The Implications of Digitizing Financial Services for Financial System Stability (SSK) in Indonesia to Strengthen Inclusive Financial Programs

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Abstract: The financial system has become an important factor in the economic system and increasingly continues to experience development and innovation in line with the demands of the digital diera community that wants everything to be practical and simple. The presence of technology has made a major contribution in creating a financial technology development ecosystem (fintech) based on an inclusive financial program so that the bottom of the pyramid community can be served by the financial system, but also contains risks that can lead to financial system instability if not managed properly. It is therefore necessary to ascertain whether the presence of fintech in Indonesia during the observation period (January 2018 to June 2019) has an impact on financial system stability. On the basis of these questions the research objectives were formulated, namely: 1) describing financial system stability and fintech developments from non-current loan ratio aspects; 2) the effect of digitizing financial services on financial system stability; 3) determine the odds ratio of financial system stability events in an alert condition. By categorizing financial service digitizing variables as low and high and financial system stability variables being safe and vigilant, they are then analyzed using contingency coefficients, chi square analysis, and odd ratios to answer or prove the three objectives of the study. The conclusions of this study are: 1) digitalization of financial services has a low risk of non-current loans with the stability of the financial system in a safe condition tends to be vigilant; there is a moderate influence between the digitalization of financial services and the stability of the financial system; 3) the ratio of non-current loans (RPTL) to fintech will cause the stability of the vigilant financial system to be 0.143 times the occurrence of low category RPTL with the stability of a secure financial system.

Keywords: financial system stability, financial inclusion, digitization of financial services, fintech

INTRODUCTION

The financial system is an important factor in the economy and continues to experience development and innovation in line with the needs of the people who are increasingly easy going. If the godliness is not managed properly, it will impact on the financial system instabilities and can even lead to systemic risk. Therefore financial system stability needs to be maintained in both the microprudential and macroprudential aspects. Bank Indonesia as the holder of the monetary system in Indonesia has the responsibility so that systemic risk does not occur in the economic system in Indonesia, as was the crisis that occurred in 1998 which occurred systemically because financial institutions were no longer able to meet their financial liquidity.

Financial system instability can result in: 1) the transmission of monetary policy does not function normally so that monetary policy becomes ineffective, 2) the intermediation function cannot run because of improper allocation of funds that hinders economic growth; 3) public distrust of the financial system which will generally be followed by panic behavior of investors to withdraw funds so as to encourage liquidity problems; and 4) the cost of rescuing the financial system is very high in the event of a systemic crisis.

Based on the above conditions, efforts to avoid or reduce the risk of instability in the financial system are necessary, especially in order to avoid increasing losses. Frederic S. Mishkin (Mishkin 2013) divides the financial system into two components, namely financial markets (capital markets) and financial intermediaries (financial intermediary institutions).
The main function of financial markets and financial intermediaries in the financial system is to channel funds from lenders (households, companies, or government) that have excess funds to borrowers-spenders who need funds (households, companies, or the government). Excess funds to borrowers-spenders who need funds (households, companies, or government).

Theories and realities in the field related to financial institutions and financial markets can increase economic growth, this is in line with Neo-Classical economic theory which assumes that the operation of the market is perfect, the magnitude of the interest rate determines the investment that is feasible (James, 2008). However, in reality this world does not always follow these rules. Although the level of national savings in a country is relatively large, a financial system that cannot collect savings can hamper economic growth and cannot allocate funds to the maximum productive sectors. However, if viewed with a broader aspect, financial risk also depends on the structure of the financial system.

On the elements of financial institutions the authors use the theory of financial system stability trinity which includes 3 aspects, namely: 1) pressure aspects; 2) intermediation aspects; 3) and efficiency aspects, this is to describe conditions that enable the financial system to work effectively and efficiently and be able to withstand internal and external turmoil so that the allocation of funding or financing can contribute to the growth and stability of the national economy. The three aspects of the financial system stability, by researchers, are used as the main indicators to determine the stability of the financial system as well as being an index of financial system stability in the dimensions of financial institutions, while in the financial market dimensions liquidity risk, bond yield, IHSG volatility, exchange rate volatility, and bond yields.

Based on the National Strategy document for financial market development and deepening (SN-PPPK) in 2018-2024, it states that the financial market has a very strategic role as a source of funding for economic activities, a medium for transmitting monetary and fiscal policies. A healthy financial market is also very instrumental in supporting financial system stability. Several factors need to be prioritized for development to optimize the role of financial markets for the economy. First, increasing the level of participation of borrowers of funds (capital users), lenders or investors (capital providers), and intermediary institutions (intermediaries) accompanied by the lack of alternative financial instruments that can be used by market participants. Second, the infrastructure of the domestic financial market is still open for development by simplifying complex processes for efficiency. Third, perfecting and completing the legal / regulatory framework and increasing the competence of market participants.

The financial system acts as the backbone of the economy, both on a regional, national and international scale. To be able to support the acceleration of economic growth that is just and able to reduce poverty, the contribution of the financial sector needs to be optimized by opening access to financial services as widely as possible to the public and businesses such as Micro, Small and Medium Enterprises (MSMEs). So as to create a stable financial system one of the policies used to encourage economic growth is through financial inclusion and overall economic growth (inclusive financial booklet, 2014).

The implementation of financial inclusion with the aim of opening access to financial services to the widest possible bottom pyramid group is in fact not easy to implement. But the presence of digital technology makes it possible to implement inclusive financial practices with the term fintech which is the practice of digitizing financial services. The presence of fintech is an opportunity for the financial services industry, it encourages banks to be
concerned in investing in investment technology and adopts the technology to expand the scope of bank services, especially fintech which is engaged in peer to peer lending.

Some financial inclusion programs with fintech integration such as ATM, e-money, telkomselcash and credit procurement play a major role in financial inclusion and fintech. Financial inclusion is dominated by payment transaction business activities by 43% and loans by 17%, the remainder in the form of aggregators, crowdfunding, personal finance planning, landing etc. (Hadad et all, 2004) This condition shows that financial development through financial technology is becoming interesting to discuss given that the financial sector is the main sector in economic stability.

In the financial sector, innovations arising from technological advances are in the form of financial technology (fintech). Phillipon (2015) described fintech as an industry that includes digital innovations and technology-enabled business models in the financial sector. Phillipon (2015) said that innovation could disrupt the current industrial structure and even blur industrial boundaries. Although accessibility to financial institutions is easier, on the other hand privacy, regulation, and law enforcement require special attention.

Fintech has the potential to open access for 1.6 billion people without a bank account to enter the formal business sector (Irawati, 2018). Globally, fintech also opens 95 million new jobs in various business sectors, both formal and informal. Even so, the shift in the economic / business landscape due to digitization has created unprecedented risks, both financially and operationally. Financial risks, such as maturity mismatch, liquidity mismatch, leverage, and business risk. Meanwhile, from the operational side, the risks posed are governance factors, cyber attacks, dependence on third parties, and legal risks. In addition, digitalization can also lead to macro risks and financial system stability, such as: risk of contagion, procyclicality, excessive volatility, risk of being too big to fail, and risk of market concentration.

In this paper we will discuss how the role of digitizing financial services in maintaining financial system stability to support inclusive financial programs is seen from the use of Financial Technology and the banking sector to financial system stability.

Research Objectives
1. Describe the importance of financial system stability in driving national growth.
2. Knowing the effect of digitizing financial services on financial system stability.
3. Determine the odds ratio of the occurrence of financial system stability in an alert condition.

UNDERLYING THEORY
Digitalization of Financial Services
1. Inclusive Finance
   According to the definition of the financial ministry of an inclusive fiscal fiscal policy body is a condition when every member of the community has access to a variety of quality formal financial services that are timely, smooth and safe at affordable costs in accordance with their needs and abilities in order to improve the welfare of the community. The mission of inclusive finance is to increase access of the whole community to formal financial services through increased understanding of financial systems, products, and services, as well as the availability of quality formal financial services in a timely, smooth and safe manner at affordable costs in accordance with the needs and abilities in in order to improve people's welfare.
Based on the Household Balance Survey (2011) conducted by Bank Indonesia, it shows that the percentage of households saving at formal and non-financial financial institutions is 48 percent, so that people who have no savings at all either in banks or in non-bank financial institutions are still relatively very which is 52%. This shows the existence of unequal financial access, because there are still many unbankable families. So that the idea of inclusive finance becomes a national strategy in order to encourage economic growth through income distribution, poverty alleviation and financial system stability is a strategy that is considered appropriate.

As digital technology advances in all sectors of life, including the financial sector, digitalization of financial services has emerged in the form of fintech (financial technology) which provides services to unbankable people to be able to access financial services institutions (Awanti, 2018). Bank Indonesia is committed to encouraging the digitalization of financial services (fintech) programs with the aim of increasing the efficiency of financial transactions and facilitating the public to gain financial access. The presence of fintech can be seen as an effort to encourage increased financial inclusion, because technology support enables fintech companies to reach the wider community to those living in small towns or remote villages.

Basically, inclusive financial policy is a form of financial service deepening aimed at the community in the bottom of the pyramid to utilize formal financial products and services such as means of keeping money safe, transferring, saving or borrowing and insurance. This is done not only providing products in an appropriate manner but combined with various aspects (BI, 2019)

There are 6 pillars of inclusive finance that must be upheld by the main stakeholders are Bank Indonesia (BI), namely: 1) financial education; 2) public financial facilities; 3) mapping financial information; 4) supporting policies / regulations; 5) intermediation facilities & distribution channels; 6) consumer protection.

2. Digital Fintech

Financial Technology (FinTech) is a form of application of information technology in finance that provides digital financial services (DFS). This provides benefits for both consumers and service providers. For consumers, making financial transactions efficient, safe and very fast, the risk of losing money is lower. For providers, providing opportunities to access new markets and introducing new services for small high-value transactions with high frequency, it can be said for service providers this activity is also an opportunity for cross-selling between service providers. For the community, it can help the most vulnerable small micro entrepreneurs with cash transfers as a non-cash payment instrument and avoid leakage of funds.

Some research states that there is a positive relationship between the development of the financial sector, especially the financial system on economic growth and productivity (King and Levine, 1993); Rajan and Zingales, 1998. In line with that research Hasan, Renzis and Schmiedel (2012) concluded that migration to the electronic payment system becomes more efficient, safe, fast and can stimulate economic growth, consumption and trade as a whole for economic actors.

LKD model according to CGAP: 2012 is divided into 2 (two) large groups, namely the bank based model and the non-bank based model, while the models managed by non-bank are grouped into two namely models managed by mobile network operators, and models managed by third party (Third-party led). In reality, emerging digital or fintech-based non-bank financial companies are urging the banking industry to improve itself.
On one hand, fintech can be a threat that can erode traditional banking market share. On the other hand it opens up opportunities for collaboration to penetrate unexplored market share, from where the wide open financial inclusion program can be implemented. The presence of fintech, in fact, makes it easy for people who are at the bottom of the pyramid which has been said to be unbankable to be able to access finance. There are 4 types of fintech that are developing in Indonesia, namely: 1) crowdfunding and peer-to-peer lending; 2) market aggregator; 3) risk management and investment; 4) payment, clearing, and settlement.

a. Crowdfunding and Peer-to-Peer Lending;
   Marketplace that brings together people who want to apply for loans with people who are willing to provide loans as pioneers of peer-to-peer (P2P) lending marketplaces. The majority of P2P lending portals make the process of borrowing and borrowing simpler because the procedures are not complicated and can be completed in less than a week and more affordable. At the end of the process, the borrower gets a competitive-interest loan while the lender gets a return in the form of the principal and interest from the funds lent.

b. Market Aggregator;
   Portal that collects and presents various information on financial service options to be presented to users. This information can then be compared to determine the best financial products ranging from credit cards, credit, insurance, to investment. You can learn the advantages and disadvantages of each product and choose the credit card that best suits your requirements.

c. Risk Management and Investment;
   Portal that helps you find out your financial situation and do financial planning easily and quickly. Simply rely on a smartphone, all you have to do is fill in the data requested to find out the right financial plan, according to your needs and abilities.

d. Payment, Clearing, and Settlement.
   Portal that provides payment system services both organized by the banking industry and BI such as Bank Indonesia Real Time Gross Settlement (BI-RTGS), BI National Clearing System (SKNBI), to the BI Scrip less Securities Settlement System (BI-SSSS), this portal exists to simplify the process of online transactions.

3. Financial System Stability
   The financial system is part of the economic system that functions to allocate funds from parties experiencing a surplus to the deficit. If the financial system is unstable and does not function efficiently, then the allocation of funds will not go well so as to hamper economic growth. An unstable financial system causes a crisis that requires very high costs to save it.

   For example, when in 1998, Indonesia experienced a financial crisis, required large costs to recover, and also took a long time to generate public confidence in the financial system. An unstable financial system tends to be vulnerable to various shocks so that it disrupts the wheels of the economy. In general it can be said that instability in the financial system can result in a number of adverse conditions such as: 1) the transmission of monetary policy becomes ineffective; 2) the intermediation function does not work as a result of improper allocation of funds that hinders economic growth; 3) low public confidence in the financial system followed by panic behavior of investors to withdraw funds impacting the occurrence of liquidity problems; 4) high rescue costs trigger a systemic crisis.
Financial system stability (SSK) is very important to be managed because it is a benchmark for the success of the economic system. A stable financial system is able to create good economic mechanisms in pricing, fund allocation and risk management so as to support economic growth. A stable financial system is expected to be able to allocate sources of funds and absorb shocks that occur so as to prevent disruption to the activities of the real sector and financial system, and be able to perform the intermediation function, as well as carry out payments and spread risk properly.

As part of the economic system, the financial system is not alone, its existence is highly dependent on the monetary system, like a piece of currency that cannot be separated, on the one hand it is the financial system and on the other the monetary system. This means maintaining financial system stability without being followed by monetary stability, will not have much meaning in supporting sustainable economic growth. Monetary policy has a significant impact on financial stability and vice versa, financial stability is a pillar that underlies the effectiveness of monetary policy.

The financial system is one of the channels of monetary policy transmission, so if financial system instability occurs, monetary policy transmission cannot run normally. Conversely, monetary instability will fundamentally affect financial system stability due to the ineffectiveness of financial system functions.

The components of the financial system consist of a number of financial institutions, a set of financial markets, financial system infrastructure, and a number of procedures and regulations that guarantee the proper operation of savings and loans. Financial system stability depends on the health of financial institutions and financial market stability. In this case, the health of a financial institution is associated with its ability to carry out the intermediation function or other financial service functions (for example, the payment system) smoothly, both under normal conditions and under conditions of a financial system that is under pressure.

Meanwhile, financial market stability is defined as the market's ability to facilitate the sale and purchase of assets at prices that are as close as possible to its fundamental value, to maintain financial system stability policies and instruments needed to maintain financial system stability are: First, monetary stability, among others, through interest rate instruments in open market operations. Monetary policy through the application of interest rates that are too strict, will tend to be deadly in economic activity, so it is necessary to implement a policy called the inflation targeting framework. Second, the performance of sound financial institutions, particularly banks, is carried out through supervisory and regulatory mechanisms. As in other countries, the banking sector has a dominant share in the financial system. Therefore, failure in this sector can lead to financial instability and disrupt the economy. To prevent these failures, an effective banking system and banking policies must be upheld. In addition, market discipline through authority in supervision and policy makers as well as law enforcement must be implemented to protect banks and stakeholders while at the same time fostering confidence in the financial system. Third, maintain a smooth payment system. If there is a failure to settle on one of the participants in the payment system system, there will be a potential risk that is quite serious and disrupts the smoothness of the payment system. These failures can cause contagion risk, thereby causing systemic disorders.

Fourth, research and monitoring to access information deemed threatening financial stability. Through macroprudential monitoring, the vulnerability of the financial sector can detect potential shocks that have an impact on financial system stability so steps can be taken to reduce disruptions in the financial sector.
Fifth, the financial system safety net as a lender of the last resort (LoLR) in order to avoid instability of the financial system in providing liquidity in normal and crisis conditions so as not to potentially trigger a systemic crisis.

Frederic S. Mishkin (Mishkin 2013) divides the financial system into two components, namely financial markets (capital markets) and financial intermediaries (financial intermediary institutions). The main function of financial markets and financial intermediaries in the financial system is to channel funds from lenders (households, companies, or government) that have excess funds to borrowers—spenders who need funds (households, companies, or the government). According to Neo-Classical economic theory which assumes the operation of a perfect market, states that the magnitude of the interest rate determines the investment that is feasible. However, in reality this world does not always follow these rules. Although the level of national savings in a country is relatively large, a financial system that cannot collect savings can hamper economic growth and cannot allocate funds to the maximum productive sectors. However, if viewed with a broader aspect, financial risk also depends on the structure of the financial system in facilitating the saving and borrowing of funds or money (intermediation function).

Research (Rusdianasari, 2018) states that the provision of financial services should be given to low-income groups because it can help the sustainability of local economic activities. In addition, according to (Dienillah & Anggraeni, 2016) at the level of the country financial inclusion can improve efficiency in financial intermediation through increasing domestic savings and investment so as to encourage economic stability. While the results of research conducted by Dupas et al. (2012) showed a different result that an increase in banking services did not cause an increase in financial stability because it was not followed by a decrease in borrowing costs for the lower middle class, lack of trust, and was not followed by an increase in service quality.

4. Financial Institutional Stability

In measuring the financial institutions, the writer uses the concept of the trinity of financial system stability in the banking industry which emphasizes pressure, intermediation, and efficiency.

![Trinity Financial System Stability](Image 1)

*Source: KSK Bank Indonesia No 22 March 2014 Page 128*
a. Dimension of Pressure

The pressure dimension involves the ratio of non-performing loans (NPLs) and return on assets (ROA). The NPL ratio is an indicator of the health of the quality of bank assets, the greater the value means that the level of health is increasingly disrupted (Solviana, 2015). According to Bank Indonesia Regulation Number 6/10 / PBI / 2004 dated 12 April 2004 concerning the Rating System for Commercial Banks, stipulates that the ratio of non-performing loans (NPL) is 5%. While the ROA Ratio is a profitability ratio that shows the percentage of profits (net income) earned by the company, as well as measuring how efficient a company is in managing its assets to generate profits during a period. The greater ROA ratio means the company's ability to generate greater profits.

b. Dimension Intermediation

In the dimension of the bank intermediary function, the loan debt to ratio (LDR) variable reflects the ratio of total loans to Third Party Funds (DPK) collected by the Bank. This ratio will indicate the level of the Bank's ability to distribute funds from the public (in the form of: Demand Deposits, Savings, Time Deposits, Certificates of Time Deposits and Other Immediate Obligations) in the form of Credit.

c. Dimensions of Efficiency

Whereas the efficiency dimension uses the net interest margin (NIM) variable and Operational Income Operating Costs (BOPO). The NIM ratio is used to analyze how much net interest income is compared to a company's productive assets. While the BOPO ratio is the level of efficiency and the ability of banks to run their operations. For this reason, banks must make comparisons between the amount of operational costs and also the operational income that they get.

5. **Financial Market Stability**

There are three pillars of financial markets that need to be managed to create financial market stability, namely: 1) as a source of economic financing and risk management; 2) market infrastructure development; 3) policy coordination, harmonization of provisions, and education. The three pillars are implemented in seven financial markets, namely: 1) government bonds; 2) corporate bonds; 3) shares; 4) foreign exchange; 5) money market; 6) structured products, and 7) Islamic financial markets. The contraction of the seven financial markets will result in high volatility in financial markets. Including shares that are reflected in the volatility of the composite stock price index (CSPI). The volatility of the composite stock price index (C SPI) is an indicator of financial market stability. The higher the value of volatility reflects the instability of the combined stock price, such characteristics can be a measure for financial system stability.

Financial Stability Index (ISSK) is an index that reflects better financial system stability and can see sources of instability. The index is built by looking at the financial system consisting of financial institutions and financial markets. Instability in financial financial institutions can be observed in the aspects of pressure from banking institutions, aspects of banking intermediation, and aspects of banking efficiency, while instability in financial markets can be observed from fluctuations or volatility in stock prices, exchange rates and bonds.

In aggregate, measurements of financial system stability can be monitored with Delta indicators (Liquidity Reserve Requirements) / Total Assets, NPLs, Capital (CAR), and Profitability of Banking ROA for the aspect of institutional pressure, while the interest rate spread Credit with sb DPK (%) , LDR (%), Credit / GDP Gap (%) for banking intermediation aspects, and NIM indicators (%), BOPO (%), CIR (%), OHC / PO (%) for
banking efficiency aspects. As for the financial markets, the financial markets can be monitored from indicators of the money market, stock market, foreign exchange market and bond market.

Theoretical Framework

Theoretical Framework

Figure 2
Framework Research

Sources: Compilation (Gunadi, Taruna, & Harun, 2013) & (Kim & Kwon, 2019)

METHODOLOGY AND DATA
1. Measurement of research variables
   a. Digitalization of financial services

   The digitalization of financial services in this paper uses non-current loan ratio indicators, arguing that uneven loan payments can create a sound or not a financial institution can even create systemic risk. Whereas the loan size between Java and outside became a complement to describe the role of fintech in the spread of financial inclusion in Indonesia.

   Non-current loan ratios are categorized into two groups namely critical and vigilant. The measurement is done by dividing the data with a filter average (cut off) with the provisions that if the value of non-current loan ratios is greater than the average for the January 2018 to June 2019 period, then it is included in the critical category, but if below, it is classified into the alert category.
b. Financial system stability

Financial system stability index is measured using the concept of trinity of financial stability which includes institutional pressure, intermediation, efficiency and financial market stability which consists of liquidity risk, bond yields, IHSG volatility, exchange rate volatility, and bond yields (Gunadi et al, 2013).

ISSK

\[ t = i_x x + \bar{x} \]  
\[ i_x = \frac{t_k(t_{\text{max}} - t_{\text{min}})}{2} + t_{\text{min}} \]  
\[ t_{\text{max}} = \frac{(X_{\text{max}} - \bar{x})}{\sigma} \]  
\[ t_{\text{min}} = \frac{(X_{\text{min}} - \bar{x})}{\sigma} \]

Information

\[ t = \text{threshold conversion results} \]
\[ t_k = \text{threshold ISSK} \]
\[ i_x = \text{initial threshold index} \]
\[ t_{\text{max}} = \text{maximum threshold index} \]
\[ t_{\text{min}} = \text{minimum threshold index} \]
\[ \sigma = \text{standard deviations from January 2018 to July 2019} \]
\[ x = \text{indicator value (initial threshold)} \]
\[ \bar{x} = \text{average in 2018 until 2019} \]

2. Analisis Statistik

a. Chi Square

\[ \chi^2 = \sum_{i=1}^{N} \sum_{j=1}^{n_i} \left( \frac{O_{ij} - E_{ij}}{E_{ij}} \right)^2 \]  

Keterangan

\[ \chi^2 = \text{Chi Square Value} \]
\[ O_{ij} = \text{frequency of observations in the i-th column and row to j} \]
\[ E_{ij} = \text{expected frequency in the i-th column and row to j} \]
\[ E_{ij} = \frac{n_i n_j}{N} \]
\[ n_i = \text{Total frequency in line i} \]
\[ n_j = \text{total frequency in column j} \]
\[ N = \text{Total Samples} \]

b. Contingency

To calculate the Contingency coefficient, the formula is used
\[ C = \sqrt{\frac{\chi^2}{\chi^2 + N}} \]

Information:
- \( C \) = Contingency Coefficient
- \( \chi^2 \) = Chi Square Value
- \( N \) = Count the observed sample

c. Odds Ratio

<table>
<thead>
<tr>
<th>Variable Y</th>
<th>A</th>
<th>B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>( n_{11} )</td>
<td>( n_{12} )</td>
<td>( n_{1\cdot} )</td>
</tr>
<tr>
<td>+</td>
<td>( n_{21} )</td>
<td>( n_{22} )</td>
<td>( n_{2\cdot} )</td>
</tr>
<tr>
<td></td>
<td>( n_{1\cdot} )</td>
<td>( n_{2\cdot} )</td>
<td>( n_{\cdot\cdot} )</td>
</tr>
</tbody>
</table>

\[ \theta = \frac{p_{11}/p_{12}}{p_{21}/p_{22}} = \frac{p_{11}p_{22}}{p_{12}p_{21}} = \frac{(n_{11}/n_{1\cdot})(n_{22}/n_{\cdot\cdot})}{(n_{12}/n_{1\cdot})(n_{21}/n_{\cdot\cdot})} = \frac{n_{11}n_{22}}{n_{12}n_{21}} \]

\[ \theta = odds\ ratio = \frac{n_{11}n_{12}}{n_{12}n_{21}} \]

Information:
- \( n_{11} \) = count the occurrence of variable X in category A with the negative variable Y variable
- \( n_{12} \) = count events with variable X in category B with variable Y in negative category
- \( n_{21} \) = count events with variable X in category A with variable Y positive category
- \( n_{22} \) = count of events with variable X in category B with positive variable Y variable
- \( p_{11} \) = probability of occurrence of \( n_{11} \) over the occurrence of occurrence of variable X in category A
- \( p_{12} \) = probability of occurrence of \( n_{12} \) over the occurrence of variable X category B
- \( p_{21} \) = probability of occurrence of \( n_{21} \) to occurrence of variable X category A
- \( p_{22} \) = probability of event \( n_{22} \) with respect to the occurrence of variable X category B

3. Research Data

Research data for the digitization of financial services variables are taken from the FSA Fintech statistics which are reflected in the quality of fintech loans, especially on non-current loan ratios in the observation period January 2018 until July 2019, and the accumulation of Javanese loans (Borrowers from Java) and accumulation of loans outside Java (Borrowers from Outside Java).

While research data for financial system stability variables are taken from Indonesian banking statistics (SPI) published by OJK and Banking Statistics (SPI) published by Bank Indonesia in the observation period January 2018 until July 2019.

ANALYSIS AND DISCUSSION

1. Description of digitizing financial services and financial system stability

Along with technological developments, the presence of FinTech as a means, in addition to banking, is known to improve payment systems. FinTech’s advantages in innovative information technology are also balanced with a number of shortcomings including lack of risk management, difficulties in capital, and have not been trusted by the public due to the absence of clear regulations. FinTech is dedicated to financial service operations and the interaction of financial service providers with consumers (Ion & Alexandra, 2016).
Financial technology transaction data (FinTech) from the financial services authority (OJK) during 2018 is estimated to reach Rp 122.67 trillion, and for January to June 2019 it is estimated to reach 211.36 trillion. When compared to data from January to June 2018 amounted to 30.23 trillion with January to June 2019 an increase of Rp 181.13 trillion. This figure increased 6 times from the previous year, this indicates an increasing trend of loans channeled through fintech peer to peer lending in Indonesia, especially transactions in Java.

Graph 3. Fintech Peer To Peer Lending Transaction 2018-2019

The increase in disbursed funds is in fact directly proportional to the increase in non-current loan ratios, as evidenced by the summary of fintech financial data (peer to peer lending) from January 2018 to June 2019 issued by the OJK. Next, an analysis showed that the greater the funds channeled to the public, the ratio non-current loans are also increasing both in Java and outside Java. The following table categorizes the ratio of non-current loans to the amount of funds channeled in Java and outside Java. This shows the need for prudence in lending to avoid non-current loans.

Table 2

<table>
<thead>
<tr>
<th>Digitalization of Financial Services</th>
<th>Borrower</th>
<th>Borrower</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Java</td>
<td>Outside Java</td>
</tr>
<tr>
<td>RPTL Low</td>
<td>15.571.400.150.136</td>
<td>2.561.905.349.865</td>
</tr>
<tr>
<td>RPTL High</td>
<td>16.770.916.757.237</td>
<td>2.635.431.425.046</td>
</tr>
</tbody>
</table>

RPTL = non-current loan ratio
Source: data processed 2019

Furthermore, it is described about financial system stability using the financial system stability index (ISSK) approach adopted from working paper (Gunadi et al, 2013) that financial system stability is composed of two dimensions, namely the dimensions of financial institutions and the dimensions of the financial markets. In the dimension of financial institutions, the theory of trinity of financial stability is broken down into three domains, namely the realm of pressure from banking institutions, the realm of banking intermediation, and the realm of banking efficiency. In the realm of institutional pressure can be observed from its performance through NPL and ROA. The following graphs are observations of NPL and ROA for the period January 2018 to June 2019.
According to Bank Indonesia Regulation No. 6/10 / PBI / 2004 dated April 2004 concerning the Rating System for Commercial Banks, determined that the ratio of non-performing loans (NPL) was 5%. The higher the NPL (above 5%), the bank can be said to be unhealthy. Because as we alluded to above, high NPLs will cause a decline in profits to be received by banks. During the period of January 2018 until June 2019 the NPL value was below 5% meaning that financial institutions were under safe pressure.

Whereas ROA (Return On Assets) is a ratio that measures the ability of banks to generate profit or profit, its function is to see how effectively banks use their assets in generating real income during the January 2018 to June 2019 average ROA value of 3.06, meaning the ability of financial institutions to generate income or profit of 3 times the assets.

In the realm of banking intermediation it is sufficient to observe the loan to deposit ratio (LDR). Based on research data can be presented LDR graphs in the period January 2018 to June 2019 as follows:
The higher the LDR ratio the lower the bank's liquidity capability (Dendawijaya, 2000). However, the tolerance limit ranges from 85% -100% or according to Kasmir (2003), the safe limit for LDR is a maximum of 110%. The graph shows that the LDR ratio is in the range of 89% to 97%, in the range it can be said that it is still in a safe range.

In the realm of banking efficiency by observing the NIM ratio that serves to determine the ability of bank management in managing productive assets in generating net interest income, and the BOPO ratio to measure the ability of bank management in controlling operational costs to operating income. The following is a graph of the ratio of NIM and BOPO for the period of January 2018 to June 2019.

**Figure 6**
NIM and BOPO graphics

| Source: Data Analysis 2019 |

In the NIM ratio seen in the range of 5% to 6%, this shows that the ability of banks in managing their productive assets to generate net interest income is quite good, while the BOPO ratio is in the range of 78% to 88% according to SEBI No 6/23 / DPNP May 13, 2004 entered the category of healthy.

Furthermore, the dimensions of the financial markets can be observed from the indicators of combined stock price volatility during the crisis and normal periods, as in the following graph:

**Figure 7**
IHSG Volatility Chart

| Source: Data Analysis 2019 |

Based on the analysis data, the JCI volatility obtained in the crisis period is in the range of -0.027 to -0.009, while in normal conditions the JCI volatility is in the range of 0.223 to 1.998. Crisis value calculation on the JCI illustrates the condition of the lowest JCI price that may occur in one month. The smaller the value of the ratio, the lower the
likelihood of profits will be obtained by investors when the crisis occurs. According to (Bekaert and Harvey, 1997; Wang, 2007), Levine and Zervos (2008), high volatility can disrupt the growth and development of the capital market, which also plays a role in national economic growth in the long run (Indonesian Capital Market Study Team and the World Economy, 2011).

Digitalisation of financial services reflects how much the budget has been lent by fintech service companies during the period 2018 to June 2019 in aggregate and in accordance with the location, namely on the island of Java and the outer islands of Java. Besides the amount of loans disbursed, the more important is the non-current loan ratio.

Summary of fintech financial data (peer to peer lending) for the December 2018 period of funds disbursed by fintech institutions amounting to Rp 122,675,767,963,772 with the composition of the island of Java amounting to Rp 105,693,529,195,566 and outside of Java amounting to Rp 16,982,238,768,206, while for the distribution of funds in 2019 the period of January to June amounted to Rp 211,361,987,129,934 with the composition of Java Island in the amount of Rp. 181,788,773,149,479 and outside of Java amounted to Rp. 29,573,213,980,455. If calculated the percentage of the comparison of Java with outside Java in 2018 is 1: 6 as well as in 2019. This shows that the funds channeled by Java in the island of Java fintech 6 times greater than those distributed in the islands outside Java.

Table 3
Distribution of Fintech Funds in Java and Outside Java

<table>
<thead>
<tr>
<th>Lokacation</th>
<th>Period January to December 2018</th>
<th>Period January to June 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java</td>
<td>105,693,529,195,566</td>
<td>181,788,773,149,479</td>
</tr>
<tr>
<td>Outside Java</td>
<td>16,982,238,768,206</td>
<td>29,573,213,980,455</td>
</tr>
<tr>
<td>Aggregate</td>
<td>122,675,767,963,772</td>
<td>211,361,987,129,934</td>
</tr>
</tbody>
</table>

Source: processed from OJK data for 2019

Whereas the ratio of non-current loans in the January to December 2018 period was 3.3% and for the January to June 2019 period was 2.1% as in the following Graph:

Figure 8

Graph of Non-Current Loans Ratio

Source: analyst 2019
2. The effect of digitizing financial services on financial system stability

Based on the results of the chi square analysis of the data variable digitalization of financial services and financial system stability that has been categorized can be summarized as follows

<p>| Table 4 | Crosstabulation of Digitalization of Financial Services with Financial System Stability |
| Digitization Financial Services | Financial System Stability Index | Total |</p>
<table>
<thead>
<tr>
<th></th>
<th>Alert</th>
<th>Secure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTL Tinggi</td>
<td>Count</td>
<td>1a</td>
<td>5a</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>5.6%</td>
<td>27.8%</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>2,7</td>
<td>3,3</td>
</tr>
<tr>
<td>RPTL Rendah</td>
<td>Expected Count</td>
<td>5,3</td>
<td>6,7</td>
</tr>
<tr>
<td></td>
<td>% of Total</td>
<td>38.9%</td>
<td>27.8%</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>% of Total</td>
<td>44,4%</td>
<td>55,6%</td>
</tr>
</tbody>
</table>

Each subscript letter denotes a subset of issk_2 categories whose column proportions do not differ significantly from each other at the .05 level.

Incidence of digitalization of non-current loan financial services is high with stability of the financial system being alert 1 time (5.6)% of events, namely in July 2018, and stability of the secure financial system 5 times (27.8%), namely in January, November, December 2018, and February, March 2019. While non-current loans were low category with stability of the financial system being alerted 7 times (38.9%), namely April, May, June, August, September, October 2018 and May 2019. For incidents of secure financial system stability 5 times (27.8%), namely in February, March 2018 and in January, April, June 2019.

The data shows a pattern of interrelationships between the digitalization of financial services to the stability of the financial system which is moderate. This can be seen from the calculation of the calculated chi square value of χ² = 2.813 < χ² 0.05; 1 = 3.84 with a probability value of 0.094 or (0.05 < p = 0.094 < 0.1). With a probability in the range 0.05; 0.01 this indicates that the digitalization of financial services will have a moderate effect on financial system stability. While the magnitude of the effect of digitizing financial services on financial system stability in accordance with the contingency index is 0.368 or 36.8%. This means that digitalization of financial services will affect financial system stability by 36.8%. The results of this study are in line with research (Kim & Kwon, 2019) which states that Fintech influences financial system stability.

3. Odd Ratio Opportunities for financial system stability events in an alert condition

To answer the objective of the third research, which is the chance that a non-current loan ratio will affect the stability of the financial system, the odd ratio tool is used. Based on the analysis results obtained an odd ratio value of 0.143 meaning that the occurrence of non-current loan ratios at fintech will cause alert financial stability of 0.143 times the ratio of non-current loans to the low category with the stability of the secure financial
system. This fact is statistically said to have a moderate probability because it has a significance level between 5% to 10% which is 0.094.

The instability of the financial system during the period January 2018 to June 2019 was influenced moderately by the ratio of non-current loans in the fintech financial services industry, especially in the type of peer to peer lending. This is in line with research (Wibowo, 2016) which states that the development of fintech has a moderate relationship with financial system stability so that fintech regulation is needed so as not to harm the public.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Conclusion

1. Digitalization of financial services has a low risk of non-current loans with the stability of the financial system in a safe condition tends to be vigilant.

2. There is a moderate influence between digitalization of financial services and financial system stability.

3. Non-current loan ratio (RPTL) at fintech will cause alert financial stability of 0.143 times the occurrence of low category RPTL with safe financial stability.

Policy Recommendations

1. There is a need for regulations in the practice of financial technology (fintech) so as not to harm the community.

2. Formation of the fintech association governing the rules of conduct of digital financial services.

3. Making policies based on research

REFERENCES


