

# Financial Inclusion on Indonesia's Financial System Stability: The Role Intervening of Financial Technology

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## Abstract

This study aims to express the concept of thinking related to in-depth financial development through financial inclusion with the intervention of new technological developments which are expected to have a positive impact on increasing the stability of Indonesia's financial system. This study uses the Estimation Error Correction Model (ECM). Banking instruments represented by international investment banking have a significant effect in the long term on the stability of the Indonesian financial system. Then on financial inclusion instruments, the number of financial office services has a significant influence on NPL performance which reflects the performance of the financial system. Fintech instruments that encourage financial inclusion, such as the number of ATMs and e-money, do not have a significant impact on financial system stability. Policy recommendations that can be made can be through fintech socialization as a form of financial integration to achieve speed, effectiveness and efficiency of access to unbanked communities. In addition, in the short term, as the socialization and realization of fintech processes are integrated into the unbankable community, the construction of bank branches as financial service offices also needs to be carried out as an effort to expand the deepening of access to financial information and services

**Keywords** : Financial inclusion; Stability; e-money; Fintech  
**JEL Classification** : B26, E42, O23

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## 1. INTRODUCTION

The development of digital technology is currently experiencing rapid development, which caused changes in the ways of social interaction and personal relationships. The digital technology wave has penetrated into various aspects such as transportation, health, education, retail, hotels, and finance. Thus, social and economic integration has made technological progress effectively support economic growth. One of the intensive economic integration is conducting economic intervention in the financial sector through financial technology (FinTech). FinTech is a new instrument that drives financial growth and quickly

achieves financial inclusion. Financial inclusion is one of the elements of inclusive growth that spearheads development. The Asian Development Bank (2020) and the Asian Development Bank (2020) explain the importance of inclusive growth, which refers to equity and the creation of equal opportunities for all segments of life, especially socio-economics towards sustainable community welfare and reducing poverty. Financial inclusion was first introduced through the Leaders Summit in Los Cabos, Mexico in 2012, the G20 through the launch of the Financial Peer Learning Program (FPLP), and the Global Partnership on Financial Inclusion (GPFI) as a form of promotion and launch of financial inclusion. This financial strengthening is also accompanied by the issuance of 9 Innovative Financial Inclusion Principles as the basic rules for developing financial inclusion, including leadership, diversity, innovation, protection, empowerment, cooperation, knowledge, proportionality, and framework.

The development of the financial sector has become an important instrument in the context of equity and poverty alleviation, which can be demonstrated through increased access and financial services (Cihak & Sahay, 2020; Rochon & Monvoisin, 2019). Empirical studies related to fintech and financial inclusion were also conducted by Gabor & Brooks (2017), revealing the importance of the role of fintech-based financial services and access as a form of financial development intervention. The role of digital finance as a financial revolution will increase, strengthen and accelerate financial intervention for those who are far from the reach of formal finance. However, the financial revolution that is experiencing rapid dynamics through financial technology innovation will create opportunities and risks for financial system stability. Therefore, it becomes a consideration for policymakers to carefully address problems and solutions without causing any financial problems (Arner & Taylor, 2016). The FinTech metamorphosis has become an important instrument in accelerating financial inclusion as one of the accelerated development programs (Pambudianti et al., 2020). Efficiency and effectiveness based on the implementation of fintech have resulted in a shift in public interest in the banking sector, both in the payment process, investment, savings, etc. This condition directly accelerates the growth of banking and financial inclusion among the public. Financial inclusion policy innovation is a banking policy package that was set after the global financial crisis. Anwar et al. (2020) explain the importance of inclusive finance to accelerate development, especially in the financial sector among the poor, which means the fintech revolution has become a driver of financial sector growth (Gabor & Brooks, 2017). This revolution leads to a shift in people's mindsets and behavior. People behave more practical, effective, and efficient in doing various things. Activities to access, serve and share information quickly and efficiently. E-money and ATMs are two fintech instruments that provide convenience, effectiveness, and efficiency in carrying out financial activities by the community. Moreover, transactions or saving activities through e-money and ATMs have a high level of security and increase the mobility of people's transactions. Financial development through financial inclusion with technological intervention has been intensively carried out in developing countries that are vulnerable to global shocks, such as Asian countries, including Indonesia. This program was intensively carried out after the 2008 global financial crisis. The aims were to increase the banking sector's access and services and increase financial integration for people who are unable to reach the financial sector. The financial development program through financial inclusion is a form of deepening financial services. To open access for people in the lower middle class to use formal financial services in the form of loans, savings, and transactions more safe, easy, and efficient (Central Bank of Indonesia, 2019). Several financial inclusion programs with fintech integration such as ATMs, e-money, Telkomsel cash, and the provision of credit. The role of financial inclusion and fintech is dominated by payment transaction business activities by 43% and loans by

17%, the rest in the form of aggregators, crowdfunding, personal financial planning, landing, and others (Nizar, 2017). This condition shows that the development of finance through financial technology is an interesting matter to discuss, considering that the financial sector is the main sector in economic stability. The development of financial inclusion supported by technological developments has great power over financial markets, especially for business activities.

However, the role of financial inclusion through fintech integration has not been able to reach the wider Indonesian community, and the dominant contribution of financial inclusion has not been seen in influencing financial system stability. Based on the described background, this study aims to determine the role of financial inclusion supported by fintech in influencing Indonesia's financial stability, which is supported by several financial sector variables.

## **2. CONCEPTUAL FRAMEWORK AND HYPOTHESIS**

The revolution in the financial sector has an important role in improving financial services and people's welfare through financial inclusion. This will affect the stability of the financial system, which can be seen through the performance of the banking sector, such as credit and loans. Financial system stability is driven by the performance of financial variables, including financial inclusion, current assets of banks, the average income of all residents, and direct investment. The synergy that occurs between the variables of the banking sector and financial inclusion through fintech integration will lead to a form of the country's financial stability. Technological developments have resulted in the emergence of new thinking concepts for the economic cycle, especially in the banking sector, which has a major role in the economy. In order to accelerate banking growth and financial development aimed at the public through financial access and services, the banking sector has made various efforts, namely integration of technology into financial inclusion (Ayudya & Wibowo, 2018). The existence of technological developments is expected to be able to contribute to the acceleration of access and financial services and increase the number of accesses for the poor. This study expresses the concept of thinking related to deep financial developments through financial inclusion supported by new technological developments, which are expected to have a positive impact on increasing the stability of Indonesia's financial system. This improvement in financial inclusion performance will boost the performance of the banking sector toward financial system stability. Through banking instruments such as credit, loans, assets, and foreign investment channeled to the banking sector so as to improve financial system stability. Based on the explanation in the conceptual framework of this research, the hypotheses in this study are:

H<sub>1</sub>: Financial inclusion can improve Indonesia's financial stability

H<sub>2</sub>: Financial technology is able to increase financial inclusion in Indonesia's financial stability

## **3. METHODS**

The Error Correction Model (ECM) analysis method is used to determine the long-term, and short-term effects of technological developments integrated into financial inclusion instruments on the stability of the Indonesian financial system, the Error Correction Model (ECM) analysis method is used. This ECM method aims to determine and conclude causal relationships in time series data that have a short time (David et al., 2018). When a regression model has cointegration in the cointegration test, the data can be transformed into the ECM model. They can then be further analyzed to determine the long-term and short-term relationship (Aribaba et al., 2020). Another phenomenon related to

data, when the value of the cointegration is stationary in the long and short term, the model can be transformed into the ECM model (Anwar et al., 2020; David et al., 2018). In addition, through modeling from a theory, can be shown the dynamics of the short-term balance of time series data and can be used to see heterogeneity in data variations (Olivari et al., 2021). This ECM estimate can be seen from the residual relationship between variables from the research model. The data used in this study uses secondary data from various sources, including the Central Bank of Indonesia (BI), the Financial Services Authority (OJK), the World Bank, and International Financial Statistics (IFS), in the form of monthly data starting from 2017-2019.

The specification of the research model with the components of the fintech, financial inclusion, and banking sector variables based on the conceptual framework of this research is as follows:

$$NPL = f(\text{Credit, ATM, Services, E-Money, GDP/CAP, Asset, FDI/GDP}) \quad (1)$$

Then the model is transformed into model econometrics with the integration of coefficients and parameters that will be used as regression estimators becomes as follows:

$$NPL_t = \beta_0 t + \beta_1 \text{Credit}_t + \beta_2 \text{ATM}_t + \beta_3 \text{Service}_t + \beta_4 \text{E-money}_t + \beta_5 \text{GDP/Cap}_t + \beta_6 \text{Asset}_t + \beta_7 \text{FDI/GDP}_t + e_t \quad (2)$$

In testing and modeling ECM, there are several stages of testing the data to proceed to the transformation of the ECM model consisting of a data stationarity test (unit root test) and cointegration test.

In this test, it contains the urgency that each data needs to be stationary to avoid random regression and to find out whether the data has too large a unit root so that the sample data taken is close to the average value (Whang, 2019). The main purpose of this test is to observe the estimated value of the model, which is transformed through differentiation until the time series data used is stationary. There is an assumption that the disturbance variable has no correlation, so in this unit root test, the Augmented Dicky-Fuller (ADF) root test is used by increasing the lag value (Whang, 2019). In this stationarity test, there are three levels of testing consisting of a level with a critical value of 1%, a first difference level with a critical value of 5%, and a second difference level with a critical value of 10% so that it can be seen whether the data is stationary in the unit root test through the critical value of each level. Stationary test equation by using the ADF (King et al., 2017) as follows:

$$\Delta Y_t = \gamma Y_{t-1} + \sum \pi_i = 2 + \beta_i \Delta Y_t + i + t + e_t \quad (3)$$

Then proceed with the cointegration test to continue the data analysis of time series that are not stationary because time series data can deviate from the short-term average (Whang, 2019). This test is used to determine the same degree of integration between variables in the model through the value of the error term in that variable, and there is no unit root. If the variable has a trend with a value that is not too far from other variables, it can be concluded that the variable has a long-term relationship (Flores & Chen, 2018; Gilli et al., 2019). The cointegration test was first introduced by Whang (2019) and further developed by Johansen, so it was called the Johansen Test in cointegration testing. A data or variable is known to have cointegration if both have a general balance by looking at the probability value in the model (King et al., 2017). Cointegration test, which is continued from the ADF test, the equation is as follows:

$$ECT_t = \beta_1 ECT_{t-1} \quad (4)$$

$$\Delta ECT_t = \beta_1 ECT_{t-1} + \sum \pi_i = 1 + \beta_1 ECT_{t-1} \quad (5)$$

Then the model is transformed into the form. The ECM equation is as follows:

$$NPL_t = \beta_0t + \beta_1Credit_t + \beta_2ATM_t + \beta_3Service_t + \beta_4E-money_t + \beta_5GDP/Cap_t + \beta_6Asset_t + \beta_7FDI/GDP_t + \beta_1Credit_{t-1} + \beta_2ATM_{t-1} + \beta_3Service_{t-1} + \beta_4E-money_{t-1} + \beta_5GDP/Cap_{t-1} + \beta_6Asset_{t-1} + \beta_7FDI/GDP_{t-1} \quad (6)$$

#### 4. RESULTS

Testing of banking and fintech instruments using the ECM method went through several testing stages consisting of a data stationarity test and a cointegration test before entering the ECM estimation stage.

**Table 1.** Data Stationarity Test Result

NPL	Credit	ATM	Services	e-Money	GDP/Cap	Asset	FDI/GDP
0.0000*	0.0000*	0.0000**	0.0000 *	0.0000*	0.0001**	0.0001**	0.0000**

Description: Level 1% (\*), First 5% (\*\*), Second 10% (\*\*\*)

The results of the analysis of the stationary test data in Table 1 show that all independent and dependent variables include NPL, MSME credit, ATM, services, e-money, GDP per capita, and stationary direct investment at each level. NPL, MSME credit, ATM, Services, and stationary e-money at levels with a probability of 0.0000 compared to an alpha value of 1%. Meanwhile, GDP per capita, Assets, and FDI/GDP are stationary at the first difference level with a probability value of less than 5% alpha value.

Then to determine the cointegration between variables and the long-term relationship between variables in the model, cointegration testing was carried out.

**Table 2.** Johansen Cointegration Test

Level	Trace Statistic	Critical Value	Description
1%	209.8777	174.0809	cointegrated
5%	209.8777	161.0777	cointegrated
10%	209.8777	156.2122	cointegrated

Cointegration test results indicate that the current level of 1%, 5%, and 10% of the data indicate cointegration. This condition is shown by comparing the trace statistic value and the critical value. Table 2 shows that at each level there is a cointegration which is indicated by a trace statistic value that is greater than the critical value. In addition, the cointegration test also shows a long-term relationship between variables that is significant in influencing the dependent variable.

Furthermore, data estimation using ECM shows the results that financial services and investment variables have a significant influence on financial system stability with a comparison of alpha values of 5% and 10%, where the number of financial office services represents financial inclusion and FDI represents banking instruments. Meanwhile, the fintech variable does not have a maximum effect on the stability of the financial system. The results of the analysis are presented in Table 3.

The estimation results show that two variables have a significant effect on NPL in the long term, as indicated by the cointegration of the research model, while the inclusion variable is represented by the number of office services which shows a probabilistic value of less than 10% alpha value is  $0.0710 < 0.1$ . Meanwhile, the banking instrument variable is represented by the direct investment banking variable (FDI) with a long-term effect as indicated by the cointegration value, which indicates that the model is cointegrated,

meaning that FDI has a long-term effect on financial system stability. This condition is indicated by a probabilistic value less than 5% alpha value, which is  $0.0166 < 0.05$ . However, other variables do not have a significant effect on banking stability as proxied by the Role of Financial Inclusion through Fintech Integration in Indonesia's Financial System Stability.

**Table 3.** Estimation Results of Error Correction Model (ECM)

Variable	t-statistic	Probability	Information
Asset	-0.26666	0.7099	Not Significant
Service	1.95111	0.0710**	Significant
ATM	1.10201	0,3102	Not Significant
Credit	0.87277	0.3791	Not Significant
e-money	-1.32921	0.1987	Not Significant
FDI	1.20712	0.2081	Not Significant
GDP per Capita	1.02210	0.3992	Not Significant
Asset <sub>t-1</sub>	0,60776	0.4921	Not Significant
Service <sub>t-1</sub>	1.75511	0.1001	Not Significant
ATM <sub>t-1</sub>	-0.82766	0.3466	Not Significant
Credit <sub>t-1</sub>	0.93301	0.2871	Not Significant
e-money <sub>t-1</sub>	1,52221	0.1211	Not Significant
FDI <sub>t-1</sub>	-2.66201	0.0166*	Significant
GDP per Capita <sub>t-1</sub>	0.52011	0,52011	Not Significant

Remarks: (\*) = alpha 5% and (\*\*) = alpha 10%

Analysis of the ECM estimation results shows that financial services provided by the government in the form of financial offices are still an effective financial inclusion instrument in serving the long-term needs of public banking. This condition is due to the reach and ability of the public to understand and fulfill their banking needs. Fintech, such as ATM and e-money, is only affordable by a few layers of society who are more technology savvy. Thus, fintech is only needed for speed and effectiveness of access, not only access to services. Contrary to the lower-middle-class people who need services that are limited in access and outreach, they have not yet reached the stage of effective and efficient financial services. Meanwhile, the number of financial office services such as bank branches that were built in several areas can reach the lower class of society with minimal knowledge of banking. This has become a spotlight and concern for the banking sector to make more efforts related to financial inclusion and depth in local communities. In addition, the FDI variable also shows a significant influence on the stability of the Indonesian financial system in the long term through several direct investments channeled to the banking sector so that it is productive. Those investment implemented in business loans could improve the business cycle and will have an effect on increasing financial system stability in the long term, supported by good performance in financing the business sector. Meanwhile, fintech instruments have not been able to contribute to financial system stability due to weak financial depth, whereas fintech is only accessed by the upper-middle-class community. At the same time, most of the credit and loans are needed by the lower middle class to meet their capital needs. Technological developments provide a stimulus to financial policy by accelerating financial growth through financial inclusion and financial system stability. The constellation of banking and fintech can be seen in Table 4.

**Table 4.** The Constellation of Banking and Fintech

	FY19	FY20	ΔYoY	3Q20	4Q20	ΔQoQ
Branch Banking	14,586	12,446	-14,7%	3,023	3,232	6,9%
ATM	2,322	2,020	-13,0%	497	527	6,0%
Internet Banking	10,701	11,308	5,7%	2,830	3,208	13,3%
Mobile Banking	2,089	2,693	28,9%	694	802	15,6%

\*Transaction value -Quarterly (million)

## 5. DISCUSSION

The development of technology has become an attractive and efficient way to increase access and financial services. To Figure 3, in the 2019-2020 period, there was an increase in financial access through E-money, including internet banking which increased by 5.7 percent, and mobile banking increased by 28.9 percent. The decline occurred in transactions through ATMs, namely the 2019-2020 period, which decreased by 13 percent, and branch banking decreased by 14.7 percent. This condition shows that the public is increasingly aware of the use of technology as a form of accelerating financial growth through transactions and other financial activities. Another thing that is highlighted in financial stability is the existence of financial inclusion through micro small medium enterprise (MSME) credit which reflects financing of the financial sector to capitalize on improving the welfare of low-income people. This MSME loan reflects financial inclusion in the form of banking sector financing. The number of MSME loans fluctuated in 2000.

In The 2020 period, there are fluctuations in MSME loans, wherein in December 2020, there was an increase in the number of loans for medium-sized enterprises compared to January 2020 of 1.91 percent. Meanwhile, for small businesses, there was an increase in lending in December 2020 by 1.34 compared to the beginning of 2020. Micro-enterprises experienced a downward trend in lending at the end of the 2020 period compared to the beginning of the 2020 period at 3.25 percent. This condition represents MSME businesses in their start-up stage facing several obstacles to maintaining their business. The capability to survive is still rare. When it comes to term of financing, MSMEs are unable to manage their business properly. It tends to stop due to weak management and business risk mitigation. Since the definition of financial inclusion has not been described, several institutions provide different definitions and views. Ejefobihi et al., (2019) define financial inclusion as a form of access and financial services. The role of Financial Inclusion through Fintech Integration in the Stability of the Indonesian Financial System and businesses that are obtained effectively to overcome the problems of inequality and poverty. Westermeier (2018) claims that financial inclusion is access and service according to the type of use of formal financial services based on user needs. Meanwhile, the Asian Development Bank (2020) highlights financial inclusion in terms of equity, that financial inclusion aims to equalize access and formal financial services for marginalized communities so that optimal equity will be achieved and can reduce poverty. Central Bank of Indonesia (2019) defines financial inclusion as an effort to increase access and financial services, especially for the lower middle class to access formal financial services in terms of improving welfare. Based on some of the definitions above, it concluded that financial inclusion is as efforts formed by related institutions to increase the ease of access and services of formal financial services among the public, especially for the unbanked (not familiar with banks) to improve welfare, equity and reduce poverty. Positive financial integration will lead to good financial stability and create development alignment, whereas one sector to be considered is financial development.

Financial development is included as an effort to accelerate growth in the financial sector. The goals are to stabilize the financial system financial markets and increase the role of financial institutions in people's lives and contribute to overall and sustainable economic development. The relationship between the financial sector and growth has become a topic of intense discussion and is in a position of ambiguity that has been debated by many researchers (Alexiou et al, 2019). Various theoretical and empirical conceptual frameworks have not yet been able to solve and find a point of illumination (Sainz et al., 2018; Prochniak & Wasiak, 2017; Saqib, 2018). There are many empirical debates regarding the role of the financial sector in influencing economic growth. Various studies show that financial institutions do not necessarily make a major contribution to economic growth and development, while researchers who are pro-contribution to financial sector development explain that financial development influences economic stability and growth. Sethi & Acharya (2018) prove that financial integration through financial inclusion in financial institutions plays an important role in economic development. Adusei (2019) broadened his view regarding the role of the financial sector in encouraging economic development and growth through investment and innovation by providing credit to entrepreneurs. It would play as a point of business expansion and encourage innovation. In the end, to encourage economic circulation through the business cycle. While another empirical study conducted by Boukhatem (2016) shows a selective picture of financial development on poverty alleviation and economic development through increasing sources of access to funding using a sample of 67 low- and middle-income countries over 26 years. Later on, Dewi et al. (2018) used the private credit variable in financial development efforts in poverty alleviation.

Other empirical studies related to the integration of fintech in financial inclusion were conducted by Gabor & Brooks (2017). They concluded that the concept of financial integration through fintech is not only based on the ability to access for the unbanked. It is also about the necessity of risk mitigation in accessing financial capital so that financial development through fintech would not bring a negative impact on the implementation of a policy framework. Above all, the development of fintech is important to improve services and access to finance in developing countries in a quick and efficient way (Thanh Tam & Nhat Hanh, 2018). The development of this fintech has the potential to increase promotion and social security in transactions and other financial activities. The need for technological innovation in financial inclusion for the range of access and services, especially for unbankable people. It would bring cooperation or partnerships between banks and technology companies as practiced by some panelists that form modeling technology development by focusing on technology as market driver. It surely will drive financial markets (Asian Development Bank, 2020). The synergy between banking and technology companies through the development model of financial technology and financial inclusion in improving access and financial services can be through capital lending, credit services, savings, investment, and banking assets so that it will have an impact on improving the performance of the banking sector which will affect the stability of the finance system. The urgency of financial inclusion carried out by Bank Indonesia is expected to be able to increase the knowledge and ability of the community to become unbanked in terms of service provision or service demand and public access (Central Bank of Indonesia, 2019). In addition, the Central Bank of Indonesia (BI), as the holder of the Indonesian financial services authority and the highest managerial level of Indonesian banking, has several objectives related to the urgency of financial inclusion, such as increasing economic efficiency through the speed of access and financial services, encourage financial system stability through banking activities, minimize shadow banking, deepen financial market share, increasing the human development index through the ability to access and banking



services with new technology development models, support economic growth to achieve sustainable economic growth, reduce poverty and reduce income inequality.

## 6. CONCLUSION

Based on the results of the analysis, it is shown that banking instruments represented by international investment banking have a significant effect in the long term on the stability of the Indonesian financial system. Financial inclusion instruments and the number of financial office services have a significant influence on NPL performance which reflects the performance of the financial system. Meanwhile, fintech instruments that encourage financial inclusion, such as the number of ATMs and e-money, do not have a significant impact on the performance of financial system stability. Based on the discussion and analysis, it can be concluded that the role of fintech has not been maximized in influencing financial inclusion and stability. This is motivated by the fact that the development of fintech has not been able to penetrate the lower layers of society that dominate economic activity. Fintech can only be reached by people who have access to technology to achieve speed, effectiveness, and efficiency through ATMs and E-money as new financial technology breakthroughs. This means that the socialization of fintech as a form of financial integration needs to be recommended as a policy to achieve speed, effectiveness, and efficiency of access for the unbanked community. While in the short term, the construction of bank branches as financial service offices also needs to be carried out as an effort to expand the deepening of access to financial information and services.

This research has not been able to explain the conditions of financial inclusion, financial system stability, and the latest financial technology developments, especially in the midst of the COVID-19 pandemic. The data used were in 2017-2019 as its limitation. Further researchers can explore the conditions of financial inclusion, financial system stability, and financial technology developments in the midst of the COVID-19 pandemic and in the new normal era.

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