The Effect of Fintech Loans on Income Inequality in Indonesia

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Abstract: This study aims to analyze the impact of FinTech loans on income inequality in Indonesia. The data utilized comprises 34 provinces in Indonesia with quarterly frequencies from 2019 to 2022. The use of provincial-level panel data enables subgroup analysis and differentiation based on FinTech loan levels for comparison purposes. The Two Step System Generalized Method of Moments (SYS-GMM) method is employed to address research questions and test the proposed hypotheses. Estimation results reveal that FinTech loans have a positive and significant impact on income inequality in Indonesia. Subgroup province analysis also indicates similar outcomes, with a greater influence observed in provinces with higher levels of FinTech loans.

Keywords: FinTech loans, income inequality, economic growth, open unemployment rate, two-step SYS-GMM.

INTRODUCTION

Indonesia is committed to achieving the Sustainable Development Goals (SDGs) set by the United Nations (UN). The SDGs aim to improve human welfare with the principle of meeting needs without sacrificing existing resources in the future. One of the important aspects in achieving the SDGs is reducing income inequality in society (United Nation, 2020). However, facts found by the United Nations (2020) show that income inequality between the rich and poor around the world has continued to increase in recent decades (Hodula, 2023). This shows that high income inequality can have a negative impact on a country's development process. One way for the government to improve people's welfare and reduce income inequality is through sustainable economic growth. However, Niekerk (2020) states that increasing economic growth alone does not always significantly address income inequality, especially in Developing Countries (NSBs). (Niekerk, 2020).

Although efforts have been made through the traditional banking system, the results have not been adequate in addressing income inequality (Stiglitz, 2015). In Indonesia, there are still many individuals and Micro, Small and Medium Enterprises (MSMEs) actors who are not yet connected to banking institutions. This results in them facing difficulties in obtaining the

financial access needed to obtain credit and develop their businesses so as to increase their income (Primasari, 2022). (Primasari, 2022). Bank Indonesia noted that as many as 91.3 million people and 62.9 million MSME actors have not been connected to financing and banking institutions. Based on BPS data, there are approximately 186 million working-age individuals from the lower-middle per capita expenditure segment and 63 million businesses incorporated in the MSME segment in Indonesia in 2018. Of this figure, around 71 percent of lower-middle-income individuals and 74 percent of MSME businesses still do not have access to credit.
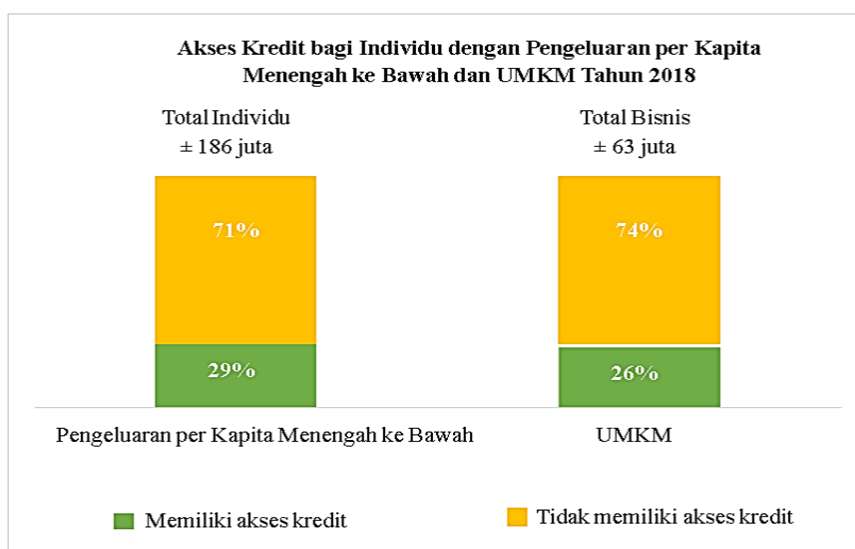

Source: BPS, Kemenkop UKM, and Bank Indonesia (2018)
Figure 1. Graph of Credit Access for Individuals with Lower Medium Per Capita Expenditure and MSMEs in 2018

This shows that most individuals with lower-middle income and MSME businesses still face obstacles in obtaining the financing they need. In fact, credit extended by banking institutions tends to show a certain socioeconomic bias, where those who already have access to sufficient resources and finances tend to get credit more easily than those in more vulnerable economic conditions. Therefore, the implementation of a financial system that is accessible to all is a necessary action in the financial inclusion program. This financial inclusion program aims to increase accessibility for people who have not been served by formal financial institutions. (Rizkianda & Wiguna, 2022).. In addition, Park & Mercado Jr (2018) also pointed out that financial inclusion, which involves increasing the poor's access to financial services, has proven effective in reducing income inequality in developing countries, including Indonesia. (Park & Mercado, 2018).

One of the emerging financial inclusion instruments is FinTech. FinTech start-ups have also proven to be more flexible in adopting technological innovations as they do not operate within traditional financial ecosystems such as banking. (Haddad & Hornuf, 2019). The rapid development of FinTech start-ups in Indonesia has presented a variety of diverse FinTech products. One of the popular and dominant FinTech services in the Indonesian market is peer-to-peer (P2P) lending. As of December 2020, there were 149 registered P2P lending FinTech companies, of which 37 have obtained licenses from the Financial Services Authority (OJK). However, there is an interesting fact based on OJK data that reveals that almost all FinTech Lending companies are domiciled in Java Island, and FinTech loan disbursements are also

mostly centered in the region. In 2022, the average outstanding FinTech loan in Java Island reached around Rp40.29 trillion, while outside Java Island was only around Rp10.83 trillion.
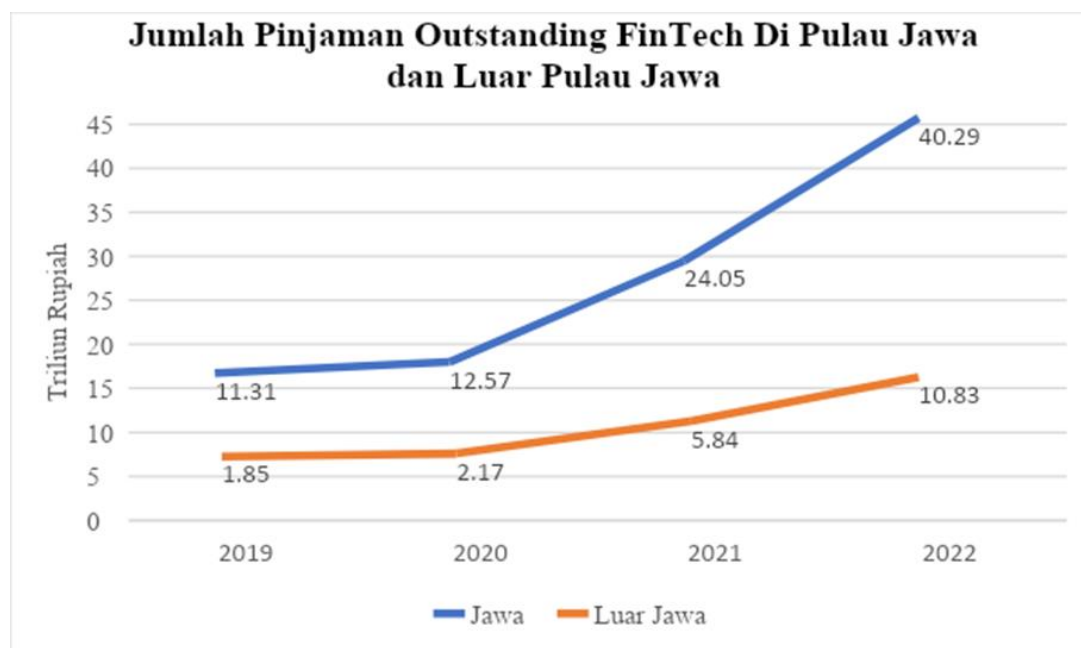
Source: OJK (2019-2022)
Figure 1. Graph of Outstanding Loan Amount of Fintech in Java and Outside Java Island

This phenomenon reflects the imbalance in the distribution of FinTech loans between Java and regions outside Java. As stated in the research of Adiputra (2021) and Saraswati et al. (2020) that the concentration of fintech lending and fintech companies on the island of Java can result in higher income inequality in Indonesia. (Adiputra, 2021; Saraswati et al., 2020).. However, Jiang & Li's (2021) research provides evidence to the contrary, namely that financial inclusion, especially through FinTech lending, has a significant impact on reducing income inequality. (Jiang & Li, 2021).

Through financial inclusion innovations such as FinTech lending, access to financial services can be provided to marginalized groups of people, thereby increasing their income. However, Reis T. (2020) and Ashenafi & Dong (2022) suggest that the direct impact of FinTech lending on reducing income inequality may not be significant. While FinTech lending can provide opportunities for individuals with limited access to improve their well-being through financial services, in the context of developing countries, its impact on reducing overall income inequality is limited. (Ashenafi & Dong, 2022; Reis, 2020).. Thus, it is of interest to the authors to analyze the effect of FinTech lending on income inequality in Indonesia, given the rapid growth of the FinTech sector, especially during the COVID-19 pandemic. In a condition where digitalization has permeated various aspects of life, individuals and MSMEs need alternative financing to make ends meet and maintain their business continuity. In addition, it is important to keep in mind that the effect of FinTech on income inequality may also depend on how access and use of these technologies are distributed in society, whether all segments of society have equal opportunities to utilize them.

In addition, the authors found that studies exploring the contribution of FinTech lending to income inequality in Indonesia are still very limited. In fact, the potential of FinTech, especially in terms of financing and financial inclusion, has been highlighted in an effort to overcome income inequality. (Oh & Rosenkranz, 2020).. Therefore, this study attempts to examine the effect of FinTech lending on income inequality in Indonesia using provincial-level

panel data covering 34 provinces in Indonesia. The use of panel data at the provincial level also allows the authors to conduct provincial sub-group analysis by dividing the sample based on FinTech lending in each province, given that most FinTech lending is still focused on Java. However, the selection of the research sample period is based on the availability of data on the main independent variable, namely outstanding FinTech loans, which is available in full for 34 provinces in Indonesia since the first quarter of 2019, so this study has not been possible to conduct long-term analysis. In this study, the authors also included control variables of economic growth and open unemployment rate. This is done to control for endogenous factors that may affect both FinTech lending and income inequality. (Hodula, 2023; Jiang & Li, 2021)..

LITERATURE REVIEW
Income Inequality

There are several studies that have looked at the phenomenon of income inequality. Jhingan in 2013 highlighted the role of strong reverse flows and weak dispersion as the main factors of inequality. Meanwhile, according to Kuncoro in 2006, production factors and resources influence such differences, triggering inequality in welfare and income distribution across regions. Kuznets' theory in 1995 shows the worsening of income distribution in the early stages of economic growth, which then evens out when it reaches a certain peak. The determinants of income inequality, such as population growth, inflation, and low social mobility, were also explained by Adelman & Morris in 1976. Technology, particularly in the FinTech sector, provides wider financial inclusion opportunities (Fu & Liu, 2023; Jensen, 2022; Saraswati et al., 2020).. However, we should also be aware of the new possibilities of inequality that arise in access to these financial technologies.

Relationship between Financial Sector and Income Inequality

Greenwood & Jovanovic (1989) introduced a single model that links economic growth, inequality, and financial sector development. In this model, financial development is considered to benefit economic growth because it has a higher rate of return on capital. Along with high economic growth, the need to develop financial structures also increases, which can be costly. The model shows that during the process of economic growth and financial development, income inequality may vary as the economy goes through different phases of development. The early stages of economic development are characterized by a less organized financial sector and slow growth. At this stage, access to financial services is limited, so people have limited access to loans and investments. However, as economic incomes rise, the financial sector begins to expand and become more widespread. Economic growth also increases along with the development of this financial sector (Greenwood & Jovanovic, 1989).

Although the financial sector is expanding, increased financial accessibility does not always bring equitable benefits to the whole society. As economic growth and the financial sector expand, income inequality between high and low income earners also tends to increase. This gap may occur because high-income earners are more likely to benefit from better financial development than low-income earners (Yao & Ma, 2022). (Yao & Ma, 2022). However, when the economy reaches a mature stage, income distribution among agents becomes more stable. This mature stage is characterized by high economic growth with a fully developed financial structure. This causes the gap between high- and low-income people to become more manageable (Jintar et al., 2023).

Therefore, the role of the financial sector in economic development and income inequality is crucial. In the early stages of development, it is important to increase financial accessibility for the whole society to make economic growth more equitable. However, in the mature stage, attention needs to be paid to the stability of income distribution so that inequality

can be reduced and the benefits of financial sector development can be enjoyed by all levels of society.

Empirical Study

This research builds on the work of Hodula (2023) who explored the effect of FinTech lending on income inequality using panel data from 78 countries during 2013-2019. The study divided countries into three groups based on income levels. However, in this study, Song & Appiah-Otoo (2022) referenced the division of the sample into two groups, namely high and low levels of FinTech lending. The variables used also partly refer to the variables that have been analyzed by Hodula (2023), but due to data limitations, only a few variables can be included. Alternatively, variables such as Gini ratio, amount of FinTech loans, economic growth, and open unemployment rate were selected based on the availability of relevant data and the ability to support the analysis. This study highlights the importance of financial inclusion through FinTech lending in reducing income inequality, as also expressed by previous studies such as those conducted by Saraswati et al. (2020), Fu & Liu (2023), and Jiang & Li (2021). However, some studies suggest that the direct impact of FinTech lending on reducing income inequality may not be so significant, depending on the country context and the level of financial inclusion as revealed by Hodula (2023), Demir et al. (2022) and other studies (Demir et al., 2022; Fu & Liu, 2023; Hodula, 2023; Jiang & Li, 2021; Saraswati et al., 2020; Song & Appiah-Otoo, 2022)..

In Indonesia, the findings on the impact of FinTech lending on income inequality are mixed with studies suggesting that FinTech lending can reduce inequality. (INDEF & AFPI, 2019), increasing inequality (Wahyono et al., 2022) or no significant effect. Thus, further research is needed to better understand how FinTech lending can affect income inequality in different settings, given that each country or region has its own unique social, economic and policy context.

METHOD

The research method used is the Two Step System Generalized Method of Moments (SYS-GMM) method. The use of the Two Step SYS-GMM method in this study was chosen because this method can produce estimates that are more consistent, efficient, and robust, and can overcome problems caused by instrument proliferation. This method minimizes the possibility of bias in estimation (Roodman, 2009).

Referring to the research of Song & Appiah-Otoo (2022), the authors also conducted a provincial sub-group analysis using a sample of provincial groups with high and low FinTech lending. (Song & Appiah-Otoo, 2022).. The aim is to compare the effect of FinTech lending on income inequality in each of these provincial groups. Thus, there are three models in this study: model I includes the sample of all provinces, model II includes the sample of provinces with high FinTech lending, and model III includes the sample of provinces with low FinTech lending. Secondary data in this study were obtained from several sources, namely the Census and Economic Information Center (CEIC), the Central Bureau of Statistics (BPS), and the Financial Services Authority (OJK). The data used is panel data covering 34 provinces in Indonesia. This data is collected with quarterly frequency from the first quarter of 2019 to the fourth quarter of 2022. Some types of data used in this study include Gini ratio data, FinTech outstanding loans, GDP at current prices, and open unemployment rates. In addition, the author also divided the sample into two provincial subgroups, including a sample of 17 provinces with high FinTech loans and a sample of 17 provinces with low FinTech loans. The division of the sample was done by calculating the average number of FinTech loans for each province during the study period, then divided into two categories based on the median value.

In analyzing the effect of FinTech loans on income inequality in Indonesia, the author first compares the coefficients of the lag of the dependent variable in the SYS-GMM, FD-GMM, FEM, and POLS estimations to determine the appropriate research model. The desired result is a consistent (unbiased) estimation. After that, two stages of testing are carried out, namely the Arellano-Bond test to test whether there is serial autocorrelation of the first order and second order and the Hansen test to test for overidentification, assuming heteroscedasticity. (Lillo & Torrecillas, 2018). Therefore, in this study, the Hansen test will be used to check whether the instrument variables in the model fulfill the assumption of exogeneity.

The model used in this study is based on the framework proposed by Hodula (2023). In the model, the dependent and independent variables are formulated by including lags, which aims to observe the dynamic relationship between these variables. In contrast, to avoid the possibility of autocorrelation and endogeneity, the control variables are set without lags (Hodula, 2023). (Hodula, 2023). Nevertheless, some modifications were made to the model to suit the context and limitations of this study:

$$GINI_{i,t} = \beta_0 + \delta GINI + \beta\, LFLEN_{i,t-11i,t-1} + \beta_2\, GDP_{i,t} + \beta\, TPT_{3i,t} + \varepsilon_{i,t}$$

Description:

- L indicates that the variable is transformed into logarithmic form.
- $GINI_{i,t}$ is the Gini ratio for province i and period t.
- $GINI_{i,t-1}$ is the *lag* variable of Gini ratio in province i and period *t-1*.
- $LFLEN_{i,t-1}$ is the *lag* variable of FinTech *outstanding* loans in province i and period *t-1*.
- $GDP_{i,t}$ is GDP at current prices in province i and period t.
- $TPT_{i,t}$ is the open unemployment rate in province i and period t.
- $\varepsilon_{i,t}$ is the *error term*.

RESULTS AND DISCUSSION
Hansen Instrument Validity Test

Table 1. Hansen Instrument Validity Test Results

Model	*Chi2*	*Prob > chi2*
I	29,52	0,288
II	14,65	0,083
III	12,48	0,115

Source: Data processed by the author (2023)

Table 1 shows that the probability value (Prob > chi2) for the three research models used on the effect of FinTech loans on income inequality in Indonesia is more than 0.05, where the probability value (Prob > chi2) for models I, II, and III. Thus, the instrument variables used are valid and there is no overidentification problem in the research model.

Arellano-Bond Autocorrelation Test

Table 2. Arellano-Bond Autocorrelation Test Results

Model	AR(1)		AR(2)	
	z	Prob > z	z	Prob > z
I	- 3,61	0,000	1,72	0,117
II	-3,35	0,001	2,03	0,063
III	-3.71	0,000	0,19	0,813

Table 2 shows that the AR(2) probability value for all research models is greater than 0.05, where the AR(2) probability value for models I, II, and III. Thus, the null hypothesis of this test is not rejected so that there is no autocorrelation problem in all research models. Meanwhile, the AR(1) probability value is not a crucial determinant.

Two Step System Generalized Method of Moment (SYS-GMM) Estimation

Table 3. Two Step SYS-GMM Estimation Results

Independent Variable	Dependent Variable: GINI	
	Model I	
	Coef.	P> |z|
L1.GINI	0,0301233***	0,000
L1.LFLEN	0,0005747***	0,000
GDP	-0,0002642***	0,000
TPT	0,0001241***	0,021

Notes: *, **, *** denote error rates at 1%, 5%, and 10% respectively

Source: Data processed by the author (2023)

Based on the data processing results, the FinTech loan lag variable has a value of 0.0005747. This indicates that there is a positive influence between the lag variable of FinTech loans and income inequality in Indonesia. This means that a 1% increase in FinTech loans in the previous period will increase income inequality in Indonesia by 0.0005747% in the following period. This estimation result is in line with Hodula's (2023) research which states that there is a relationship between an increase in FinTech lending and a decrease in income inequality, especially in countries with high financial inclusion. However, in countries with low financial inclusion, an increase in FinTech lending may worsen income inequality due to technological access constraints, low financial literacy, and limited financial infrastructure. (Setiawan et al., 2024).

The economic growth variable has a value of -0.0002642. This figure shows that economic growth has a negative effect on income inequality in Indonesia. This means that a 1% increase in economic growth will reduce income inequality by 0.02642%. These estimation results confirm the research of Nguyen et al. (2020) which states that economic growth will reduce income inequality. However, this result is not in line with Kusumawardani & Dewi's (2020) research, which shows that economic growth contributes to an increase in income inequality. The open unemployment rate variable has a value of 0.0001241. This figure indicates that every 1% increase in the open unemployment rate will increase income inequality by 0.01241%. This result is consistent with the findings of previous research conducted by Arkum & Amar (2022), which states that the open unemployment rate has a positive and significant effect on income inequality. However, this finding is different from the research conducted by Topcu & Tugcu (2020) which shows that an increase in unemployment can reduce income inequality in the long run. (Arkum & Amar, 2022; Kusumawardani & Dewi, 2020; Nguyen et al., 2020; Topcu & Tugcu, 2020)..

Provincial Subgroup Analysis

Table 4. Two Step SYS-GMM estimation results by Province Group

Independent Variable	Dependent Variable: GINI

	Model II		Model III	
	Coef.	P> |z|	Coef.	P> |z|
L1.GINI	0,2810815***	0,000	0,1704651***	0,000
L1.LFLEN	0,0040304***	0,047	0,0006853***	0,000
GDP	-0,2875809***	0,000	-0,0041972***	0,000
TPT	0,0000248***	0,052	0,0016187***	0,000
Notes: *, **, *** denote error rates at 1%, 5%, and 10% respectively				

Source: Data processed by the author (2023)

FinTech lending has different impacts on income inequality in provinces with high and low levels of lending (Adiputra, 2021; Saraswati et al., 2020).. In provinces with high FinTech lending, an increase in FinTech lending has a significant positive effect on income inequality of 0.0040304, while economic growth has a significant negative effect of -0.2875809. (Primasari, 2022; Song & Appiah-Otoo, 2022).. In contrast, in provinces with low FinTech lending, an increase in FinTech lending and economic growth positively affect income inequality by 0.0006853 and -0.0041972 respectively. The centralized distribution of FinTech firms in Java Island is the main factor explaining this difference. (Adiputra, 2021; Saraswati et al., 2020).. Economic growth plays an important role in reducing income inequality in provinces with high FinTech lending, while the open unemployment rate affects income inequality in provinces with low FinTech lending. (Primasari, 2022; Song & Appiah-Otoo, 2022).. High unemployment rates in provinces with low FinTech lending indicate gaps in access to and participation in such lending services.

CONCLUSION

This study reveals that FinTech lending has a significant effect on income inequality in Indonesia, with a larger impact seen in provinces with high FinTech lending. Meanwhile, economic growth and open unemployment rate have opposite effects on income inequality, with different provinces showing different responses. The policy implications of this study include encouraging the growth of the FinTech industry to improve financial inclusion, expanding FinTech lending to areas outside Java, improving digital infrastructure and financial literacy across Indonesia, and the need for good risk management to mitigate the risks associated with the growth of the FinTech industry. Thus, collaborative efforts between regulators, government, and the FinTech industry are crucial in optimizing FinTech's contribution in reducing income inequality and increasing financial inclusion in Indonesia.

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