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The Rise of Financial Technology and Its Credit Risk in Indonesia

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ABSTRACT

The purpose of the study is to use VECM to examine credit risk, basic loan interest rate, the number of lending entities, and the total amount of outstanding loans for fintech companies. Fintech is expanding quickly in Indonesia, even during the Covid 19 pandemic. In March 2019 until the present, Indonesia has formally entered the Covid 19 epidemic, causing Indonesia's GDP growth in 2020 to be -2.07. However, Indonesia's outstanding fintech loans are still sharply rising. Fintech businesses offer numerous financial services and can connect with the unbanked. Because a fintech firm tries to offer ease, particularly for customers who have trouble accessing traditional banks, credit through a fintech company is an easy loan to approve. Profit and credit risk are increased for fintech enterprises. As a result, interest rates have a short-term influence on outstanding loans because Fintech lending companies derive revenue from activities and services based on fees and interest. Fintech financing has extremely minimal credit risk, is below OJK's criteria, and has no immediate or long-term effects on outstanding loans. The number of lender entities significantly impacts outstanding long-term loans to fintech companies.

Keywords: Credit Risk, Financial Technology, Granger causality, Outstanding Loan, VECM.

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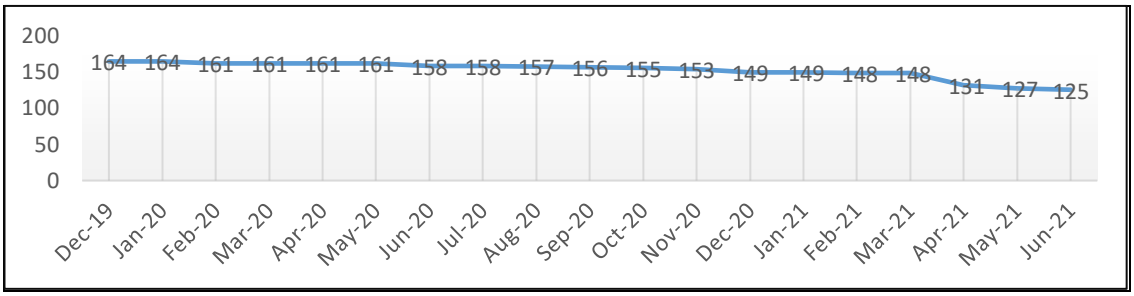
INTRODUCTION

Since 2008, industrialized nations have seen the emergence of financial technology (Fintech), a recent breakthrough in the financial industry. Financial technology (FinTech) is a new form of business that combines technological and digital power devices to provide people with the convenience of financial transactions (Utami & Sitanggang, 2021). Fintech is currently advancing by fusing e-finance, big data, and security on an Android platform so that it can be accessible using a smartphone anywhere and whenever it is needed. The fintech phenomenon is a logical stage in evolution (Gimpel, Rau, & Röglinger, 2018). In connection to contemporary technologies, Fintech refers to businesses that offer software, services, and solutions for digital financial services (Kamana, 2018). Bank Indonesia defines Fintech as the application of technology in the financial sector that results in service products, technology, and or new business models that may impact security, efficiency, security, and payment systems. Bank Indonesia (BI) is also concerned with implementing Financial Technology. BI regulates the use of Fintech in Indonesia should support the increasing welfare through financial inclusion. So, according to Bank Indonesia's 2017 report, Fintech refers to innovations in financial services based on information technology.

Bank Indonesia defines fintech as the use of technology in the financial system that produces service products, technology, and new business models and may impact security, security, financial systems, and efficiency, security, and payment systems. Implementing Fintech among people in developing countries such as Indonesia is different from implementing Fintech in developed countries. Infrastructure in developing countries is not as sophisticated as developed countries. And the people in developing countries may not have the financial and technology literation to maximize the utilization of Fintech to increase welfare.

Fintech is expanding quickly in Indonesia, even during the Covid 19 pandemic. As of now, the Covid 19 pandemic has officially reached Indonesia since the beginning of March 2020. One of the policies the Indonesian government introduced, Large-Scale Social Constraints (PSBB), substantially impacts the economy as a whole (Dewi, & Melati, 2021). Indonesia's GDP growth 2020 will be -2.07, the worst economic growth since the 1998 monetary crisis (BPS, 2021). In 2020, Indonesia's GDP growth turned negative, although the country's fintech industry is growing quickly.

Figure 1. The Total of Financial Technology Companies in Indonesia December 2019-June 2021

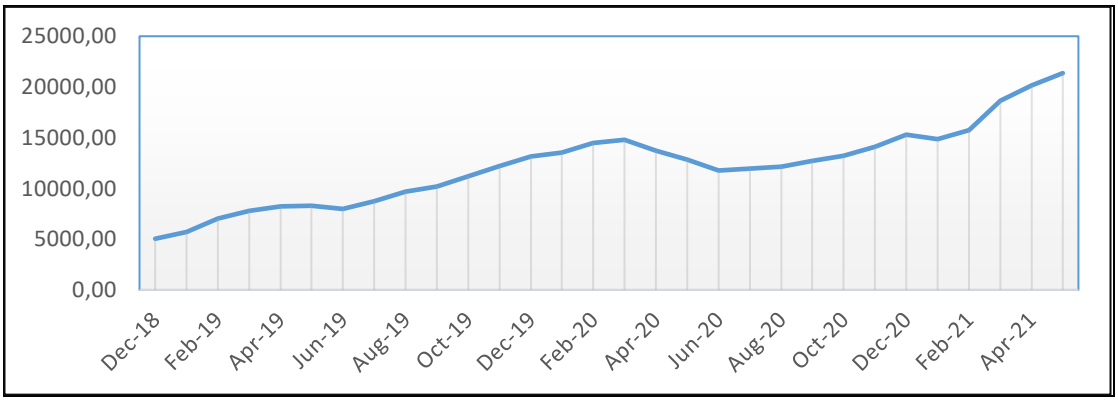


Source: OJK, 2021.

However, data on outstanding loans reveals that even during the Covid19 pandemic, outstanding loans from fintech lending companies in Indonesia are growing rapidly. Loans that are still being made are deemed outstanding loans. This sum calculates the remaining loan principal (Otoritas Jasa Keuangan, 2021b). Meanwhile, the number of outstanding loans in circulation is growing thanks to legitimately operating fintech

companies. The growth in outstanding loans is necessary to fulfil the community's growing financial needs in the midst of a pandemic, when the economy is struggling due to widespread unemployment, numerous bankruptcies, and a lack of activity overall, particularly in the service sector. Due to this, there is a rise in the demand for credit from fintech lending firms (Ozili, 2020).

Figure 2. Outstanding loan (in billion IDR)



Source: OJK, 2021.

Because a fintech firm prioritizes ease, particularly for customers who have trouble accessing traditional banks, credit through one of these companies is simple to approve (Duca & Peltonen, 2011). Microloans and peer-to-peer lending are two credit products that fintech companies offer that customers are particularly interested in. Credit applications can be authorized, and money will be directly paid from the fintech company to the customer's account in roughly 30 minutes with access via a smartphone and equipped with an identity card document and other identification (Sheng, 2020). Be advised that credit risks are associated with this service for clients and fintech lending organizations. Moreover, the purpose of this study is to use VECM to examine credit risk, interest rate, the number of lending organizations, and the outstanding loans of Fintech companies over both the short and long term. This study will be beneficial in extending our understanding of fintech companies and credit analysis.

LITERATURE REVIEW

The presence of fintech lending companies offers lending services and other financial services such as 1) Crowdfunding can be done for economic or social purposes. Crowdfunding for economic purposes, of course, is gaining maximum profit as part of the banking intermediation function, which is to collect funds from parties with excess funds and distribute them to those without funds. Funds can be channelled through microfinancing for Small and Micro Enterprises (SMEs) funding. Crowdfunding for economic purposes can be in the form of raising funds to invest, called Crowd-investing. This is related to other Fintech services: wealth and asset management. Crowdfunding for social purposes is collecting/raising funds for the poor (non-profit activity) (Ghahroud, Jafari, & Maghsoodi, 2021). 2) Peer-to-peer lending is a financing service. P2P lending to support economic activity for low-income people can be called microfinancing. P2P lending also funds bigger project with moderate interest rates (Suryono, Budi, & Purwandari, 2021). 3) Payday loan is a loan for emergency activity in a very short time (days) with a high-interest rate (Kastrop, Ciaglia, Ebert, Stoßberg, & Wolff-Hamacher, 2014). 4) Digital payment system offers the convenience of payment services digitally for monthly payments or investment payments (such as buying investment instruments). 5) Market comparison is a service to process customer data registered for more advanced analysis. 6) Wealth and asset management is a service to manage wealth and

assets to be invested. 7) Personal financing is the management of personal finances, usually to maintain financial independence for retirees.
Suitable interest rates become essential to setting the profitability of a fintech lending company. The Basic Loan Interest Rate (BLIR) is estimated as basic of commercial banks loan interest rates that banks implement to customers. BLIR should match the benchmark interest rate, Bank Indonesia seven days repo rate (BI7DRR). If monetary authority reduces BI7DRR, bank should also reduce BLIR at a suitable level. This research employs BLIR because fintech lending distributes unsecured credit without collateral. Non-mortgage consumption credit does not include the distribution of funds through credit cards and Unsecured Credit (Otoritas Jasa Keuangan, 2021a). The data source for the Basic Loan Interest Rate (SBDK) published on the OJK website is from online bank reports through the OJK Online Reporting Application until June 2021.

Credit risk is the possibility of suffering a financial loss due to a defaulted loan that fails to meet its contractual obligations and leaves the lender with a financial loss. Lending, payment, and settlement activities are all examples of banking activity that might result in credit risk. Credit risk can be produced by sales operations both domestically and globally. Failure to repay principal and interest is the most serious credit risk, also known as default risk, which puts lenders at the most danger (Saunders & Cornett, 2008). Another credit risk is delaying the payment of credit interest. All areas of the financial market are subject to this risk, but banks are the most important because of credit activity and off-balance sheet activities like guarantees. Credit risk can also develop by engaging in derivative transactions, securities lending, buyback transactions, and negotiations. For derivative transactions, a creditworthiness study of counterparties was performed, and its alterations were tracked (Spuchľáková, Valašková, & Adamko, 2015).

Therefore, it takes a series of credit contracts to bind the rights and obligations of lenders and borrowers in legal protection. In applying for a loan to a fintech lending company, there are terms and conditions and a privacy policy that the borrower should read and understand carefully (Bejaković, 2016). Fintech lending companies must conduct a series of borrower selections to reduce credit default risk. Fintech lending companies choose borrowers from companies which has networked with leading companies. For example, state-owned enterprises, multinational companies, and government agencies. The company must have a clear track record (Suryono et al., 2021).

The Financial Services Authority Regulation Number 77/POJK.01/2016 concerning Information Technology-Based Borrowing-Lending Services requires Fintech lending companies, as Information Technology-Based Money-Lending Service Providers, to publish the success rate to comply with the principle of transparency. This will help the Borrower and the Lender settle their borrowing and borrowing obligations. (Otoritas Jasa Keuangan, 2016). The higher the 90DSR percentage listed, the better the Fintech lending company's lending and borrowing. 90DSR is a measure of the success rate of Fintech Lending companies in facilitating the settlement of lending and borrowing obligations within a period of up to 90 days from the due date (Otoritas Jasa Keuangan, 2021b). The formulation for 90DSR is

$$90\text{DSR} = 100\% - 90\text{DLD} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

90DLD is a measure of the default level in settling the obligations stated in the agreement more than 90 days from the due date.

$$90\text{DLD} = \frac{\text{Outstanding default}}{\text{Total Outstanding}} \text{X } 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(2)}$$

90DLD represent credit risk for Fintech company (Otoritas Jasa Keuangan, 2021b)

Fintech offers technology-based financial services, which has a competitive advantage over traditional banking. This prompted Vasenska et al. (2021) to offer a survey analysis of individual customers' use of Fintech before and during the crisis in Bulgaria. A 242 individual questionnaire survey respondents were used as part of the technique. Identifying concerns with fintech transactions during the Covid19 pandemic in Bulgaria under the circumstances of the economic crisis is one of the results that highlights the primary issues with implementing financial transactions with Fintech (Vasenska et al., 2021).

The use of Fintech and blockchain in Islamic finance is covered by Mohamed dan Ali (2019), who makes the strong case that these applications not only allow for the fusion of technology and Islamic finance but also lay the groundwork for a new Islamic digital economy that respects Maqasid Al-Shariah. Internal banks can use Fintech, and all departments will benefit from better networking, thanks to these applications. Citak and Acar (2019) suggest fintech integration in internal banking based on their research, which covers the complete process of fintech integration from identifying internal department needs to its conclusion (Acar, 2019). In 84 countries, Fung, Lee, Yeh, and Yuen (2020) investigated the impact of fintech innovation on financial fragilities. One of their conclusions is that because maximizing profitability is the primary goal of financial operations, Fintech impacts financial institutions' stability through this channel (Fung et al., 2020). The unbanked people can access a variety of services from fintech lending companies. Gain from operations and services in a fintech loan company on a fee- and interest-based basis. Sheng (2020) explores how financial technology (Fintech) has affected banks' ability to provide credit to small and medium-sized businesses (SMEs) by looking at their lending histories in Chinese provinces between 2011 and 2019 (Sheng, 2020).

Correlation between fintech and micro-small-medium enterprises (MSMEs) becomes interesting because both of them should be motor of economic growth in developing countries. The government should become a market supervisor and create a regulation strategy that supports and motivates innovation of Fintech and MSMEs (Batunanggar, 2019). There are numerous demographic variables to choose when examining Fintech customers in emerging nations. Gender is an intriguing factor. Over half of the remaining disparity is accounted for by gender variations in the desire to embrace new financial technology or fintech entrants, provided they offer less expensive services (Chen, Doerr, Frost, Gambacorta, & Shin, 2021).

RESEARCH METHOD

This research analyses four variables: outstanding loan, basic loan interest rate (BLIR), lender entities and 90DLD related to Fintech. Outstanding loan is loans from Fintech companies that are still ongoing. BLIR is calculated from BLIR average of 9 biggest banks in Indonesia. The term "lender entities" refers to accounts belonging to individuals, businesses, and/or legal entities with receivables due to a fintech loan transaction. DLD is a gauge of the extent of non-compliance with the contract terms more than 90 days beyond the due date. All variables using monthly data from December 2018 to May 2021.

Data analysis of these variables employs Vector Error Correction Model (VECM). VECM model just like VAR (Vector Auto regression) model, assumes that all variables are endogenous (Kozhan, 2010). The procedure in VECM analysis is as follows: 1) Specification of estimation, and model checking using unit root test (stationary check), Johansen co-integration test, model Estimation and model checking: An important procedure in estimating the VECM equation is selecting the optimum lag. Optimum lag selection in VECM can use information criteria, namely AIC and SC. 2) Causality analysis

using Granger causality test. 3) Forecasting and structural analysis using Impulse Response Forecasting (IRF) and Variance Decomposition (VD) is also carried out (Caporale & Plastun, 2019).
General VECM formula with lag 1 (p-1) is

$$\Delta Y_t = \alpha e_{t-1} + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \cdots + \beta_p \Delta Y_{t-p+1} + \varepsilon_t \quad \text{..... (3)}$$

$$e_{t-1} = Y_{t-1} - (\varphi + \omega X_{t-1}) \quad \text{..... (4)}$$

Description:

Y_t : first difference vector from dependent variable
ΔY_{t-1} : first difference vector from dependent variable with lag 1
ΔY_{t-2} : first difference vector from dependent variable with lag
e_{t-1} : error term from regression estimation between Y and X in lag 1
ε_t : vector residual/vector of error terms
α : cointegration coefficient matrix
β_i : coefficient matrix for dependent variable i = 1, 2, …., p

The data unit in the variables has a different scale. Data for the outstanding loan variable is in billions hundreds of rupiah, data for lender entities is in thousands hundreds, while data for the BLIR and DLD variables are in percent. Therefore, the outstanding loan and lender entities variables are converted to the natural logarithm (Geyer, 2021). Furthermore, the outstanding loan variable will be called LNO. And the lender entities variable is labeled LNEL.

When variables are cointegrated, departures from the long-term equilibrium will have a short-term feedback effect on changes in the dependent variable, forcing the long-run equilibrium to move in that direction. The dependent variable will respond to this feedback if the long-term equilibrium mistake drives it. The significance of the t-test on the lagged error correction term thus determines the inferences of long-term causal effects. If not, it is only reacting to sudden shocks. (Allen & Morkel-kingsbury, 2014). Therefore, this study aims to analyze credit risk, interest rate, the amount of lender entities and outstanding loans of Fintech companies in short and long term using VECM. This study would be beneficial for broaden the view about fintech companies and its credit analysis.

RESULTS

The data condition requirements to be analyzed using VECM) are non-stationary data at the level and co-integrated data. First test that is carried out is the unit root test. Unit root test shows that all data in variables are not stationer in level, but stationer in first difference. Table 1 shows that all data in the first difference have a probability value of 0.000, less than 0.05 significance level. After the lag length criteria result was revealed, we used optimum lag 3 to estimate with VAR model. Then we will combine VAR model with Error Correction Model (ECM), but we need to do a stabilization test.

Table 1. Stabilization Test Result

Root	Modulus
-0.896710	0.896710
0.756654 - 0.450042i	0.880376
0.756654 + 0.450042i	0.880376
-0.187613 - 0.837609i	0.858363
-0.187613 + 0.837609i	0.858363
0.749673	0.749673
0.368229 - 0.565509i	0.674828
0.368229 + 0.565509i	0.674828
-0.458151 - 0.453622i	0.644729
-0.458151 + 0.453622i	0.644729
-0.008314 - 0.314679i	0.314789
-0.008314 + 0.314679i	0.314789

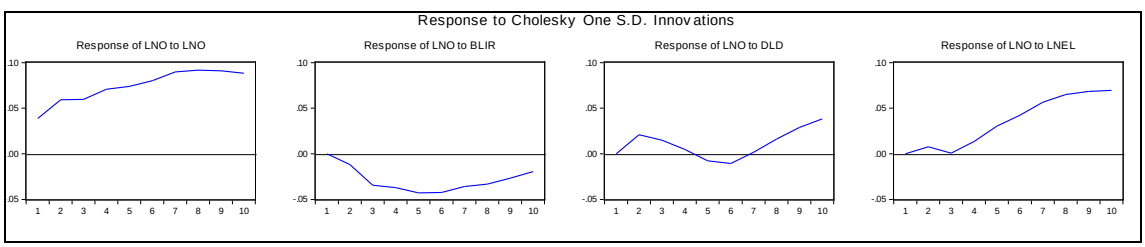
Source: Author's research

The value of modulus is less than 1, and the information below table 3 mentions that VAR satisfies the stability condition and is ready to be combined with ECM model. ECM model requires co-integration in 0.05 level of significance.

Co-integration test Result shows the same result indicates 4 co-integrations eigenvalue at 0.05 significance level. After that, we should examine causalities between variables with Granger Causality Test to recognize the long-term causality impact. The result of Granger causality test shows the causality of BLIR variable to LNO. VECM in lag 3 with LNO as a dependent variable is the best model to analyze data in this research. VECM (3) has a value of R2 0.732303 and an adjusted R^2 0.590581.

EC_t is negative and significant, meaning that BLIR impact to LNO is negative and significant in the short term. Based on the figure below, the IRF analysis of the LNO for the next ten months is that the LNO has a strong positive response to shocks from itself in month 1, but it getting weaker in month 9. This means that after month 9 the reaction of the inflation rate to shocks from itself tends to be weak. The LNO negatively responded to BLIR shocks in months 1 to 5 and continued to decline. If there is a shock of 1 standard deviation in the BLIR, LNO will react negatively. The LNO had a positive response to shocks from DLD in month one but then decreased until month 4. The value was zero, and LNO has negative response to DLD in month 5 to 7. And continued to increase its positive response. If there is a shock of 1 standard deviation in the DLD, LNO will react positively then negatively and continues positively till month. The LNO's response to shocks from the LNEL in months 1 to 2 was weak but then continued to increase. If there is a shock of 1 standard deviation in the LNEL, LNO will react positively stronger in month 3.

Figure 3. Summary of Impulse Response Function of LNO



Source: Author's research

Impulse response (IR) was beneficial in revealing each variable fluctuation according to shock from other variables and the time of recovery. The summary of IR as follows only shows the response of LNO aftershock from BLIR, DLD as a result of the Granger causality test.

The variance decomposition of LNO in 10 periods which means that variance decomposition in first 10 months after influenced by other variable. They suggest the following based on the output, it can be seen that in the first period, the LNO variable is only influenced by itself without any fluctuation contribution from other variables. Meanwhile, for the following periods, the BLIR and LNEL interest rates are quite dominant variables contributing to fluctuations in LNO compared to the DLD variable.

Table 3. Varians Decomposition of LNO

Variance Decomposition of LNO:					
Period	S.E.	LNO	BLIR	DLD	LNEL
1	0.038662	100.0000	0.000000	0.000000	0.000000
2	0.075048	88.76075	2.450331	7.760041	1.028876
3	0.102880	80.74191	12.46182	6.242695	0.553584
4	0.130966	78.94618	15.68040	3.984253	1.389165
5	0.159461	74.71127	17.81729	2.929601	4.541839
6	0.188584	71.50607	17.81328	2.408571	8.272078
7	0.219343	69.61209	15.83765	1.786718	12.76354
8	0.249185	67.46400	14.04338	1.800748	16.69188
9	0.276799	65.50201	12.31456	2.540475	19.64296
10	0.301802	63.64443	10.77378	3.749528	21.83226

Source: Author's research

DISCUSSION

Outstanding loans are shown as a dependent variable in the top VECM models. As a result, interest rates have a short-term impact on existing loans because fintech lending companies profit from their operations and services on both interest- and fee-based basis (Mishkin, 2004). The credit risk rate of Indonesian Fintech lenders is still meagre, below OJK's standard, and has no immediate or long-term effects on outstanding loans. According to IRF and VD forecasting results, a credit risk rate of 1% to 2% does not have any significant short- or long-term effects on outstanding loans. However, if the credit risk rate increases in the future, the shock to the outstanding loan could be more significant. To prevent this and keep the fintech industry healthy, a fintech company should keep its credit risk at or below 5% per OJK regulations (PwC-Indonesia, 2019).

The raise of Fintech company in Indonesia mainly supported by suitable basic loan interest rates. Before the pandemic, banks determine the basic loan interest rate at a moderate rate. But during the pandemic, Bank Indonesia established the Bank Indonesia 7 days repo rate (BI7DRR) as a benchmark interest rate low rate to encourage economic activities. All financial institutions in Indonesia, including Fintech companies, should adapt their basic loan interest rate to BI7DRR. According to data BLIR during the pandemic also in a low rate. It makes the rise of a fintech company in Indonesia keeps going on.

The rapid development of information and technology (IT) promotes the fintech industry's growth and attracts investors to lend to fintech firms. The lenders are accounts of individuals, businesses, and or legal entities that owe money due to the fintech lending

agreement. The variety of investments offered by fintech companies provide a fresh possibility for lenders.

Character of fintech company's lenders are dominated by youth and risk seeker to maximize profit. Most lenders are millennials aged 19-34 years, which is 69,53% from total lender, based on data from the Financial Services Authority (OJK) in April 30, 2019. These young investors will stay in the Fintech market for the next 20-30 years. The rest are lenders aged 35-54 years (27,26%), and other age groups. The number of lenders will rise as a result of technological advancement. The number of lender entities greatly impacts outstanding long-term loans to Fintech companies.

CONCLUSION

The rise of Fintech companies in Indonesia before and during the pandemic Covid19 mainly supported by reasonable short-term basic loan interest rates. In the long term, lender entities would impact increasing outstanding loans. And low credit risk of a fintech company does not impact outstanding loans. Forecasting results using IRF and VD revealed that a credit risk rate 1-2% has a weak shock to outstanding loans in the short and long term. But if the credit risk rate becomes more substantial in the future, it may give a firmer shock to outstanding loans. A fintech company should maintain credit risk below 5%, which is suitable with OJK regulation.

An intelligent lender should choose a Fintech company platform licensed or registered to the Financial Services Authority (OJK) and suitable to the lender's character. The lender could diversify their investment into various lending products with various levels of risk. It will be safer for the lender if they choose to fund Invoice Financing. Invoice financing means that the business actor who becomes the borrower has completed his work or project but has not received payment from the payor, so the borrower tries to borrow funds from the Fintech company. Last but not least, lender must observe the borrower's economic activities by looking at its website/buyer's testimony in the marketplace/financial report to recognize the track record of the prospective borrower's activities (Acar, 2019).

The credit risk rate of Fintech lending company in Indonesia is still very low, below OJK's standard and does not have a short- and long-term impact on outstanding loans. The effort to maintain low credit risk for Fintech companies is using risk-based pricing technology using banking data, financial reports, relationships with payors, and secure payments for projects being financed in analyzing prospective borrowers to reduce default credit risk (Spuchľáková et al., 2015). The fintech company could collaborate with other companies to rank the borrower's stock and bonds. Because through its services, Fintech companies can find out the historical credit profile of borrowers and credit ratings that complement the Fintech lending company's scoring (Guérineau & Léon, 2016).

Governments and central banks should place more emphasis on boosting financial inclusion by improving not only financial access but also financial usage. Because of the abundance of information available today—which simultaneously presents facts and hoaxes—people in developing nations are confused and are more likely to believe false information about Fintech. The research results of El Bourainy, Salah, and Sherif (2021) found that also highlight the crucial role of the government and central bank in fostering a better strategy to change the financial sector as a whole by illuminating how increasing access to and utilization of banking services may help achieve this goal. (El Bourainy et al., 2021).

Fintech company also cooperates with third parties to check borrower profiles related to Anti-Money Laundering and Prevention of Terrorism Financing (Bank Indonesia, 2019).

In the collection department, the Fintech lending company has its collection team in accordance with financial industry standards to carry out the collection process (Fung et al., 2020). Currently, most of the borrower profiles are from the creative industry. Usually, they come from the business of event organizers, agencies, and production houses. These characteristics can be included in the following research about Fintech in Indonesia. Future research about Fintech in South East Asia will be excellent.

The rise of Fintech nowadays must be accompanied by high public financial literacy as customers of commercial banks so that they can safely and optimally utilize technological sophistication. With the increase in Fintech technology, there is a risk, namely the increasing ability of hackers and virtual crimes supported by technological sophistication. Economic activities in the form of saving and investing are expected to increase in quantity and quality with the existence of Fintech.

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DECLARATION OF CONFLICTING INTERESTS
The authors declared no potential conflicts of interest.

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