The effect of digital finance on financial stability

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CHRONICLE	ABSTRACT
	Digital finance plays a major role in achieving financial inclusion targets which have a positive impact on economic growth and people's welfare. One of the main elements of digital finance is digital payments, which are increasingly playing a role with the presence of e-commerce and financial technology (fintech). Apart from these positive impacts, digital finance is also feared to have a negative impact on financial system stability, especially in relation to systematic risk. The purpose of this study was to determine the role of risk factors in digital financial relations and financial stability. The research method used is the Multiple Linear Regression Model and Moderating Regression Analysis (MRA), using 120 samples of panel data for 10 years (2010 to 2019). The results show that market risk can moderate the influence of digital finance on financial stability, so that increased systematic risk will reduce the positive impact of digital finance on financial stability.

1. Introduction

Currently, financial inclusion is a target that all countries must achieve, financial inclusion is believed to have a positive impact on economic growth and the prosperity of society. Therefore, studies and discussions on the importance of financial inclusion for economic growth and social welfare are new topics and attract the attention of researchers (Pazarbasioglu et al., 2020; Durai & Stella, 2019; Akinwale et al., 2018; Ozili, 2018; Bruhn & Love, 2014; Cardona et al., 2013; Beck et al., 2007). Financial inclusion is a condition in which every member of the community has access to a variety of quality, effective and efficient financial services. Increasing public accessibility to financial service products will further reduce the level of economic and social inequality in the community and increase economic growth which in turn is expected to improve the welfare of the community. One of the efforts to achieve this financial inclusion target is through digital finance, namely financial products and services that use internet technology that makes it easier for people to directly access various kinds of payments, shopping, savings, investments, including loan and credit facilities. Among these digital financial elements, the payment facility is the service that is experiencing the fastest development and contributes greatly to the achievement of financial inclusion targets. Therefore, in this study we will focus on digital payment services. Almost all countries started implementing digital payments with non-cash or payment electronification programs which later developed into an integrated digital payment instrument. The use of digital payment systems as one of the main elements of digital finance has been accelerating by the significant growth of online shops (e-commerce) and the presence of financial technology (fintech). This condition is very helpful in achieving the target of financial inclusion, but on the other hand it has raised concerns from various parties, both monetary authorities and academics, about the impact on financial stability. It is hoped that increasing digital payments as the main element of digital finance and driving financial inclusion will not have a negative impact on financial stability, which the monetary authority must always maintain, but it is expected to be able to help authorities maintain financial stability. However, there is always concern about the negative impact of digital finance on financial stability, this has motivated researchers to conduct research on this topic (Pazarbasioglu et al., 2020; Nelson, 2019; Ozili, 2018; Nelson, 2018). Regarding

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the concern about the negative impact, a new variable that has emerged as an addition to the topic of the effect of digital finance on financial stability, namely risk factors. The role of this risk factor has not been widely discussed in various studies on this topic, therefore in this study the effect of digital finance on financial stability will consider these risk factors as a moderating variable. So this research is a different and recent study on the topic of the influence of digital finance on financial stability.

2. Literature Review and Hypotheses Development

2.1 Financial stability

There is no standard definition of financial stability or financial system stability, Bank Indonesia defines financial system stability as a condition that enables the national financial system to function effectively and efficiently and is able to withstand internal and external vulnerabilities, so that the allocation of sources of funding or financing can contribute to growth. and national economic stability (BI, 2020). According to the World Bank, a stable financial system is capable of efficiently allocating resources, assessing and managing financial risks, maintaining employment levels close to the economy's natural rate, and eliminating relative price movements of real or financial assets that will affect monetary stability or employment levels (World Bank, 2020). Meanwhile, the financial system is defined as a system consisting of financial institutions, financial markets, financial infrastructure, non- financial companies and households, which interact with each other in funding and / or providing financing for economic growth (BI, 2020). The relationship between digital finance and financial system stability is related to financial infrastructure, that the challenging global business environment has driven banks around the world to be innovative and use alternative delivery channels such as Internet banking and mobile banking (Redda & Surujlal, 2017). Internet technology facilities have made it easier for people to directly access various kinds of payments, savings, credit and even investments. With this convenience, it has stimulated an increase in demand for financing which is beneficial to the economy. However, this growth in financing can have direct implications for financial stability (Utari et al., 2012), this will happen if the growth in financing is achieved by loosening credit terms, high leverage, and insufficient collateral value. Likewise, increasing payment service activities will have an impact on financial stability, according to Nelson (2018) that the health of the payment system is very important for financial stability. There are many financial stability indicators, some of these indicators use banking as an object, even though banks are not the sole financial institution in the financial system, but banks are the main institutions in the financial system, therefore most indicators of financial stability are concentrated on indicators of banking sector health. The way of assessing the internal bank as an indicator is called microprudential indicators. On the other hand, there is also an assessment of macroeconomic indicators which are also called microprudential indicators. Actually, several monetary authorities and governments have formulated an index as a parameter of financial system stability, despite different names such as the Banking Stability Index, Financial Stress Index (FSI), Financial Stability Index, Monetary Conditions Index (MCI), Financial Conditions Index (FCI), and the Financial Stability Condition Index (FSCI). Indonesia also already has a Financial Stability Index (FSI) financial stability index, but because the FSI data cannot be accessed for the purposes of this study, the financial system stability in this study will use data on the percentage of loan availability or the growth of bank loans.

2.2 Digital finance

The definition of digital finance is still diverse, both from the point of view of academics and practitioners, some governments and monetary authorities also define digital finance differently, including the classification of payment data, some of which are still integrated with electronic transactions (PBI, 2018; Ramli, 2020). Digital finance is defined as financial services delivered via cell phones, personal computers, internet, mobile banking, e-wallets, mobile wallets, and credit and debit cards (Manyika et al., 2016; Durai & Stella, 2019). According to Pazarbasioglu et al. (2020) digital financial services are financial services (for example, payments, remittances, and credits) that are accessed and sent via digital channels, including through mobile devices and pre-existing instruments (for example, debit and credit cards) offered primarily by banks. Meanwhile, according to Ozili (2018) digital finance includes all products, services, technology and / or infrastructure that enable individuals and companies to have access to payments, savings, and credit facilities via the internet (online) without the need to visit bank branches or without dealing directly with financial service providers. Based on the latest technological developments, digital finance also includes financial technology (fintech) which offers various investment products in the form of gold which is then referred to as digital gold, stocks, financial derivative products and commodities. Fintech companies are also a financial marketplace that organizes peer-to-peer lending and crowdfunding, so that they can directly bring together lender and borrower, although this function as a financial marketplace is still being debated as a digital financial element that helps achieve financial inclusion. Further about the scope of digital finance in the future is crypto assets, maybe one day crypto assets are considered as part of digital finance that contributes to financial inclusion, this is because crypto assets are allegedly a very effective and efficient means of payment (cryptocurrency). has become an informal means of payment in several developed countries, but it is still debating whether crypto assets are currencies or commodities. Digital financial transactions were first used in developed countries because of the availability of adequate technology and infrastructure. Therefore, previous studies were more in developed countries such as Germany (Bömer & Maxin, 2018), United States (Scott et al., 2017; Jakubik & Moinescu, 2015; Buchak et al., 2018; Wolfe & Yoo, 2018; Jagtiani & Lemieux, 2018; Tang, 2019). However, technological advances are increasingly evenly distributed and internet services are cheap in developing countries, so that currently digital financial transactions are increasingly being used and popular in developing countries (Kanobe et al., 2017; Ramli, 2020), and there is a transition from finance. conventional to a digital-based contemporary economy, the

transformation of the payment system from currency (paper and metal) and paper based (checks, bilyet giro, credit / debit notes) to card based and internet based (Ozili, 2018; Goldfarb & Tucker, 2017). In developing countries that have large areas and large populations, there are many financial technology companies (fintech), startups, internet and mobile banking, smartphone-based payment applications (mobile payment), moreover e -commerce. Digital financial technology has changed the lifestyle and business model, where buying and selling transactions through shops, shophouses, or malls is less attractive and is no longer effective and efficient. Digital finance has indeed started and is growing rapidly in digital payment services, therefore digital finance in this study will focus on digital payment services. The relationship of digital finance and financial stability can be studied through the influence of digital finance on banking as the main financial institution in the financial system. There are not many studies on this topic and the findings are mixed and some still use a qualitative approach due to limited sources of quantitative data. Several findings show negative results that digital finance, especially fintech and peer-to-peer lending, disrupt banking performance & financial stability, such as the empirical findings of Nugroho et al. (2020), Tang (2019), Buchak et al. (2018), Romānova and Kudinska (2016). On the other hand, the influence of digital finance in this case digital payments on financial stability is a positive impact on banking performance which helps banks in lending, expanding the reach of financing, helping people move from cash to non-cash payments. According to Ozili (2018) digital financial services have a long-term positive effect on banking performance, the results of research by Scott et al. (2017) show the significant effect of implementing network-based technology infrastructure and a set of standards for network tele-communication (SWIFT) on banking performance in 6848 banks in 29 countries in Europe and the US. The findings of Li et al. (2017) show a positive relationship between the growth of funding and transactions in fintech companies and the stock returns of US retail banks. Likewise, the findings of Juengerkes (2016) show that with the collaboration between banks and fintech startups, they are possible to gain more trust from their customers and potential complementary effects. Digital finance can help governments, financial and monetary system regulators to exercise control by providing faster early warnings because they also use technology in reporting and data bases. Therefore, we can propose the hypothesis that there is a positive effect of digital finance on financial system stability.

2.2 Systematic Risk

Digital finance is also a phenomenon of globalization in the financial sector which is facilitated by technological advances, this is not only a positive thing in achieving financial inclusion targets which are useful for increasing economic growth and public welfare, but on the other hand this phenomenon has led to the emergence of an integrated financial system without national borders. and the economy. This can expand the possible sources of financial system instability in macroeconomic terms (Mörttinen et al., 2005). The interconnectivity of these interconnected financial transactions will have a chain effect, that is, when difficulties occur in one entity it can be transmitted quickly to other entities in the network. That financial system instability in other countries can easily be transmitted and destabilizes the financial system in any country, in other words, digital financial developments that are expected to help financial system stability will be reduced by increasing macroeconomic risk or systematic risk. Likewise, the negative impact of digital finance on financial stability will increase with increasing systematic risk. Systemic risk is defined as the potential for instability due to contagion in part or all of the financial system due to the interaction of size factors, business complexity, inter-institutional linkages and/or financial markets (interconnectedness), and behavioral tendencies excessive from financial actors or institutions to follow the economic cycle (procyclicality) (PBI, 2014). According to Hodula & Pfeifer (2018) the effect of macroeconomics in this case monetary indicators on financial stability is related to monetary policy transmission channels: the asset-price channel, the bank-lending channel, and the balance-sheet channel. Research on systematic risk or also known as market risk. particularly the risk of transmission related to banking health or financial stability continues to be an interesting topic for researchers, both academics and practitioners. The results of the research of Gai and Kapadia (2010), Caballero and Simsek (2013), and Minoiu and Reyes (2011) found that highly complex networks can increase the likelihood of transmission risk.

The second hypothesis of this study is that systematic risk can mediate the effect of digital finance on financial stability

3. Research Method

This study uses panel data with a period of 10 years, from 2009 to 2019. The data used is 120 samples for 10 years from Bank Indonesia data sources. The data analysis technique used is univariate linear regression and moderating regression analysis (Multiple Regression Analysis/MRA), the analysis tool uses Eviews software.
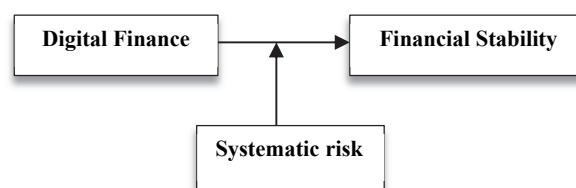

Fig. 1. Conceptual Framework

To examine the effect of market risk as a moderating variable on the relationship between digital finance and financial stability, we use moderating regression analysis (MRA):

$$Y = a + bX + cXM + e \qquad (1)$$

where: Y is financial stability, a: constant, b, c: regression coefficient of each variable, X: digital finance; M: Market Risk, e: error.

Financial stability (Y) is proxied by using the percentage of loan availability by the banking industry.

$$ksk = \{[k(t) - k(t-1)]/ k(t-1)\} \times 100\% \qquad (2)$$

where:

• Ksk: Financial stability;

• K (t): Availability of loans by the banking industry year t;

• K (t-1): Availability of loans by the banking industry, year (t-1).

Digital finance is proxied by internet-based digital payment, namely the volume of electronic money transactions.

$$VT(k) = \{VT(ue)/VT(total)\} \times 100\% \qquad (3)$$

where:

• VT (k): Digital finance;

• VT (ue): Volume of electronic payment transactions;

• VT (total): The total transaction volume of recorded payments.

The proxy for systematic risk or market risk is the percentage of total derivatives by total assets.

$$Rp = \{[Td - TA]/ TA\} \times 100\% \qquad (4)$$

where:

• Rp : Systematic Risk or market risk;

• Td : Total derivative;

• TA : Total Asset.

4. Results and Discussion

The First is the selection of data that meets the requirements, then calculates the tabulated data for each variable value using the variable formula in question. Because the data used are panel data so it is necessary to select a panel data regression approach using the Chow test, Hausman test and Lagrange Multiplier (LM) test, then followed by a model fit test and hypothesis testing:

Table 1
Panel Data Regression Model Selection

Testing	Indicator	P-Value	Selected Model
Chow Test	*Cross-section Chi-square*	*0.0000*	*Fixed Effect*
Hausman Test	*Cross-section random*	0.0454	*Fixed Effect*

Source: Output of Eviews 10

Lagrange Multiplier (LM) testing does not need to be done because the results of the Chow test and the Hausman test show that the appropriate model is the fixed effect model (FEM), while the LM test is used to select the appropriate model between the fixed effect model or the random effect model. The eviews output for the fixed effects model is summarized in the following table:

Table 2
Summary of Panel Data Regression

Dependent Variable: Y			
Variable	Coefficient	t statistics	p-value
C	546236.4	14.87255	0.0000
X	183499.7	0.824770	0.0414
XM	-180030.6	-0.808364	0.0427

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  The regression coefficient of variable X is 183499.7, this digital finance has a positive effect on financial stability of 183499.7 units of financial stability. The probability value for variable X is 0.04114; this value is smaller than 0.05; Thus it can be concluded that digital finance affects financial stability. This finding shows that the increase in digital financial activities, which is proxied by the volume of digital payments using the internet, will cause an increase in financial stability as measured by the increase in loan growth, because banks will be motivated to increase financing. This finding supports the opinion of Ozili (2018) that digital financial services have a positive effect on banking performance, this finding also supports the findings of Scott et al. (2017) and Li et al. (2017) and the opinion of Juengerkes (2016). However, these findings do not support the results of Tang (2019), Buchak et al. (2018), Romānova and Kudinska (2016), this difference in findings is possible due to differences in methodology used, especially data and proxies, where their research focuses on fintech that organizes peer-to-peer lending, as well as the independent variable is banking performance.
- Multiple Regression Analysis / MRA, it is known that the regression coefficient X and Y without a moderating variable (M) is +183499.7, then after being multiplied by the variable M, the coefficient value is reduced by -180030.6. This shows that the variable M can be a moderating variable, its effect is to weaken the effect of digital finance (X) on financial stability (Y).

$$Y= 546236.4 + 183499.7 X - 180030.6 XM \qquad (5)$$

In case of increasing systematic risk, internet-based payments (digital payments) will no longer increase bank loan growth, because banks will be careful in financing (loan reduction) to increase their liquidity reserves. The findings of this study support the results of research and research opinions regarding systematic risk, especially the risk of transmission related to banking health or financial stability, the results of the study support the empirical findings of Gai and Kapadia (2010), Caballero and Simsek (2013), Minoiu and Reyes (2011).

Research Limitations

The scope of digital finance is quite broad, in this study it only focuses on payments so that it cannot represent digital finance as a whole. Likewise, financial stability has a variety of indicators that can be used, while the research only uses indicators growth in bank loans. This limitation can be a suggestion for further research using different proxies.

5. Conclusion

Digital finance has a positive impact on financial stability by increasing the ability of banks to provide financing, so that the availability of bank loans tends to experience growth. However, the positive influence of digital finance on financial stability will decrease with increasing systematic risk, increasing digital payments as the main element of digital finance can no longer automatically support the growth of banking financing, this happens because banks anticipate systematic risks by reducing loans.

Increased systematic risk will have an impact on financial system instability, in such conditions the banks will have liquidity difficulties and even lack of liquidity, therefore by reducing credit availability when there is an increase in systematic risk, banks will have sufficient liquidity in the event of financial system instability and / or there was a financial crisis caused by systematic risk.

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