Financial Technology and Poverty Alleviation in Indonesia During the COVID-19 : Impact Evaluation Analysis

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ABSTRACT

The COVID-19 pandemic has brought significant changes, especially to each country's economic and financial sectors. Economic growth in Indonesia experienced a contraction entering mid-2021. This also impacted limiting economic activity, decreasing household consumption, unemployment risk, and increased poverty. In addition, there are changes in people's behavior, such as digital financing systems, non-cash payment systems, and online buying and selling transaction systems. Efforts to improve the economy are encouraged by stimulating people's economic productivity through adaptation to digital technology developments, especially using digital finance. However, the development of digital finance needs to be supported by public financial literacy and inclusion so that it can positively alleviate poverty. This study aims to analyze the impact of financial technology lending on poverty in Indonesia during the COVID-19 pandemic using instrumental variable analysis (IV) for 2019-202. The results of the study show that fintech lending has a negative effect on the poverty rate. However, it is not significant when other variables are added. E-commerce and the use of credit cards have a negative and significant impact on the poverty rate in Indonesia. In maximizing the role of Fintech in Indonesia, support and cooperation from the government, financial institutions, and various relevant stakeholders are needed.

INTRODUCTION

The COVID-19 phenomenon has attracted great attention, causing global economic shocks so that most economies experience contraction (Li, Wu and Xiao, 2020; Maysaroh and Diansyah, 2022). This also causes the activities of the entire community to stop due to restrictions on face-to-face activities and interactions between individuals, which have an impact on reducing household consumption and the risk of unemployment (Li, Wu and Xiao, 2020; Lee *et a.,* 2021; Song and Appiah-Otoo, 2022). Declining household consumption and increasing risk of

unemployment are factors causing poverty to increase. Poverty was the main problem and challenge faced even before the Covid-19 pandemic. Poverty implies financial resources are unable to meet household economic needs (Song and Appiah-Otoo, 2022). According to the Central Bureau Statistics, Indonesia experienced a contraction in the rate of economic growth of -0.4 percent or -5.32 percent in the second quarter of 2020 and with the poverty rate increased to 10.19 percent in the second semester of 2020.

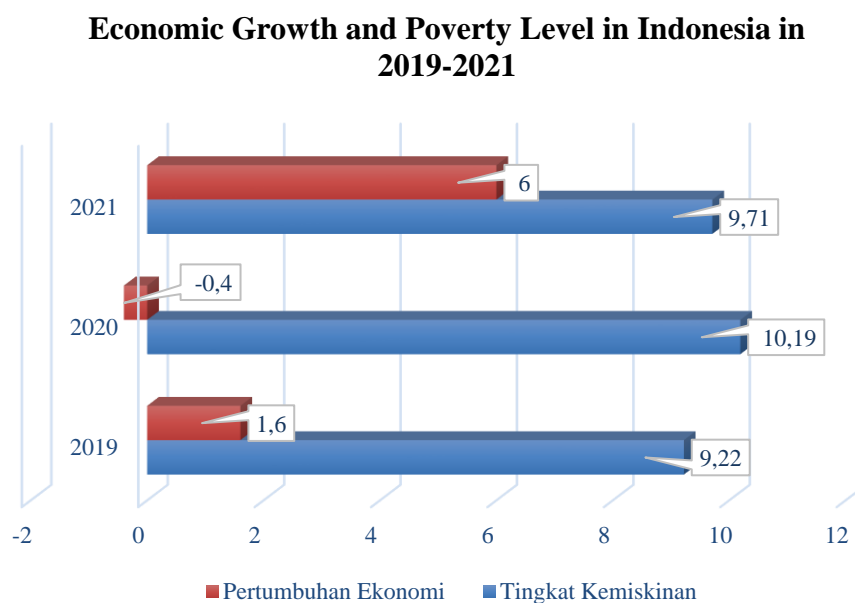**Economic Growth and Poverty Level in Indonesia in 2019-2021**

Figure 1. Economic Growth and Poverty Level in Indonesia in 2019-2021
Source : Sumber : BPS data processed by author, 2023

Efforts to improve the economy are encouraged by stimulating people's economic productivity through adapting to developments in digital technology, one of which is digital finance. Since the spread of the impact of COVID-19, changes in economic activity have changed significantly, where consumption and production behaviour patterns have become online or cashless. The development of financial services encourages better economic growth, thereby indirectly reducing poverty (trickle-down effect hypothesis) (Zhang, Tan, *et a.,* 2020; Song and Appiah-Otoo, 2022; Criveanu, 2023). Fast and good financial system development, such as technology-based product and service innovation, is one of the effective methods in alleviating poverty (Lee *et a.,* 2021; Ho & Lyke, 2017; Ye *et a.,* 2022; Zameer *et a.,* 2020). Digital finance plays an integral role in reducing the impact of poverty by smoothing consumption and production due to COVID-19 (Munyegera and Matsumoto, 2016)

As the rapid development of digital technology supports the process of improving digital financial services, it leads to increased automation of processes and the financial service value chain, which is known as financial technology (Fintech) (Anindyntha and Sulistyono, 2022; Maulana and Wiharno, 2022). Fintech is a form of digital financial services innovation that is considered capable of helping financial transaction activities become more effective and efficient (Harahap *et a.,* 2017; Wajuba, Fisabilillah and Hanifa, 2021). Fintech can also have a changing effect on monetary stability, financial system stability, security, smoothness and reliability of payment systems, as well as accelerating economic development (Cheng and Degryse, 2010; Wajuba, Fisabilillah and Hanifa, 2021; Anindyntha and Sulistyono, 2022).
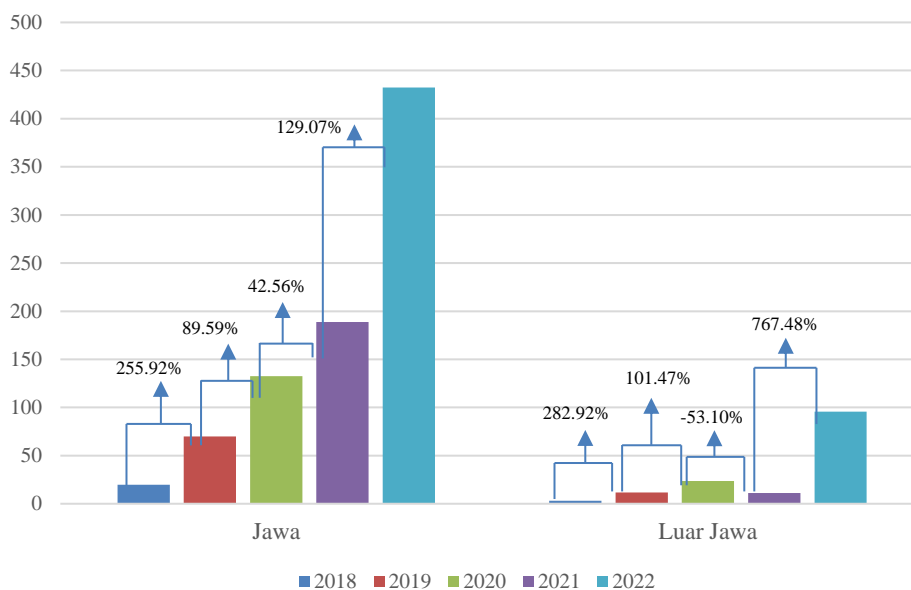
Figure 2. Accumulation and percentage increase in Fintech Lending base on clusters of Java and Non Java in Indonesia in 2018-2019
Sources : data is processed by author, 2023

Currently, payment-based financial technology (fintech payment) and financing-based (Fintech Lending) are products and services that are increasingly in demand by people in Indonesia (Wajuba, Fisabilillah and Hanifa, 2021). This is because fintech can increase, reach and accelerate financial interventions to communities in the unbankable category (Gabor and Brooks, 2017; Zhang, Zhang, *et al.*, 2020; Anindyntha and Sulistyono, 2022; Song and Appiah-Otoo, 2022)*.* Figure 2 shows a significant increase in interest in Fintech Lending loans during the Covid-19 period, namely 255.92 percent in 2019 and 89.58% in 2020 in the Java region, apart from that, 282.82% in 2018 and 101.47% in 2020 in the Outer Java region. However, in 2021, the percentage of Fintech Lending loans decreased and increased again in 2022.

People tend to choose transaction processes that are easier, faster and more practical, so the existence of fintech, digital payments and e-commerce has become a solution option for people, especially during the Covid-19 pandemic (Maysaroh and Diansyah, 2022). Fintech causes changes in the role of technology, consumer behaviour and the ecosystem as well as industry and regulations in a country (Wonglimpiyarat, 2017; Iman, 2020). Fintech, including P2P Lending can also eliminate liquidity constraints, thereby encouraging household consumption (Li, Wu and Xiao, 2020). In addition, rapidly developing digital payment platforms reduce transaction costs and time, thereby increasing payment and transfer efficiency.
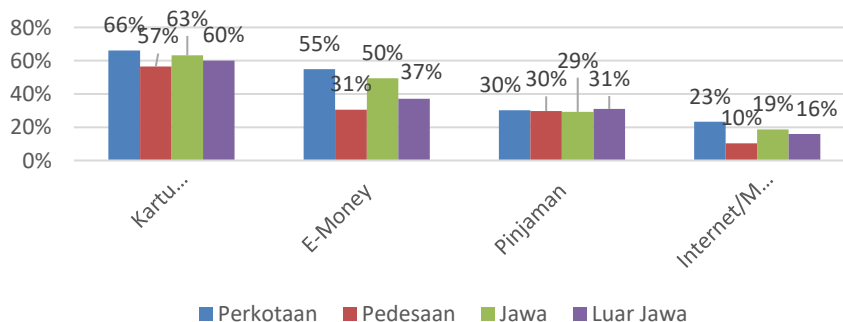

Figure 3. Percentage of Fintech Usage in Indonesia in 2021
Source : Financial Service Authority (OJK) and BI, data is processed by 2023

Figure 3. shows the percentage of fintech use in Indonesia in 2021. The use of fintech is still dominated by digital payments through ATM-Debit and Credit Cards. However, the existence of E-money has also increased where urban areas have reached 55 percent of E-money users and in Java, it has reached around 50 percent. Likewise, internet access or mobile or SMS banking, the largest percentage, is found in urban areas and Java Island. It is estimated that infrastructure such as broadband internet will be maximized in cities and Java Island. On the online loan (fintech lending) side, the percentage of average use is the same percentage in both Java and Non-Java and Urban and Rural Islands. In Java, it reached 29 percent and outside Java 31 percent. Meanwhile, in urban and rural areas.

After entering the recovery period, fintech and e-commerce continue to experience a high existence in line with the increase in the number of digital facilities that are believed to affect the economy (including poverty alleviation). In supporting economic development, the use of fintech can accelerate public financial inclusion in the form of using ATMs and debit cards, credit cards, e-money as digital payments and Peer-to-Peer (P2P) Lending as digital financing (Anindyntha and Sulistyono, 2022). However, other studies show that digital finance, such as fintech and digital payments, still needs significant potential to alleviate poverty in rural communities (Jack and Suri, 2011). This is because the level of financial inclusion in rural communities is still relatively low (Susan and Nino-Zarazua, 2011; Munyegera and Matsumoto, 2016). So, this study analyzes the impact of fintech on poverty alleviation during the COVID-19 pandemic in Indonesia with the instrumental variable (IV) to address the endogeneity problem.

LITERATURE REVIEW

Despite the rapid development of fintech in Indonesia, the academic literature exploring the impact of fintech on poverty still needs to be more robust. This is because research related to the effect of fintech is often linked to economic growth as a welfare variable.

Research related to Fintech Lending shows a positive influence on a country's economic growth (including in Indonesia) (Harp, Resfa Fitri and Yekti Mahanani, 2021; Wajuba, Fisabilillah and Hanifa, 2021; Maulana and Wiharno, 2022; Wahyono, Sihombing and Muchtar, 2022). Fintech Lending, or P2P Lending, encourages improvements in the financial sector, the real sector and the capital market sector to improve (Oh and Rosenkranz, 2020). P2P Lending is in demand by the public because P2P lending services provide easy access to loans effectively and efficiently as an alternative credit option, especially for the middle to lower or unbankable segment of society (de Roure, Pelizzon and Tasca, 2021; Maulana and Wiharno, 2022; Najaf, Subramaniam and Atayah, 2022). The application of financial inclusion integrated with fintech (use of e-money and credit cards) affects financial stability in Indonesia (Anindyntha and Sulistyono, 2022). Studies (Cheng and Qu, 2020) how that the rapid development of fintech can reduce credit risk compared to non-digital financing in China. However, Fintech Lending does not affect poverty or financial inclusion, even though it increases economic growth and the aggregate unemployment rate (Wahyono, Sihombing and Muchtar, 2022).

In addition, fintech innovation also stimulates substantial value for innovators/business actors to develop their businesses with digital financial support (Chen, Wu and Yang, 2019). This is also supported by studies (Maysaroh and Diansyah, 2022) that payment gateways and Fintech Lending positively affect the performance of business actors, especially MSMEs. Digital payments improve the performance of business actors because they simplify the payment system and ensure money security (Tineishemo, 2018; Kwabena *et a.,* 2019; Ohanyere, Ngige and Jacobs, 2021; Maysaroh and Diansyah, 2022). Furthermore, fintech development can overcome gaps and contribute to urbanization, causing a trickle-down effect, a transmission mechanism for creating additional jobs and increasing income in the agricultural sector and encouraging urbanization even for people in areas with difficulty accessing the internet (Zhang *et a.,* 2020). Studies in China found that fintech positively impacts household income in rural areas, which is greater than in urban areas, thereby helping to narrow the income gap in rural areas (Zhang, *et a.,* 2020).

Digital payments, such as the use of credit cards, also have a positive impact on economic growth but have a negative effect on economic growth in the public sector in Saudi Arabia because the investment process has not been achieved in optimizing supporting infrastructure to develop online shopping (e-commerce) habits so that it can encourage national economic growth effective (Elseoud, 2014). Digital payments through mobile money access facilitate faster and more frequent remittances to receive fund transfers to improve household welfare (Munyegera and Matsumoto, 2016). However, study by (Li, Wu and Xiao, 2020) shows that digital payments via cellular only stimulated increased household consumption during the pandemic in urban areas, while there was no effect on household consumption in rural areas.

Several studies have found that e-commerce has a positive influence on economic growth in both developed and developing countries (Jahangard and Pourahmadi, 2013; Liu, 2013; Elseoud, 2014; Chen, Wu and Yang, 2019; Dianari, 2019; Lastri and Anis, 2020) Studies from (Aula and Suharto, 2021) how that e-commerce can increase economic growth in Indonesia but can also have a negative impact because import activities are greater than exports. Studies from (Hayakawa, Mukunoki and Urata, 2021) ound that the development of e-commerce in importing countries contributed to reducing the impact of COVID-19 compared to exporting countries. In addition, the government must encourage digital economic performance accompanied by a sustainable increase in the quality of adequate infrastructure in countries with low levels of digital transformation and supporting infrastructure (AT Kearney, 2015).

Technological innovations, including the development of digital financial innovations, affect the efficiency of poverty alleviation in a country, but the impact of globalization on the efficiency of poverty alleviation has yet to be significant (Zameer, Shahbaz and Vo, 2020). Although the development of the financial inclusion index has not been evenly distributed between provinces, the development of digital finance has been effective in reducing poverty in every province in China (Song and Appiah-Otoo, 2022) and even has a stronger influence in low-income provinces than in high-income provinces (Ye, Chen and Li, 2022). Inclusive digital finance can encourage household consumption, especially on recurring expenditures, compared to non-recurring expenditures. Communities with fewer assets, lower incomes, low literacy experience greater effects of digital finance in consumptive activities than productive activities (Lee *et a.,* 2021). In addition, digital financial inclusion can reduce vulnerabilities in the agricultural sector caused by risks in China (Wang and He, 2020). Financial literacy and financial inclusion positively impact the economy as a link to assist individuals in developing markets through digital financial technology (Ozili, 2018; Pipit Buana Sari, 2018; Telukdarie and Mungar, 2023).

METHODS

This research consists of explanatory and descriptive research. Explanatory research aims to test hypotheses to strengthen the results of pre-existing research. Descriptive research aims to present an overview of the results of a phenomenon of many variables related to the unit under study. The data used in this study are secondary data derived from published reports from the Central Statistics Agency (BPS), the Financial Services Authority (OJK) and Bank Indonesia (BI). In addition, this study uses panel data in thirty-three (33) provinces in Indonesia (except North Kalimantan) during the COVID-19 pandemic, namely in 2020-2021.

Table 1. Variables Descriptive

Variables classification	Variables	Symbol	Indicators
Dependent variable	Poverty Level	Pov	Percentage of poor people per province
Interest variable	Peer-to-Peer Lending	P2P_lend	Total of online loans by borrower who are registered by OJK
	Atm Debet	Atm_debet	Volume of transaction using atm and debet card per province
	Credit card	kkredit	Volume of transaction using credit card per province
	Electronic money	e-money	Volume of transaction e-money per province
	e-commerce	ecommerce	Percentage of total business using e-commerce per province
	Inflation	INF	Inflation rate per province
Instrument variable	Financial literacy	Lit_keu	Financial literacy index per province
	Financial inclusion	Keu_inklusi	Financial inclusion index per province

Source : data is processed by author, 2023

The main indicator in this study is financial technology, represented by online loan and digital payment variables, as well as online buying and selling transactions (e-commerce) as independent variables. The poverty rate is proxied by the percentage of poor people in each province as the dependent variable. The analytical method used in this research is panel data analysis. Panel data analysis is used to see the relationship and influence between the dependent variable and the independent variable in the form of combined time series and cross-section data (Wooldridge, 2013).

The analysis model can be written as follows :

$$Pov_{it} = \alpha_0 + \beta_1 P2P\_lend_{it} + \beta_2 Atm\_debet_{it} + \beta_3 kkredit_{it} + \beta_4 ecommerce_{it} + \mathcal{E}_i + \mu_i \quad \text{.. (1.1)}$$

However, there is an estimated endogeneity problem between fintech and poverty levels. Using the causality test, it was found that fintech and poverty levels have a two-way relationship. Fintech describes financing received by the public through or online, which is usually used for consumptive or productive activities. Demand for consumption and production needs increases with increased access to more effective and efficient financing so that income increases. On the other hand, low income allows individuals to carry out online financing to meet their needs. This creates a causal relationship so that the Fintech coefficient will be biased.
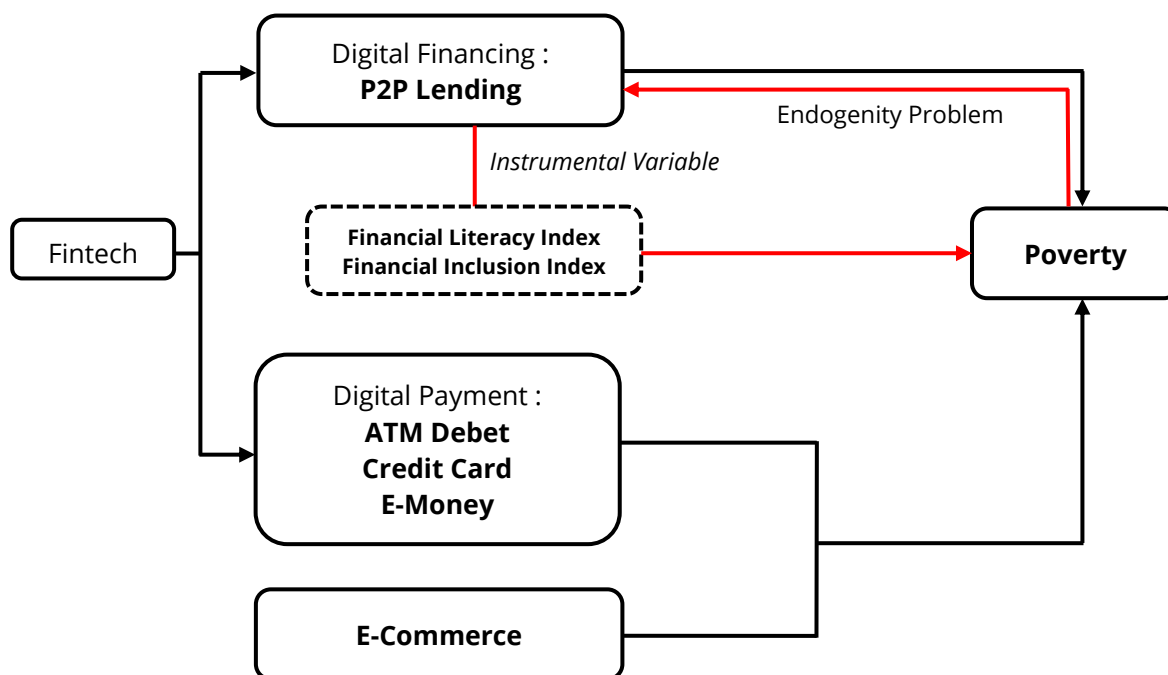
Figure 4. Research Schematic Flow Diagram
Source : data is processed by author, 2023

One way to overcome the endogeneity problem is to include residual endogenous variable values in the initial regression model (jumirah & Wahyuni, 2018; Wooldridge, 2013; Cameron & Trivedi, 2005). The analysis used to overcome endogeneity in fintech is the instrumental variable (IV) analysis method or least squares estimation from second-stage derivatives (Two Stage Square or 2SLS) (Jumirah & Wahyuni, 2018; Wooldridge, 2013). Figure 1 below shows the flow diagram of this research scheme where all the variables of interest are thought to influence poverty in Indonesia.

The selection of variable instruments can be said to be good if it meets the criteria 1) IV must not be directly related to the dependent variable; 2) IV must be significantly related to variables that experience endogeneity problems; and 3) IV must not be related to the error term. The variable instruments used are the financial literacy and inclusion indexes. The instruments used correlate with fintech but do not correlate with poverty levels. Financial literacy and financial inclusion in the province can influence individuals to access fintech properly and correctly while not affecting poverty status. The variable instrumental model can be written as follows:

Panel estimation model:

$$Pov_{it} = \alpha_0 + \beta_1 P2P\_lend_{it} + \beta_2 Atm\_debet_{it} + \beta_3 kkredit_{it} + \beta_4 ecommerce_{it} + \mathcal{E}_i + \mu_i \quad \text{...(2.1)}$$

IV estimation model :

$$\widehat{P2P\_lend_{it}} = \gamma + \delta_1 Lit\_keu_{ij} + \delta_2 Keu\_inklusi_{ij} + \mu \quad \text{...............................(3.2)}$$

*Two Stage Least Square (*2SLS) estimation model :

$$Pov_{it} = \alpha_0 + \beta_1 \widehat{P2P\_lend_{it}} + \beta_2 Atm\_debet_{it} + \beta_3 kkredit_{it} + \beta_4 ecommerce_{it} + \mathcal{E}_i + \mu_i \quad \text{...(3.3)}$$

RESULTS

This research emphasizes deepening the analysis of the effect of Fintech Lending on the poverty rate in Indonesia during the COVID-19 pandemic. There is an endogeneity problem

between the dependent variable (poverty level) and the interest variable (Fintech Lending), so the instrumental variable method is more appropriate to use in the regression of this research.

Table 2 shows a description of the data used in the research. The number of observations is 99 samples of 33 provinces from 2019-2021. The poverty level is proxied by the number of poor people per province, with an average percentage of 10.59 percent. The lowest poverty rate was 3.42 percent, and the highest was 27.38 percent. Fintech Lending, proxied by the total loans of peer-to-peer (P2P) lending borrowers, has an average of 428 trillion rupiah. The lowest total Fintech Lending loans were 3.67 trillion rupiah and 7,720 trillion rupiah. Furthermore, the variables used in digital payments are the volume of transactions using ATM debit cards and the volume of credit card transactions. The average transaction volume for ATM Debit cards is 146,372 billion rupiahs, with the lowest transaction volume being 0,806 billion and the highest transaction volume being 2589,843 billion rupiahs.

Table 2. Data Descriptive

Variable	Obs	Mean	Std. Dev	Min	Max
Poverty level	99	10.59848	5.444094	3.42	27.38
Peer-to-peer (P2P) lending	99	4.28e+13	1.26e+14	3.67e+10	7.72e+14
ATM/ Debet Card	99	146.372	379.1931	0.806665	2589.843
Credit card	99	9.093737	27.90677	0.04	174.11
E-commerce	99	42.04848	33.81102	4.66	96.85
Financial literacy	99	41.54545	27.09706	1	89
Financial Inclusion	99	77.77364	10.13543	59.84	94.76

Source : data is processed by author, 2023

In addition, the highest transaction volume was 174.11 billion rupiah using credit cards, and the lowest was 0.04 billion rupiah, with an average credit card transaction volume reaching 9.09 billion rupiah. Then, there is the digital financial variable in the form of buying and selling transactions or e-commerce. This study uses e-commerce data for the number of business actors who use e-commerce services to buy and sell goods or services. E-commerce users averaged 42.04 percent, where the highest e-commerce users were 96.85 percent and 4.66 percent were the lowest e-commerce users.

Figure 5 depicts the distribution map for the highest and lowest numbers of poor people, which are divided into five (5) regions, namely Sumatra, Java and Bali, Kalimantan, Sulawesi, West Nusa Tenggara and East Nusa Tenggara, and other Eastern Regions. The highest number of poor people are in Aceh, the Special Region (D.I) of Yogyakarta, West Kalimantan, East Nusa Tenggara (NTT), and Papua. Even though DIY occupies the highest position in the percentage of the number of poor people in 2020, this also has a contraction in the increase in the number of Fintech Lending loans, where DIY is still ranked in the top 10 in total loans given by Fintech Lending borrowers, reaching approximately 15.4 trillion rupiah.
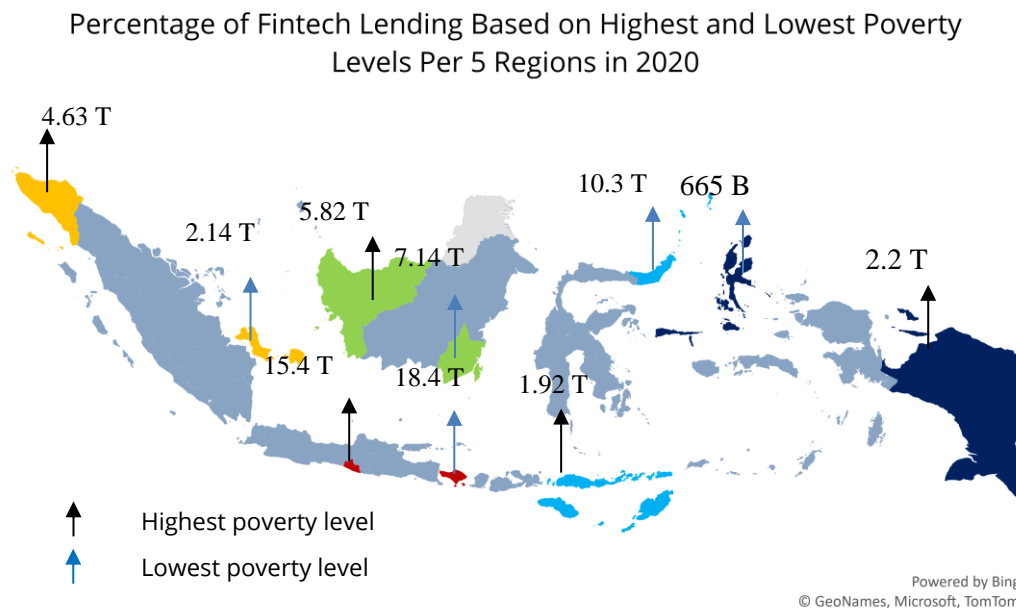
Figure 5. Percentage of Fintech Lending Based on Highest and Lowest Poverty Levels Per 5 Regions in 2020
Source: data is processed by author, 2023

Bangka Belitung Islands, Bali, West Kalimantan, North Sulawesi, and North Maluku, on average also have a high number of Fintech Lending, except for Sumatra (Aceh) and Other Eastern Regions (Papua). Even though the poverty rate is low, the use of online loans or Fintech Lending is due to the large number of entrepreneurs or MSMEs in the area, such as Bali, so Fintech Lending is still needed by the area for both consumptive and productive activities. In the Bali area, Fintech Lending reaches around 18.4 trillion rupiah, 7.14 trillion rupiah for West Kalimantan, and 10.3 billion for North Sulawesi.

In 2020, Indonesia experienced a period of sharp economic contraction, so the economic growth rate decreased, and poverty increased due to the impact of restrictions on economic activity during the COVID-19 pandemic. Furthermore, as the government made policies to improve the economy (economic recovery), the growth rate increased again, and the poverty rate decreased. Even though the trend of reducing the poverty rate is not yet significant in 2021, lending activities are experiencing a sharp increase, especially digital-based online loans (Fintech Lending). In the Java Region, D.I.Yogyakarta, Central Java, and East Java, with a poverty rate of more than 10 percent, have high Fintech Lending rates. In the Sumatra region, the rate of increase in Fintech Lending tends to be the same as various poverty levels. Meanwhile, in the Eastern Region, such as Papua, West Papua, and North Maluku, with a poverty rate of more than 20 percent, Fintech Lending has also experienced an increase (Figure 6).
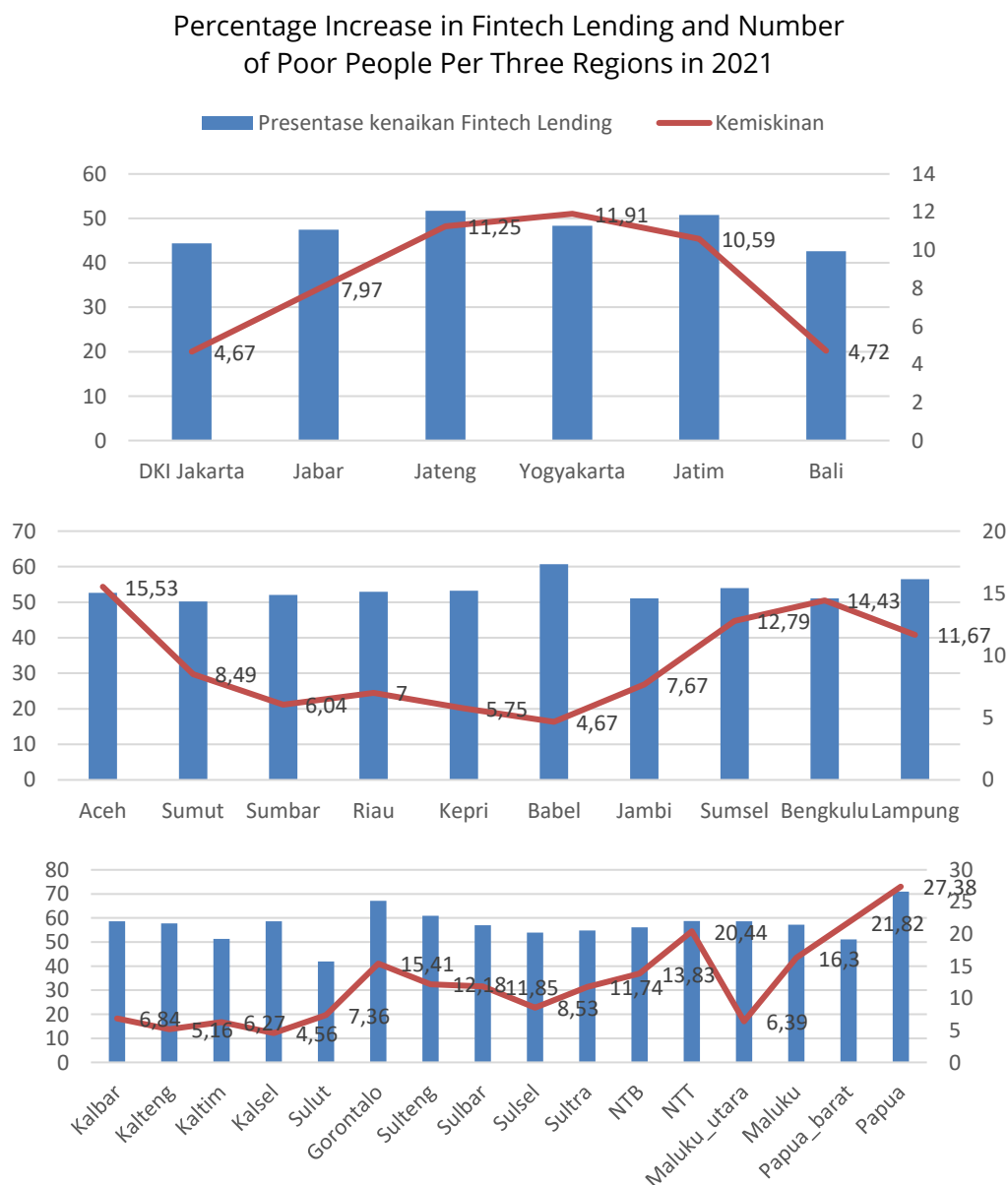
Percentage Increase in Fintech Lending and Number
of Poor People Per Three Regions in 2021

**Figure 6. Percentage Increase in Fintech Lending and Number of Poor
People Per Three Regions in 2021**
Source : data is processed by author, 2023

Table 3 shows the results of solving the endogeneity problem by selecting instrument variables on endogenous variables, namely Fintech Lending (P2P Lending). The instrument variables used are financial literacy and financial inclusion. These instrument variables were chosen because in accessing fintech lending, people as individuals or groups must have good financial literacy and adequate financial inclusion to use fintech lending properly and optimally, thereby reducing the risks and moral hazard activities carried out by fintech lending actors or consumer (borrower). The results of the endogenous test show a probability value of 0.0083 where the null hypothesis (Ho) is rejected, which

means that the fintech lending variable included as an instrument variable has become exogenous so that this variable can be continued for analysis.

Table 3. Selection of Instruments Variable in Fintech Lending

Instrumental variables 2SLS regression			Number of obs =	99
			Root MSE = 6.65804	
Variable	**Coefficient**	**Robust Std.err**	**Z**	**p>|z|**
Fintech Lending	-3.95e-14	1.72e-14	-2.30	**0.022****
_Cons	12.28784	0.922709	13.32	0.000

Tests of endogeneity

Robust Score chi2(1)		= 6.969	(p=**0.0083*****)
H0 : variables are exogenous			

Firsts-stage regresstion summary statistics				
Variable	R-sq	Adjusted R-sq	Robust F(2.96)	Prob > F
Fintech Lending	0.1518	0.1342	4.29627	**0.00163*****

Instrumented: Fintech Lending
Instruments: Financial literacy and financial inclusion

After resolving the endogeneity problem, Table 4 shows the regression results using instrumental variables. These results found that fintech lending negatively and significantly influences poverty levels in Indonesia (other variables are considered constant). When fintech lending experiences an increase in the number of online loans by borrowers, it will reduce poverty levels. However, fintech lending does not have a significant effect when other control variables are included in the model. This is in line with previous research, which states that fintech lending provides capital stimulation to drive businesses, overcome gaps, and increase household income (Chen, Wu and Yang, 2019; Maysaroh and Diansyah, 2022; Tineishemo, 2018; Kwabena *et a.,* 2019; Ohanyere, Ngige and Jacobs, 2021; Maysaroh and Diansyah, 2022; Zhang *et a.,* 2020).

Furthermore, the e-commerce variable shows negative and significant results on the poverty level in Indonesia. When e-commerce business actors increase by 1 percent, the poverty rate will decrease by 0.092 percent. Studies (Jahangard and Pourahmadi, 2013; Liu, 2013; Elseoud, 2014; Chen, Wu and Yang, 2019; Lastri and Anis, 2020) found that e-commerce contributes to increasing economic growth in developing countries. A higher rate of economic growth shows that a country is in a good economy and a decreasing poverty level. E-commerce also encourages the performance of business actors to become digitally literate so they can expand their target market and increase income.

Table 4. Data Analysis Result of Instrumental Variable (IV) Regression

Independent variable	Dependent variable : poverty			
	(Withoutt control variable)		**(With control variable)**	
	Coefficient (Robust Std. Err)	**P>|z|**	**Coefficient (Robust Std. Err)**	**P>|z|**
Fintech : Peer-to-peer lending	**-3.95e-14**** **(1.72e-14)**	0.022	-2.62e-13 (1.67e-13)	0.117
(Instrument variable : Financial literacy and financial inclusion				
E-commerce	-	-	**-0.092518*** **(0.0486569)**	0.057

| Independent variable | Dependent variable : poverty | | | |
| | (Withoutt control variable) | | (With control variable) | |
	Coefficient (Robust Std. Err)	P>|z|	Coefficient (Robust Std. Err)	P>|z|
Volume transaction of ATM Debet card	-	-	0.089419 (0.05484)	0.103
Volume transaction of credit card	-	-	**-0.245234*** **(0.1326)**	0.064
Constanta	**12.28784*** (0.922709)**	0.000	**14.8470*** (2.07537)**	0.000
Total observation	99	99	99	

Note *: Significant level p>|t| :***<1% (0.01);   **<5% (0.05); *<10% (0.10). Analysis method is instrumental variable (IV) regression.
Instrumented : peer-to-peer lending
Instruments : ecommerce, atm-debet, credit card, financial literacy, financial inclusion
Source : data is processed by author, 2023

The variable credit card use also negatively and significantly impacts poverty levels in Indonesia. The results show that the higher the transaction volume using credit cards by 1 percent, the lower the poverty level will be by 0.245 percent. A study (Elseoud, 2014) shows that the use of credit cards has a positive impact on economic growth. In addition, credit cards are widely used by middle and upper-class individuals or households. So when the number of poor people decreases in an area, credit card users will increase.

Financial Literacy and Financial Inclusion Index Based on
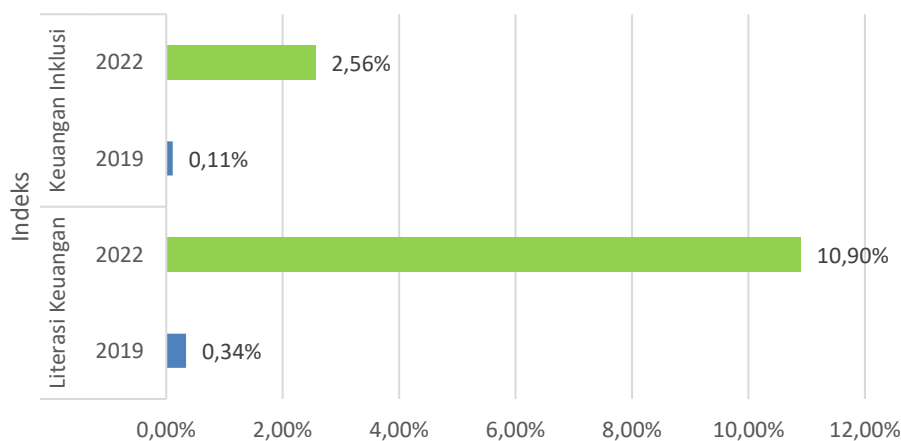Fintech Financial Sector Services in Indonesia 2019-2020

Figure 7. Financial Literacy and Financial Inclusion Index Based on Fintech Financial Sector Services in Indonesia 2019-2020
Source : data is processed by author, 2023

Financial literacy and inclusion are important factors in maximizing fintech lending, digital payments, and e-commerce use. With good and high financial literacy, a person can choose wisely and well about fintech lending, including fintech lending, which has been officially registered by the financial services authority (OJK) so that consumer security and protection can be trusted. They will not be trapped in illegal online loans and will not have moral hazard behavior. Likewise, a high

financial inclusion index will encourage maximization of the infrastructure needed to access fintech lending and other digital finance. Figure 3 shows that financial literacy and financial inclusion development from 2019 to 2022 has increased rapidly. However, this increase still needs to be increased because the percentage increase in the financial literacy index is 2.56 percent (below 5 percent), and the financial inclusion index is still 10.90 percent (below 50 percent).

Distribution of Financial Literacy Index per Province in IndonesiaYear 2022
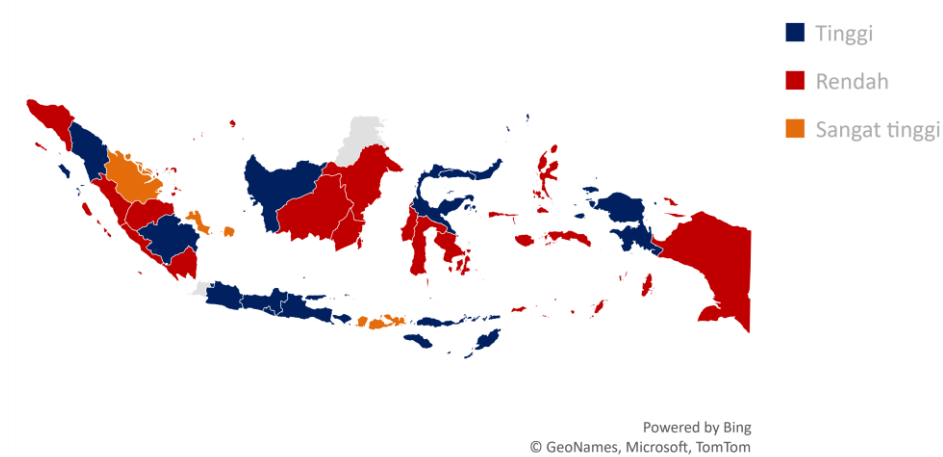
Distribution of Financial Inclusion Index per Province in IndonesiaYear 2022

Figure 8. Distribution of Financial Literacy and financial inclusion Index per Province in Indonesia Year 2022
Source : data is processed by author, 2023

DISCUSSION

This research finds that financial technology and e-commerce negatively and significantly influence poverty alleviation in Indonesia. The increasing use of Fintech as digital financing and e-commerce as digital buying and selling transactions will reduce poverty levels. Digital finance can play an integral role in alleviating poverty by stimulating increased consumption and income through production activities (Munyegera and Matsumoto, 2016). Digital finance can increase

financial transaction activities to be more effective and efficient and accelerate economic development as a form of digital financial innovation (Harahap *et al.*, 2017; Wajuba, Fisabilillah and Hanifa, 2021). In the current era of digitalization, Fintech and e-commerce are increasingly in significant demand among the public (Gabor and Brooks, 2017; Zhang, Zhang, *et al.*, 2020; Anindyntha and Sulistyono, 2022) especially as informal work opportunities or online sales businesses. Apart from that, Fintech can reach and accelerate community intervention by providing financing with unbankable community groups (Anindyntha and Sulistyono, 2022; Song and Appiah-Otoo, 2022).

People's preference for Fintech and e-commerce is due to the ease, speed of service, and practicality so it is a solution choice for people, especially during the Covid-19 pandemic (Maysaroh and Diansyah, 2022). Fintech, including P2P Lending can also eliminate liquidity constraints, encouraging household consumption (Li, Wu and Xiao, 2020). In addition, rapidly developing digital payment platforms reduce transaction costs and time, increasing payment and transfer efficiency. Fintech Lending, or P2P Lending, encourages improvements in the financial, real, and capital markets to improve (Oh and Rosenkranz, 2020). Implementing financial inclusion integrated with Fintech (use of e-money and credit cards) affects financial stability in Indonesia (Anindyntha and Sulistyono, 2022). The study (Cheng and Qu, 2020) shows that the rapid development of Fintech can reduce credit risk compared to non-digital financing. Fintech innovation also stimulates substantial value for innovators/business actors to develop their businesses with digital financial support (Chen, Wu and Yang, 2019).

Furthermore, the development of Fintech can overcome gaps and contribute to urbanization, giving rise to a trickle-down effect, a transmission mechanism for creating additional jobs and increasing income in the agricultural sector, as well as encouraging urbanization even for people in areas where internet access is difficult (Zhang *et a.,* 2020). Technological innovation, including the development of digital financial innovation, influences a country's poverty alleviation efficiency. Still, the impact of globalization on the efficiency of poverty alleviation cannot be significant (Zameer, Shahbaz and Vo, 2020). Digital financial inclusion can reduce vulnerabilities in the agricultural sector caused by risks in China (Wang and He, 2020). Financial literacy and financial inclusion positively impact the economy as a link to help individuals develop markets through digital financial technology (Ozili, 2018; Pipit Buana Sari, 2018; Telukdarie and Mungar, 2023).

CONCLUSION

The economic shock caused by the COVID-19 pandemic has changed behavior and economic activities based on the digital economy, one of which is changes to the financial system based on financial technology (fintech). Various fintechs such as fintech lending, digital payments (ATM – Debit cards, credit cards, and e-money), and e-commerce are predicted to be able to alleviate poverty, including in Indonesia. Through a variable instrumental approach in 33 provinces in Indonesia from 2019-2021, it was found that fintech lending had a negative effect on poverty levels in Indonesia. Likewise, e-commerce and the use of credit cards can reduce poverty levels in Indonesia. In maximizing the role of Fintech in Indonesia, support and cooperation from the government, financial institutions, and various related policy stakeholders are needed. Apart from that, the development of digital finance needs to be encouraged by strong regulations and adequate supporting infrastructure to maximize the effectiveness of digital finance in Indonesia.

RECOMMENDATION

This research provides recommendations for the academic field and related policy makers, namely:

1. Researchers or academics are expected to be able to develop methods and other variables of interest towards poverty alleviation, especially variables related to economic digitalization.
2. For relevant policy makers, it is hoped that they will be able to maximize the regulations, facilities and infrastructure supporting economic digitalization in Indonesia in order to increase the effectiveness of digital finance as an indicator of alleviating poverty in Indonesia.

LIMITATION

This research has limitations, namely e-money data as a digital payment. Other variables that are thought to influence poverty are considered constant with an error term that uses robustness. It is hoped that future research will be able to include other control variables that are thought to have an impact on poverty.

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