The Effect of Digital Financial Inclusion on Bank Efficiency

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Abstract The growing development of digital technology has profoundly alter the financial industry. This paper would like to examine the effect of the digital financial inclusion on the bank efficiency. The digital financial inclusion will be measured by the digital payment, while the bank efficiency by the lending-deposit spread. Based on the country level data from Global Financial Development Index database issued by The World bank, this paper found the significant effect of digital financial inclusion on the bank efficiency. This result reflects the significance of financial inclusion in the digital form on the improvement of performance of banking sector.
Keywords *Digital, financial inclusion, bank, efficiency*

INTRODUCTION

The availability and equivalence of opportunities to obtain financial services are commonly acknowledged as financial inclusion. It defines a process through which people and organizations may acquire suitable, inexpensive, and well-timed financial goods and services. According to the World Bank, an estimated 1.7 billion persons worldwide did not own an account of bank in 2018. Women and countryside poor people, who are repeatedly left out of financial institutions, experience discrimination, and belong to disadvantaged or vulnerable populations, made up a sizable portion of the unbanked population.

Financial inclusion development also in line with the international agenda to improve the wellbeing of societies particularly in developing countries. In the 2030 Sustainable Development Goals, financial inclusion assist to achieve an intention in eight out of seventeen goals, financial inclusion is positioned importantly as a facilitator of other goals. These comprise SDG 1, which emphases on poverty elimination, SDG 2, which purposes to eradicate starvation, attain food security, and encourage sustainable food production, SDG 3, which highlights health and welfare, SDG 5, which targets to realize gender equivalence and provide economic empowerment for women, SDG 8, which boosts economic and jobs development, SDG 9, which supports manufacturing, infrastructure and innovation, and SDG 10, which attentions on decreasing inequality. Better financial inclusion through enlarged mobilization of savings for consumption and investment that can promote growth is also implicitly a part of SDG 17's focus on increasing the means of implementation (UNCDF, 2022).

As one of the formal financial service provider, banks will be impacted by the outcome of financial inclusion process. The more successful financial inclusion in certain country means the more customers for banks in that particular economy and vice versa. Therefore, financial inclusion could influence the performance of the industry of banking in a country. Many scholars have investigated the effect of financial inclusion on banking stability, and they found a significant effect on it ((M Mostak Ahamed & Sushanta, 2019; Ghosh, 2022; Pham & Doan, 2020).

Currently, the development of Technology-enabled innovations offer a chance to advance financial inclusion. Nowadays, digital financial services are getting more accessible to those who were previously excluded and so this encourage the financial inclusion in the more sophisticated way. The type of services offered are varies and renew time to time, these include mobile money, virtual accounts, electronic payments , credit, insurance and combinations of these. With regard to the relationship between digital financial inclusion and performances of banking industry, it is found that digital financial inclusion positively influence the banking stability (Banna & Alam, 2021).

There is few articles that study the association between financial inclusion and bank's efficiency. There are two papers that discuss this issue and produce the similar conclusion that financial inclusion has a positive and substantial result on bank's efficiency (M Mostak Ahamed, Ho, Mallick, & Matousek, 2021; M Mostak Ahamed & Sushanta, 2019). However, firstly, still rare article that investigate the effect of digital financial inclusion on bank's efficiency. And secondly the aforementioned papers studied the performance efficiency of bank, while the interest rate efficiency which is measured by spread has not been widely studied by scholars. Therefore, this paper has an objective to investigate the effect of financial inclusion on bank efficiency which is measured by interest rate spread.

The foundation of agency theory is a scenario with two parties—the funder or owner and the management who is confronted with moral hazard issues (Jensen & Meckling, 1976). Applying the concept of agency theory in the area of banking might involve the borrower acting as the agent and the bank acting as the principal (Townsend, 1979). To make some investments, the agent, a party without wealth, borrows money from the principle. The agent is the only one who has unfettered access to the investment project's findings. Therefore, whether or not the agent must offer investment outcomes as is, he has a moral hazard issue. If the principal lacks a method to validate the agent's reports, the agent may make a profit in this situation at the expense of the principal (Canarella & Miller, 2022).

More individuals will have access to official financial services as financial inclusion rises. Most people who are just using financial services will save more than they borrow, which will allow banks to obtain a large quantity of inexpensive capital to their advantage (Allen, Demirguc-Kunt, Klapper, & Peria, 2016). Therefore, the higher the level of financial inclusion, the greater the financial benefits for banks. Financial inclusion contributes to banking to ease its financial burden. With regard to the agency problems with borrowers, financial inclusion reduces this problems.

The rapid development of technology recently has had a huge impact on improving company performance. Technology is one of the factors that can form a company's competitive advantage (Porter, 1990). The acceleration of technological progress throughout the second half of the 1990s was responsible for a significant increase in productivity growth. Although the rate of technical advancement was highest in durable manufacturing, it also rose outside of the manufacturing sector (Basu, Fernald, & Shapiro, 2001).

Digital financial inclusion take the advantage of the latest information technology innovation and apply it in the banking industry. This usage of technology, will benefit the bank in lowering their cost of production. This cost efficiency, added with the cheap deposit from new customer as the financial inclusion level increased, will enable banks to gain more efficiency. One of the measurement of bank efficiency is interest rate spread, which depict

the broad of gap between lending and deposit rate. As the bank utilize more digital financial inclusion, the spread of interest rate can be reduces because banks are more efficient in their operational expenses. Therefore, the hypothesis of this paper is:
 H1, digital financial inclusion will negatively affect bank's interest spread.

METHOD

This section summarizes the various data sources of this article, examines our approach and explains the detail of analyses.

Data from the following sources is combined by us: (a) the indicators for measuring the digital financial inclusion are gathered from Global Financial Inclusion (Global Findex) Database from the World Bank, (b) while all the bank level statistics comprises of data of bank interest spread, bank overhead costs to total assets, bank return on assets and bank cost to income ratio are generated by Bankscope and Orbis Bank Focus, Bureau van Dijk (BvD). All of the data are at the country level, Almost all bank level data are available yearly from 2006-2017, however the digital financial inclusion just available in the year of 2014 and 2017.The estimation model for this research is:

$$\text{Spread } i,j = \alpha 0 + \beta 1 \text{ DFI } i,j + \beta 2 \text{ Control } i,j + \varepsilon\_(i,j \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1$$

Where, the Spread *i*,j is the efficiency of banking sector in country i in year j, measured by interest of lending-deposit spread. DFI *i,j* is Digital Financial Inclusion in country i in year j, measured by Made digital payments in the past year (% age 15+) this is The proportion in percent of respondents who report transactions using mobile money, a credit or debit card, or a mobile telephone to do a payment from an account, or state using the internet to finance bills or to purchase something online, in the past 12 months. It also comprises respondents who state paying bills or transferring remittances straight from a financial institution account or by using a mobile money account in the past 12 months.

While the control variables consist of: bank overhead costs to total assets (%), this is bank's operating expenses of as a share of the all asset held value o. Total assets include total earning assets, bank's cash and due, excluded real estate, fixed assets, goodwill, other intangibles, present tax assets, deferred tax assets, obsolete operations and other assets. Bank return on assets (%, after tax), this is commercial banks' after-tax net income to yearly averaged total assets. Bank cost to income ratio (%), this is the bank's operating expenses as a share of totality of net-interest revenue and other operating revenue.

RESULTS AND DISCUSSION

In this section we examines the effect of financial inclusion on interest of lending-deposit spread. We will provide the result of descriptive statistics, as well as the hypothesis testing result.

Table 1. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Spread	4683	0.025	91.7583	7.89077448	7.711209899
Digital financial inclusion	286	0.69038	98.8767	42.5118488	30.26469499
Return on asset	3870	-29.1169	65.8374	1.37174782	2.247250777
Cost to income	3888	19.8953	218.087	57.166826	16.7327114

Overhead cost to total asset	3868	0.001473	89.4231	3.9065467	3.658937548

The descriptive statistics for each variable are shown in Table 1 above. The number of observation were varied among variables, while other variables observations reached thousands, the number of observation of digital financial inclusion was very limited, just 286, this is because the data for this variable just available in the year of 2014 and 2017. With regards to the descriptive of model variables, Spread has an average of 7.89 and a standard deviation of 7.71. With a standard deviation of 30.26, an average of digital financial inclusion was 42.51. While return on asset and cost to income have averages value of 1.37 and 57.17 respectively, and standard deviation of 2.25 and 16.73 respectively. Finally, overhead cost to total asset has 3.90 and standard deviation 3.66.

Table 2. Regression Financial Inclusion on spread

Variable	Coefficient	T Value	P Value
C	1.521	4.304	0.000
Digital Financial Inclusion	-0.08	-3.080	0.002
Return on Asset	.086	1.786	0.076
Cost to Income	-5.353E-5	-0.008	0.993
Overhead Cost to Asset	0.065	2.479	0.014
Adjusted R Square	0.175		
F Statistic	9.405		0.000
Observations	160		

Table 2 above presents the result of the hypothesis testing estimation using the regression with the dependent variable Ln of spread. We transform the dependent variable in to natural logarithm form or Ln, in order to solve the problem of normality. Before this run the classic assumption test on the data and check the result of normality, heteroscedasticity, autocorrelation and multicollinearity in order to make the unbiased regression, we don't present the result of this test in this article. All of the test were accepted unless for the normality problem, therefore we transform it in to natural logarithm, and thereafter it was cured by this action.

The number of observation of that test was 160. With regards to the goodness of fit of the model, it revealed that the value of coefficient determination or adjusted R square was 0.175. It means that the percentage of the dependent variable's volatility that is predicted by all of independent variables was 17.5 percent. Another indicator to check the goodness of fit is to see the value F statistic. From the table above, the value of F statistic was 9.405 and it is significant in the level of confidence 1 percent. The value of F statistic in this model mean that between-group variance in this model is greater than within-group variation. From those two indicator of goodness of fit of this model it can be concluded that the coefficient of determination of the model was quite limited, however the value of F statistic was satisfied.

Along with independent variable, we deployed three other control variables in this model. They are return on asset, cost to income and overhead cost to asset, from these three variables only overhead cost to asset that significant at the level of confidence 5 percent with the coefficient 0.065. This mean that overhead cost to asset effect the spread with 1 percent of increase of overhead cost to asset changes the level of spread 0.175 percent higher. Another variable that also has significant effect was return on asset, however just in weak

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effect at the level of confidence of 10 percent. While the variable of cost to income did not have explanatory power on spread or not significantly effect.

Regarding to the independent variable, can be seen from the table 2 above that the value of coefficient of digital financial inclusion was -0.08 and the p value was 0.002. This mean that digital financial inclusion has a negative influence on spread, further 1 percent increase of digital financial inclusion will decrease the spread 0.08 percent. The P value was 0.002 mean that this variable significantly affect spread with the level of confident 1 percent. This result is prove that digital financial inclusion has a negative significant effect on spread, and so our hypothesis was accepted and the null hypothesis was rejected.

This result might be because of digital financial inclusion can utilize the most recent advancements in information technology and implement them in the banking sector operational. This lead banks obtain gain from this technological use by having their production costs reduced. Because banks are more effective with their operating expenditures, the spread of interest rate can be reduced as they adopt more digital financial inclusion. This result in line with the finding that financial inclusion in general bring advantage to banks because it will improve the operational efficiency of banks (M Mostak Ahamed et al., 2021; M Mostak Ahamed & Sushanta, 2019). This result also indicate that digital financial inclusion benefit banking industry towards the more economic and finance resilience (Banna & Alam, 2021)

CONCLUSION

The issue of the development of financial inclusion has been rising recently, many international institution as well as the government of developing countries pay their attention to tackle this issue. As the core sector of formal financial service institution, banks are in the forefront of the effort to enhance the financial inclusion. On the contrary, the process of financial inclusion will influence the performance of banking industry. This circumstance leads to the investigations by many scholars about the effect of financial inclusion on banks.

This paper would like to investigate the impact of financial inclusion on bank's efficiency, the term of efficiency here is the interest rate efficiency that is measured by the lending and deposit rate spread. Using the country level data in the international level, and using the regression as the analysis method. Based from 160 observations, it is revealed that digital financial inclusion has a negative and significant effect of bank spread. This mean that the higher the digital financial inclusion will lower the spread and vice versa. This result reveals that digital financial inclusion has a constructive effect on banking industry to achieve its efficiency that in the end will benefit its customer and the society.

The limitation of this paper might come from the limited data and variable that could be improve by incorporating the new data and variable from the other sources to the model. Further research in this area could be done by explore more on the effect of financial inclusion on the other aspect of bank performance, such as the cost structure or risk taking behavior. Other direction of the future research also come from the investigation the difference type of digital financial inclusion tools or indicator as the development on the digital technology are fast and diverged. Finally, we hope that this paper could contribute to the improvement of the banking sector by examining the role of digital financial inclusion on bank's interest efficiency.

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