings [17]. Additionally, the questionnaire was initially compiled in English and then translated into Chinese to guarantee that participants can understand relevant questions well. Specifically, with the stratified random sampling, this study extracted 90 participants from three groups of Chinese bank staff, unbanked individuals, and banking users with the help of several social media (such as WeChat, Douyin, etc.). Each stratum included 30 participants to make meaningful intergroup comparisons. This could guarantee randomness and the proportional representation of each group [18].

Considering that online surveys can effectively reach geographically dispersed participants, the researcher conduct the survey through an online questionnaire survey platform (https://www.wjx.cn/). Meanwhile, the online platform guaranteed efficient data collection and automatic data entry, and decreased possible errors in data processing [19].

4. Findings and Discussion

4.1 Demographic information of valid participants

90 participants were invited to participate in the survey, while 62 of them ultimately completed the questionnaire. Thus, this study analysed the data from these 62 valid participants. The analysis focused on their demographic information, perceptions of AI-driven financial services, impacts of AI on financial access for the unbanked population, and challenges in adopting AI for financial inclusion.

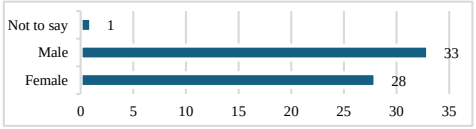

Figure 1: Gender of participants

As shown in Figure 1, there were 28 females and 33 males, accounting for 45% and 53% of total valid samples respectively.

In the survey, there were 28 participants aged more than 55, followed by 21 participants aged 46-55. The two groups took the total proportion of 79%. Relatively, there were fewer participants aged 18-45, only accounting for 21% of total participants (Figure 2).

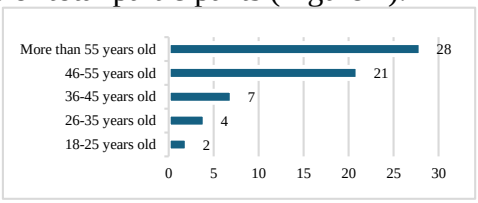

Figure 2: Age group of participants

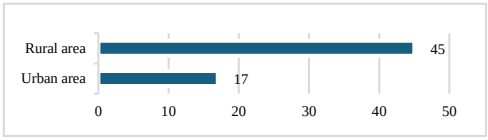

Figure 3: Living place of participants

As can be seen from Figure 3, 45 participants are currently living in rural areas of China, while only 17 participants are living in urban areas, with the proportion of 27%.

Moreover, among 62 participants, there were 21 unbanked individuals, 21 banking users and 20 bank staff (see Figure 4).

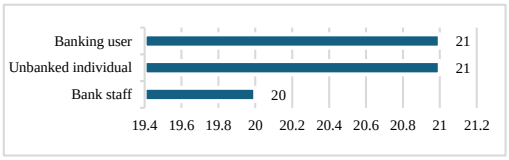

Figure 4: Identity of respondents

The above findings show that there were more males than females participating in the questionnaire survey. Most of them were more than 45 years old, living in rural areas of China. They were generally evenly distributed into three groups unbanked individuals, banking users, and bank staff.

4.2 Perceptions of AI-driven financial services

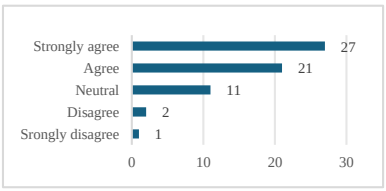

Figure 5: Participants' perception of the convenience of AI-driven financial services

In the survey, 21 participants agreed and 27 participants strongly agreed that AI-driven financial services are more convenient than traditional banking services, with the total percentage of 77%. Meanwhile, 11 participants (18%) held a neutral perception of this topic, while three participants (5%) of participants held a negative perception (see Figure 5). This shows that more than three quarters of participants recognised the convenience of AI-driven financial services.

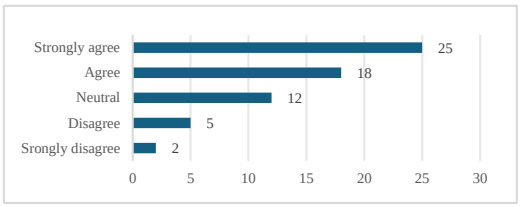

Figure 6: Participants' perception of the ease of use of AI-driven banking applications

Figure 6 shows that 43 participants (69%) agreed or strongly agreed that AI-driven banking applications are easy to use, while seven participants (11%) held the opposite perception. At the same time, 12 participants (20%) held the neutral perception of this statement. This means that nearly 70% of participants recognised the ease of use of AI-driven banking applications, which is related to the efforts of Chinese financial institutions represented by banks in improving their AI-driven banking applications.

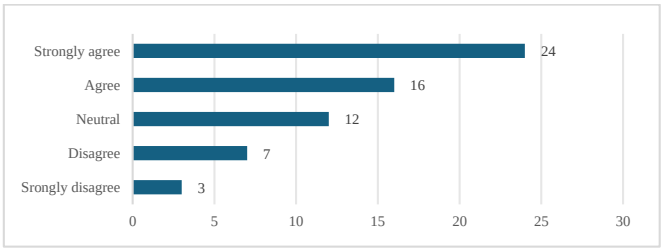

Figure 7: Participants' perception of the security of AI system

As can be seen from Figure 7, 40 participants (65%) agreed or strongly agreed that AI systems can securely handle financial transactions, but 10 participants (16%) held the opposite perception. Additionally, 12 participants (19%) held a neutral perception of this statement. This indicates that 65% of participants recognised the security of AI systems in handling financial transactions.

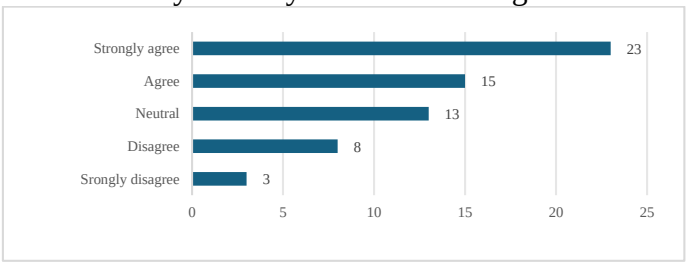

Figure 8: Participants' perception of the protection of personal data privacy

Figure 8 shows that 38 participants (61%) agreed or strongly agreed that AI-driven financial services can well protect personal data privacy, but 11 participants (18%) held the opposite perception. Meanwhile, 13 participants (21%) held the neutral perception of this statement. This means that over 60% of participants recognised AI-driven financial services' protection of personal data privacy.

4.3 AI's impacts on financial access for the unbanked population in China

From Table 1, it can be clearly seen that the average scores for these four questions were more than 3.70. Relatively, Q9 and Q12 scored higher than Q10 and Q11. This shows that these participants recognised AI's important impacts on financial access for the unbanked population in China. These impacts were mainly reflected in the accessibility, affordability and appropriateness of financial services. In China, AI has greatly improved financial institutions' ability to reach and serve the unbanked population. With smartphones and AI-driven chatbots, they can easily access banking services at a lower cost. AI-driven credit evaluation makes it easier for them to get loans, and AI

provides them with personalised financial products that satisfy their needs.

Table 1: Participants' perceived AI's impacts on financial access for Chinese unbanked population

Questions	Average score
9. AI-driven financial services make it easier for the unbanked population to access banking services.	4.17
10. AI reduces the cost of their access to banking services.	3.89
11. AI-driven credit evaluation makes it easier for them to get loans.	3.74
12. AI provides them with personalised financial products that satisfy their needs.	4.03

4.4 Challenges in adopting AI for financial inclusion in China

Through the analysis of survey data, this study identified some of the major challenges in adopting AI for financial inclusion in China.

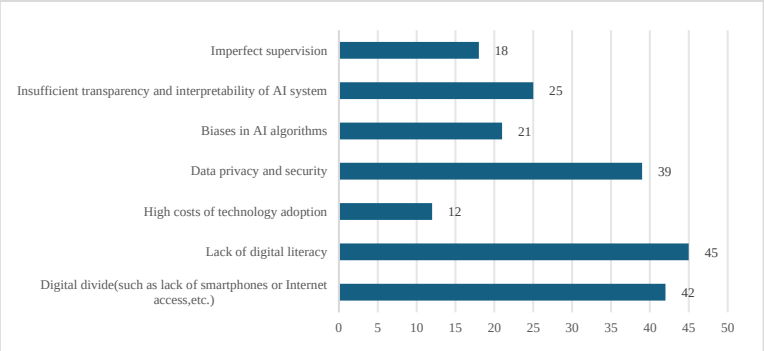

Figure 9: Participants' perceived challenges in adopting AI-driven financial services

The first was technological challenges. As presented in Figure 9, the lack of digital literacy (45, 73%) and the digital divide (such as lack of smartphones or Internet access, etc.) (42, 68%) were two major technological challenges. The second was the data privacy and security challenge, which was considered by 39 participants (63%) as a major challenge in adopting AI for financial inclusion in China. AI systems often rely on large amounts of data to work effectively. Protecting the data security and privacy of vulnerable groups is indeed a major challenge for China. The third was the ethical challenge. In the survey, the insufficient transparency and interpretability of AI systems as well as biases in AI algorithms were considered two major ethical challenges by 25 participants (40%) and 21 participants (34%) respectively. The fourth was the regulatory challenge. 18 participants (29%) believed that imperfect supervision was a challenge for China to adopt AI-driven financial services to achieve financial inclusion. Relatively, fewer participants (12, 19%) perceived high costs of technology adoption as a major challenge.

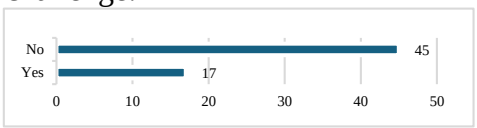

Figure 10: A manual interaction option for more complex financial decisions

As shown in Figure 10, only 17 participants (27%) perceived that AI-driven financial services should include a manual interaction option for more complex financial decisions. This means that balancing AI automation and human-computer interaction is not a major challenge in adopting AI for financial inclusion in China.

4.5 Discussion

In this study, the findings on participants' perceptions of AI-driven financial services were

consistent with Davis's [11] TAM theory that holds that perceived usefulness and ease of use are two key factors in determining the adoption of a technology. More than 68% of participants agreed with the convenience of AI-driven financial services and ease of use of AI-driven banking applications, which shows strong perceived usefulness and may bring higher adoption. Additionally, the findings also supported Venkatesh et al.'s [12] UTAUT, because users' positive perceptions of the utility and usability of AI could promote their acceptance of AI-driven financial services. The findings regarding the impacts of AI on financial access for Chinese unbanked population demonstrated Sen's [10] capability approach, indicating that AI-driven financial services could improve the individuals' capability to effectively manage finances. The higher average scores of accessibility and personalised products suggested that AI improves the individuals' ability to effectively access and use financial services. This upheld Diamond's [9] financial intermediation theory, because AI allows financial institutions to decrease information asymmetry and transaction costs, especially by means of alternative credit evaluation and cost reduction.

Moreover, the findings showed that digital literacy and digital divide are two major technological challenges, which were consistent with the findings of Grohmann et al. [8] on the role of financial literacy in financial inclusion. Serious concerns about data privacy and security were in line with infrastructure-related challenges identified by Fungáčová et al. [7]. The ethical challenges of AI transparency and algorithmic bias demonstrated the emphasis of Demirgüç-Kunt et al. [5] on removing structural barriers to financial inclusion. These findings implied that AI has much to offer in promoting financial inclusion, but the solution to these challenges demands considerations into technological and social dimensions of financial inclusion [15].

Generally, this study is of great significance in understanding AI's role in promoting China's financial inclusion, but it also has some limitations. For example, the sample size of 62 valid participants was relatively small, which largely limited the generalisation of research findings in a wider Chinese population. In addition, the rapid technological change in AI and financial services means that some research findings may be outdated in the near future. This study depended largely on participants' answers, but their perceptions may not always be consistent with the objective measurement of the impacts of AI on financial inclusion. Moreover, although the quantitative research methodology provided a comprehensive understandings, it was impossible to deeply explore the impacts of AI on China's financial inclusion.

5. Conclusion

By employing quantitative research methodology and collecting survey data, this study explored AI's role in promoting financial inclusion for Chinese unbanked population from different perspectives. Generally, most participants recognised the convenience of AI-driven financial services, the ease of use of AI-driven banking applications, the security of AI system in handling financial transactions, and AI-driven financial services' protection of personal data privacy. In addition, AI's impacts on financial inclusion were large. AI-driven financial services made Chinese unbanked population easily access banking services at low costs, get loans through AI-driven credit evaluation, and offer them with personalised financial products. Whereas, this study also found some challenges in adopting AI to promote financial inclusion, mainly including digital divide, lack of digital literacy, privacy and security challenges, and ethical challenges. These findings have some implications for financial inclusion policies and practices in China. For example, financial institutions and policymakers should give priority to narrowing the digital divide, especially the digital divide between urban and rural areas. They should also cooperate to establish sound data protection standards and practices to drive the growth of benefits while protecting customers' privacy information. Moreover, financial institutions need to develop comprehensive digital and financial

literacy plans and guarantee the transparency and interpretability of their AI systems.

In view of the limitations of this study, future research can improve it from the following aspects to expand the research findings. Firstly, future research is recommended to carry out questionnaire survey on about 300 participants to ensure the representativeness of samples and improve the generalisation of research findings. Secondly, besides quantitative research, future research can also carry out qualitative research to study the impact of AI on the financial inclusion of different regions and population groups in China deeply. Thirdly, future research may carry out vertical research to track the long-term impacts of AI-driven financial services on financial behaviours and outcomes of people who previously did not have bank accounts. The solutions to these limitations will offer more comprehensive and feasible insights for Chinese financial institutions and policymakers. They are likely to develop more targeted AI-driven financial inclusion strategies to better satisfy the needs of unbanked populations while considering regional differences and long-term impacts.

References

[1] Yanting Z, Ali M. Artificial Intelligence, Digital Finance, and Financial Inclusion: A Conceptual Framework. In: Leong CM, Ali M, Raza SA, Puah CH, Eksi IH, editors. Financial Inclusion across Asia: Bringing Opportunities for Businesses. Leeds: Emerald Publishing Limited; 2023. pp. 77-85.

[2] Yang T, Zhang X. FinTech adoption and financial inclusion: Evidence from household consumption in China. Journal of Banking & Finance. 2022; 145:106668. Available from: https://doi.org/10.1016/j.jbankfin.2022.106668

[3] The World Bank. Financial Inclusion Overview [Internet]. 2022. Available from: https://www.worldbank.org/en/topic/financialinclusion/overview

[4] Kim DW, Yu JS, Hassan MK. Financial inclusion and economic growth in OIC countries. Research in International Business and Finance. 2018; 43:1-14. Available from: https://doi.org/10.1016/j.ribaf.2017.07.178

[5] Demirgüç-Kunt A, Klapper L, Singer D, Ansar S, Hess J. The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. World Bank Group. 2018. Available from: https://doi.org/10.1596/978-1-4648-1259-0

[6] Klapper L, El-Zoghbi M, Hess J. Achieving the sustainable development goals: The role of financial inclusion. Washington, D.C: CGAP; 2016.

[7] Fungáčová Z, Weill L. Understanding financial inclusion in China. China Economic Review. 2015; 34:196-206. Available from: https://doi.org/10.1016/j.chieco.2014.12.004

[8] Grohmann A, Klühs T, Menkhoff L. Does financial literacy improve financial inclusion? Cross country evidence. World Development. 2018; 111:84-96. Available from: https://doi.org/10.1016/j.worlddev.2018.06.020

[9] Diamond DW. Financial intermediation and delegated monitoring. The Review of Economic Studies. 1984; 51(3):393-414. Available from: https://doi.org/10.2307/2297430

[10] Sen A. Development as freedom. Oxford: Oxford University Press; 1999.

[11] Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly. 1989; 13(3):319-340. Available from: https://doi.org/10.2307/249008

[12] Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: Toward a unified view. MIS Quarterly. 2003; 27(3):425-478. Available from: https://doi.org/10.2307/30036540

[13] Óskarsdóttir M, Bravo C, Sarraute C, Vanthienen J, Baesens B. The value of big data for credit scoring: Enhancing financial inclusion using mobile phone data and social network analytics. Applied Soft Computing. 2019; 74:26-39. Available from: https://doi.org/10.1016/j.asoc.2018.10.004

[14] Bapat D. Exploring antecedents to financial management behavior for young adults. Journal of Financial Counseling and Planning. 2019; 30(1):44-55. Available from: https://doi.org/10.1891/1052-3073.30.1.44

[15] Swamy V. Financial inclusion, gender dimension, and economic impact on poor households. World Development. 2014; 56:1-15. Available from: https://doi.org/10.1016/j.worlddev.2013.10.019

[16] Jagtiani J, Lemieux C. Do fintech lenders penetrate areas that are underserved by traditional banks? Journal of Economics and Business. 2018; 100:43-54. Available from: https://doi.org/10.1016/j.jeconbus.2018.03.001

[17] Bryman A, Bell E. Business research methods. 5th ed. Oxford: Oxford University Press; 2018.

[18] Creswell JW, Creswell JD. Research design: Qualitative, quantitative, and mixed methods approaches. 5th ed. SAGE Publications; 2018.

[19] Regmi PR, Waithaka E, Paudyal A, Simkhada P, Teijlingen EV. Guide to the design and application of online questionnaire surveys. Nepal Journal of Epidemiology. 2017; 6(4):640-644. Available from: https://doi.org/10.3126/nje.v6i4.17258