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MEASURING PEER-TO-PEER LENDING'S EFFICACY IN POVERTY ALLEVIATION

Mengukur Efektivitas Pinjaman Peer-to-Peer dalam Pengentasan Kemiskinan

Surya Adi Putra[1]

Info Artikel

[1]Fakultas Ekonomi dan Bisnis, Universitas Indonesia, Jakarta, suryaadi.putra@pajak.go.id

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Abstract

High poverty rates and persistent financial exclusion for Micro, Small, and Medium Enterprises (MSMEs) and the unbanked in Indonesia have necessitated the growth of Peer-to-Peer (P2P) Lending as a financing alternative. However, the existing literature often assumes a direct positive causality between fintech and welfare without adequately scrutinizing the potential downside risks, such as borrower over-indebtedness. This study addresses this gap by empirically examining the comparative elasticity of productive P2P financing versus conventional bank credit for MSMEs on poverty alleviation, while also analyzing regional heterogeneity. Employing Fixed Effects panel data regression on 34 provinces over the 2020-2024 period, the results demonstrate that productive P2P financing has a negative and significant causal impact on poverty levels. In contrast, conventional MSME bank credit shows no significant effect, highlighting the structural rigidities of traditional banking in reaching the unbanked. Regional analysis confirms P2P's consistent positive impact in both Western (β=−0.96) and Eastern (β=−1.04) Indonesia, suggesting it effectively bridges spatial digital divides. The study concludes that while P2P lending is a potent instrument for poverty reduction, its sustainability depends on regulators balancing ecosystem expansion with rigorous consumer protection measures to mitigate the risks of predatory lending and over-indebtedness.

Keywords : Poverty Alleviation, Peer-to-Peer Lending, Over-indebtedness, Financial Inclusion, Regional Heterogeneity.

Abstrak

Tingginya tingkat kemiskinan dan eksklusi keuangan yang persisten bagi Usaha Mikro, Kecil, dan Menengah (UMKM) serta masyarakat yang tidak memiliki rekening bank (unbanked) di Indonesia telah mendorong pertumbuhan pesat Peer-to-Peer (P2P) Lending sebagai alternatif pembiayaan. Namun, literatur yang ada sering kali mengasumsikan kausalitas positif langsung antara fintech dan kesejahteraan tanpa secara memadai meneliti potensi risiko kerugian, seperti kelebihan utang (over-indebtedness) pada peminjam. Studi ini mengisi kesenjangan tersebut dengan menguji secara empiris elastisitas komparatif pembiayaan P2P produktif dibandingkan kredit bank konvensional untuk UMKM terhadap pengentasan kemiskinan, serta menganalisis heterogenitas regional. Menggunakan regresi data panel Fixed Effects pada 34 provinsi selama periode 2020-2024, hasil penelitian menunjukkan bahwa pembiayaan P2P produktif memiliki dampak kausal yang negatif dan signifikan terhadap tingkat kemiskinan. Sebaliknya, kredit UMKM dari bank konvensional tidak menunjukkan pengaruh signifikan, yang menyoroti

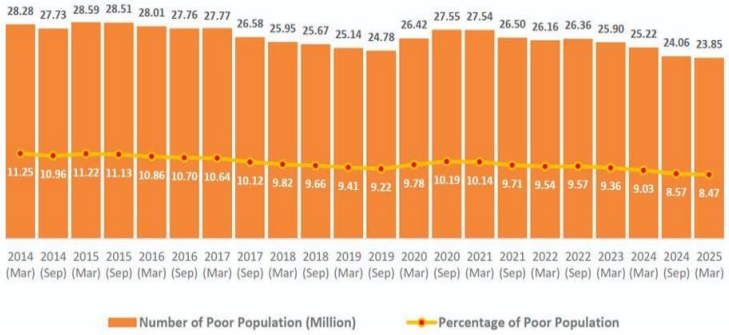
kekakuan struktural perbankan tradisional dalam menjangkau masyarakat yang tidak terlayani. Analisis regional mengonfirmasi dampak positif P2P yang konsisten baik di Indonesia Barat (β=−0,96) maupun Timur (β=−1,04), yang menunjukkan bahwa fintech efektif menjembatani kesenjangan digital antarwilayah. Studi ini menyimpulkan bahwa meskipun P2P lending adalah instrumen yang ampuh untuk pengurangan kemiskinan, keberlanjutannya bergantung pada regulator yang menyeimbangkan ekspansi ekosistem dengan langkah perlindungan konsumen yang ketat untuk memitigasi risiko predatory lending dan kelebihan utang.

Kata Kunci: Pengentasan Kemiskinan, Peer-to-Peer Lending, Over-indebtedness, Inklusi Keuangan, Heterogenitas Wilayah.

1. INTRODUCTION

Poverty continues to be one of the most persistent socioeconomic challenges in Indonesia's development pathway. Despite steady progress in poverty reduction over the past decade, structural inequality and spatial disparities remain prominent. According to Statistics Indonesia (BPS, 2025), the national poverty rate in March 2025 fell to 8.47 percent, a slight improvement from 8.57 percent in September 2024. This figure, however, still represents millions of Indonesians living below the national poverty line, with disproportionate burdens carried by rural communities and populations in eastern provinces such as Papua, Maluku, and East Nusa Tenggara. These regions continue to face multidimensional deprivations, including limited infrastructure, low education attainment, and restricted access to financial services that perpetuate intergenerational poverty cycles.

Figure 1 The Trend in Poverty Rates from March 2014 to March 2025



Source: National Socio-Economic Survey (SUSENAS), March 2014–March 2025

Beyond aggregate trends, the dynamics of poverty in Indonesia increasingly reflect issues of inclusion and access, particularly in the financial sector. Financial exclusion constrains the capacity of low-income groups to engage in productive economic activity. Demirguc-Kunt et al., (2022) utilizing Global Findex data notes that only about 52% of Indonesian adults have an account through a formal financial institution, while the Financial Services Authority (OJK, 2023) reports that a mere 18.6% of MSMEs have ever accessed bank financing. Consequently, many entrepreneurs rely on personal savings, family networks, or informal lending, even though these channels are often costly, opaque, and constrained.

In response to these structural rigidities, financial technology (fintech) has emerged as a promising catalyst for economic inclusion. Peer-to-peer (P2P) lending, one of the fastest-growing fintech models in Indonesia, directly connects lenders with borrowers via digital platforms, bypassing traditional intermediaries and extending credit to previously unbanked populations. According to OJK data (2025), the fintech P2P lending sector expanded by 29.01% year-on-year, reaching an outstanding loan value of IDR 80.94 trillion by April 2025. Such growth highlights fintech's vital role in bridging financial gaps for individuals and microenterprises that lack conventional collateral or banking relationships.

Theoretically, the mechanism by which fintech alleviates poverty is supported by the Poverty Trap Theory, which posits that a lack of access to business capital is a primary driver of poverty transmission; thus, improving access through fintech lending can interrupt this cycle. This premise is supported by substantial international evidence. Appiah-Otoo and Song (2021) and Ye et al. (2022) found that fintech effectively reduced poverty across 31 provinces in China, even where digital development was uneven. Similarly, Emara (2022) demonstrated that wider access to fintech had a statistically significant impact on poverty alleviation across 45 Sub-Saharan African countries. Furthermore, studies by Ashenafi and Dong (2022) and Chinoda and Mashamba (2021) confirm that fintech enhances financial inclusion and reduces income inequality, thereby serving as a structural tool for welfare improvement.

Empirical evidence increasingly supports the premise that fintech-driven financing fosters entrepreneurship, income generation, and resilience for microenterprises. Arner et al. (2018) emphasize fintech's capacity to democratize financial access in emerging markets, while Gabor and Brooks (2017) examine how digital credit reshapes informal economies through technological intermediation. In the Indonesian context, Liliana et al. (2021) found that the adoption of fintech credit mechanisms improves micro-entrepreneurs' incomes, especially in informal sectors, by leveraging simplified application processes and alternative credit scoring models based on non-traditional datasets.

However, a critical perspective is necessary, as the existing literature often conflates *financial inclusion* with *poverty reduction*, assuming a direct causal transmission that may not always hold. While recent studies such as Nugraha and Putriani (2023) confirm that fintech lending is negatively associated with poverty rates across Indonesian provinces, these analyses typically rely on aggregate inclusion indicators rather than isolating the specific causal elasticity of productive P2P loans. Consequently, there remains a scarcity of rigorous empirical evidence that compares the poverty-reducing efficiency of fintech directly against traditional MSME bank credit, particularly in a post-pandemic economy where digital adoption has surged but economic recovery remains uneven.

Moreover, methodological limitations persist in previous research. For instance, Fauzi and Rokhim (2022) investigated the impact of fintech lending on poverty reduction but relied solely on per capita household consumption as the proxy for poverty. This approach fails to capture the multidimensional nature of deprivation, as the Indonesian Central Bureau of Statistics (BPS) calculates the official Poverty Rate using a broader basket that includes minimum needs for food, clothing, housing, education, and health. Relying exclusively on per

capita consumption risks underestimating structural poverty; therefore, an accurate assessment of fintech's welfare effects requires the use of the more comprehensive BPS official Poverty Rate.

In addition to outcome measurement, the role of digital infrastructure is often underrepresented in poverty models. Recent empirical work confirms that Information and Communication Technology (ICT) development reduces poverty both directly—by improving access to markets—and indirectly by enhancing human development outcomes. Studies that jointly examine fintech lending and ICT infrastructure find that the combination of digital credit growth and improved ICT readiness is associated with lower poverty rates at the provincial level, suggesting crucial complementarities between financial and technological ecosystems. Therefore, a robust analysis must explicitly incorporate the ICT Development Index to provide a holistic assessment of how digital finance interacts with infrastructure to shape poverty outcomes.

Furthermore, the narrative of fintech as a poverty panacea often overlooks significant downside risks that have intensified in recent years. Alim (2025) highlights that while digital lending offers speed, borrowers increasingly perceive significant risks related to transparency and aggressive collection practices. This aligns with concerns raised by PwC Indonesia (2024) regarding the need for sustainable growth amidst rapid credit expansion. Without strict consumer protection, the ease of access to digital credit can lead to over-indebtedness, potentially trapping financially illiterate borrowers in debt cycles rather than lifting them out of poverty. This "risk vs. reward" dynamic is frequently absent from aggregate-level poverty studies.

Finally, there is a lack of comparative analysis regarding the spatial impact of fintech versus traditional banking. In an archipelago like Indonesia, where the digital divide between Western (Java-centric) and Eastern provinces remains acute, assuming a uniform impact of fintech is methodologically flawed. Existing research has not sufficiently tested whether P2P lending acts as a substitute for underperforming banking systems in lagging eastern regions or merely complements existing infrastructure in developed western area.

Therefore, a critical research gap remains. Most extant research emphasizes the potential of fintech in promoting financial inclusion without adequately examining its actual contribution to poverty alleviation at structural or regional levels, nor comparing it against the efficacy of traditional banking. Addressing these gaps, this study primarily seeks to determine whether productive P2P lending has a significant causal effect on reducing poverty rates in Indonesia compared to conventional MSME bank credit. Furthermore, it examines the extent to which the welfare benefits of digital credit outweigh the inherent risks of over-indebtedness. Finally, the research analyzes how the impact of P2P lending on poverty diverges between the digitally developed Western Indonesia and the underbanked Eastern Indonesia, thereby determining if fintech acts as an equitable development tool across the archipelago.

2. LITERATURE REVIEW

Poverty is a complex and multidimensional phenomenon extending far beyond the lack of income. It encompasses deprivation of education, health services, decent employment, and participation in social and economic life. While classical economic theories often frame poverty in terms of absolute or relative income thresholds, Amartya Sen's capability approach significantly broadened this interpretation. Sen (1999) contends that poverty should be understood not merely as low income, but as the deprivation of capabilities—the substantive

freedoms that enable individuals to lead lives they value and have reason to pursue. Hence, individuals may be considered poor due to limited access to education, healthcare, or dignified work opportunities that restrict their capacity to achieve wellbeing.

Within the perspective of development economics, poverty is often intertwined with market and institutional failures that result in an unequal distribution of resources. Consequently, inclusive public policies and equitable financial systems are vital for addressing poverty on a structural level. Without access to formal financial mechanisms, low-income households are unable to accumulate capital or protect themselves against external shocks, trapping them in intergenerational cycles of poverty. This structural view underscores the necessity of financial inclusion as a policy imperative rather than just a banking objective.

Financial inclusion has thus become a cornerstone of equitable development strategies because it expands access to affordable, secure, and efficient financial services for all population segments. The World Bank (2022) identifies financial inclusion as an integral driver of the Sustainable Development Goals (SDGs), enabling savings, investment, and resilience against economic shocks. Access to formal accounts allows households to smooth consumption during lean periods and invest in education or health. Supporting this, Allen et al. (2016) demonstrated that broader inclusion is strongly correlated with reduced poverty and inequality, as it fosters household resilience to income disruptions and enhances entrepreneurial activities.

However, in developing nations like Indonesia, financial inclusion remains uneven. The Global Findex Database (2021) shows that 52% of Indonesian adults have access to formal financial institutions, implying that nearly half of the adult population remains unbanked. This gap stems from procedural barriers, weak digital infrastructure, and low financial literacy that characterize the traditional banking sector. Conventional banks often view low-income borrowers as high-risk due to a lack of collateral and credit history, effectively excluding the very demographic that needs capital the most.

In this context, financial technology (fintech) has emerged as a paradigm-shifting enabler of inclusion, particularly in underserved populations. Unlike traditional microfinance which often relies on physical reach and peer monitoring, fintech applications—especially Peer-to-Peer (P2P) lending—leverage non-traditional data and algorithmic scoring to extend services. In Indonesia, this sector has expanded dramatically; the OJK (2025) reported that P2P lending achieved an outstanding value of IDR 80.94 trillion as of April 2025. This rapid development underscores fintech's role in bridging the financing gap for MSMEs and low-income households who are otherwise invisible to the formal banking system.

On a global scale, empirical evidence increasingly supports the positive impact of digital finance. Demirguc-Kunt et al. (2018), utilizing Global Findex data, found that expanding formal financial services reduces household vulnerability and narrows inequality worldwide. Recent studies reinforce these patterns; Ramadhan et al. (2025) conducted a comprehensive systematic review of 32 articles selected from an initial pool of 422 sources across Scopus and other databases. Their analysis of evidence from emerging markets confirms that fintech innovations significantly accelerate financial inclusion by overcoming traditional barriers to access. Similarly, Azmeh and Al-Raeei (2025) established that fintech enhances economic growth in developing countries through improved efficiency in digital payment systems.

In the specific context of Indonesia, research suggests a direct link between digital credit and welfare. Nugraha and Putriani (2023) confirmed that fintech lending and ICT infrastructure development significantly reduced poverty across 34 provinces between 2019–2021, showing that digital growth directly supports economic empowerment. Furthermore,

Liliana et al. (2021) found that microenterprises using fintech financing experienced significant increases in sales and business size, while Alim (2025) reported that borrowers perceived fintech lending as faster and less discriminatory than traditional banking.

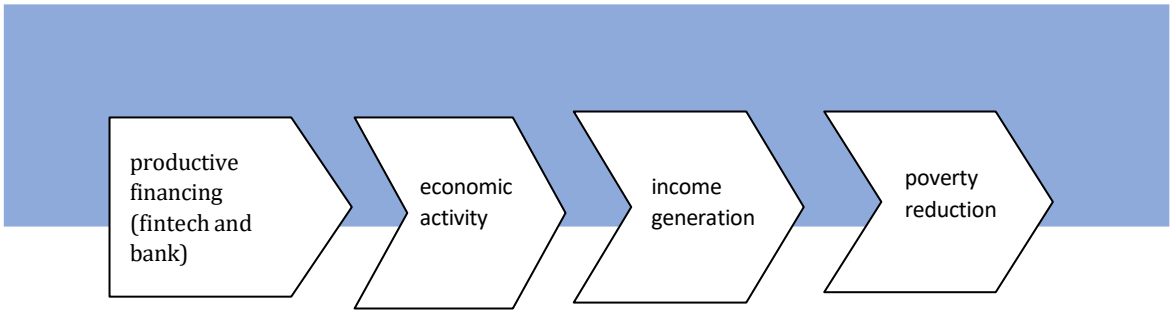
However, despite these positive aggregate findings, the micro-level dynamics of fintech adoption present a more complex picture. Theoretical assumptions regarding the automatic translation of credit access into welfare improvements have recently faced scrutiny. Early literature on microfinance, such as Karlan and Zinman (2010), provided randomized evidence that credit access improves resilience. Yet, critically, recent studies challenge the universality of fintech's positive impact. While Suri and Jack (2016) demonstrated that mobile money caused a direct reduction in poverty in Kenya, other scholars argue that digital credit often funds consumption rather than production. If P2P lending primarily finances consumption shocks rather than income-generating activities, its causal impact on structural poverty may be overstated in descriptive literature.

A significant omission in much of the optimistic fintech literature is the issue of risk. The convenience of digital credit comes with the danger of over-indebtedness, particularly for financially illiterate borrowers who may "stack" loans across multiple platforms. Schaner (2017) highlights that reducing transaction costs can sometimes have unintended consequences, such as eroding the "protective friction" that traditional savings mechanisms offer. When credit is instant and frictionless, vulnerable borrowers may accumulate debt beyond their repayment capacity, potentially deepening their poverty rather than alleviating it.

Furthermore, the digitization of finance introduces structural risks regarding data and privacy. Gabor and Brooks (2017) caution that the digitization of philanthropy and development finance can commodify the poor, turning them into reliable streams of high-interest data rather than empowered economic agents. This "fintech-philanthropy" complex raises ethical concerns about whether the primary beneficiary is the poor household or the technology provider. Thus, a balanced evaluation of fintech's efficacy must weigh its inclusion metrics against the potential for new forms of financial vulnerability.

Building on this synthesis, this study moves beyond the descriptive narrative of inclusion to examine the net effect of these opposing forces. The conceptual foundation posits that productive financing, whether provided by banks or fintech, should theoretically stimulate economic activity by strengthening business capital and creating income growth channels. However, recognizing the risks highlighted by Schaner (2017) and Gabor and Brooks (2017), this study controls for regional and structural variables to empirically test whether the benefits of access outweigh the risks of indebtedness in the Indonesian context.

Figure 2 The Conceptual Framework



Source: Processed by the author (2025)

The illustration in Figure 2 shows the theoretical mechanism linking fintech inclusion to welfare improvement. However, the magnitude and direction of this relationship are influenced by contextual variables, including socioeconomic indicators (such as education levels, unemployment, and GRDP per capita), regional variations (differences between western and eastern Indonesia), and financial infrastructure. Recognizing these moderating factors allows for a nuanced empirical evaluation of how P2P lending interacts with structural inequalities and technological divides to affect poverty outcomes across Indonesia's regions.

3. METHODOLOGY

This research adopts a quantitative approach based on panel data regression to analyze the impact of productive financing from both fintech and banking institutions on poverty levels across 34 Indonesian provinces over the 2020 to 2024 period. Panel data regression is chosen for its capacity to simultaneously exploit cross-sectional (provincial) and time-series (temporal) information, offering robust insights into how provincial characteristics and temporal trends interact in the context of poverty alleviation. This strategy is critical as it allows the estimation to control for unobserved, time-invariant heterogeneity—structural attributes unique to each province, such as local governance quality, geographic traits, or cultural-economic practices—which might otherwise confound causal inference in poverty research. The research ultimately employs a Fixed Effects (FE) specification, which is statistically justified by the necessity to address these individual provincial effects that remain constant over time, ensuring a rigorous estimation of policy impact.

The data for this study comprise secondary sources derived from recognized governmental and institutional databases, with the unit of observation set at the provincial level. Specifically, the poverty rate (PR) is obtained from Statistics Indonesia (BPS), while productive fintech financing and MSME bank credit are sourced from the Financial Services Authority (OJK). Additional socioeconomic variables, including GRDP per capita, Gross Enrollment Ratio (GER), household internet penetration, and the open unemployment rate (OUR), are derived from BPS and, where relevant, the Indonesian Internet Service Providers Association (APJII) and the Ministry of Communication and Information Technology. The resulting dataset is a balanced panel encompassing 170 province-year observations; four newly created provinces are necessarily excluded due to the absence of historical time series data necessary for the panel framework. All financial and economic variables are log-transformed to stabilize variance and facilitate the straightforward interpretation of coefficients as elasticities.

The formulation of the empirical model is grounded in three specific theoretical pillars found in previous literature. First, the inclusion of financial access variables is based on the structural poverty framework established by Allen et al. (2016), which posits that financial inclusion acts as a transmission channel for poverty reduction through consumption smoothing and capital accumulation mechanisms. Second, the selection of independent control variables adopts the growth-poverty model used by Nugraha and Putriani (2023), who argue that poverty is a function of the interaction between financial access, macroeconomic performance, and human capital capability. Third, to capture the elasticity of poverty with respect to these determinants, this study employs a double-logarithmic functional form. This specification is widely supported in development economics literature, such as Karlan and Zinman (2010), as it minimizes heteroscedasticity and allows for a direct interpretation of coefficients as percentage changes.

Based on these theoretical foundations, the core econometric framework is operationalized through the following fixed effects regression equation:

$$PRit=\beta0+\beta1ln(Fintechit)+\beta2ln(Bankit)+\beta3ln(GRDPit)+\beta4GERit+\beta5Internetit+\beta6OURit+\alpha i+\epsilon it$$

In this model, PRit refers to the poverty rate in province i at year t. The key independent variables are ln(Fintechit) (the natural logarithm of outstanding productive fintech loans), representing access to digital credit, and ln(Bankit) (the natural logarithm of MSME banking credit), proxying for conventional funding access. The control variables capture Gross Regional Domestic Product (ln(GRDPit)), human capital (GERit), digital infrastructure (Internetit), and labor market health (OURit). The term αi explicitly represents the fixed effect for each province, a crucial catchall for time-invariant characteristics, while ϵit is the error term.

To further examine regional heterogeneity in the effect of fintech financing, an alternative model specification disaggregates the fintech variable by interacting it with a regional dummy: Western Indonesia (WIB) versus Central and Eastern Indonesia (WITA/WIT). This yields ln(Fintech Westit) and ln(Fintech Eastit), allowing the estimation to capture potential spatial differences in the effectiveness of digital finance. Estimation employs Stata 18, including initial Hausman testing for model selection confirmation. Furthermore, the strategy utilizes robust standard errors to ensure reliable inference by addressing potential heteroscedasticity, and standard diagnostics are run for multicollinearity among the explanatory variables. This comprehensive methodological design ensures that the impacts of both forms of productive financing on poverty reduction are estimated rigorously, accounting for the complex, regionally diverse, and temporally dynamic context of Indonesia's provinces.

4. RESULT AND DISCUSSION

This section presents and discusses the estimation results from the Fixed Effects (FE) panel data regression used to analyze the comparative impact of productive Peer-to-Peer (P2P) Lending and Bank Credit on poverty levels across 34 Indonesian provinces during the 2020–2024 period. The selection of the FE method was statistically grounded in the Hausman Test results ($p<0.05$), which indicated a systematic difference between fixed and random effects. This confirms the necessity of controlling for unobserved, time-invariant heterogeneity—such as unique cultural economic practices or geographic challenges specific to each province—that could otherwise bias the measurement of poverty reduction policies

To provide context before the regression analysis, descriptive statistical analysis (Table 1) was performed on the 170 observations. The data reveals significant structural disparities across the archipelago. The poverty rate (PR) averaged 10.16% but exhibited extreme variability, spanning from a minimum of 3.8% to a maximum of 27.38%. This wide range highlights the "dual economy" nature of Indonesia, where industrialized western provinces coexist with underdeveloped eastern regions. To address this high variability and stabilize the variance, the natural logarithm (ln) was applied to all financial and economic variables, allowing the subsequent regression coefficients to be interpreted as elasticities—measuring the percentage change in poverty for a 1% change in the independent variables.

Table 1 Summary Statistics

This table provides the summary statistics of the variables used in the analysis (n=170)

	Obs	Mean	Std. Dev.	Min.	Max.
Poverty Rate (PR)	170.0	10.16	5.13	3.8	27.38
ln_FintechProductiveOutstanding	170.0	5.84	1.64	2.13	9.87
ln_OutstandingSMELoanBankID	170.0	9.66	2.0	0.0	12.33
ln_GRDPperCapitainthousand rupiahs	170.0	11.02	0.58	9.87	12.73
GER for Primary Education	170.0	106.47	3.36	91.1	113.55
GER for Lower Secondary Education	170.0	94.13	7.65	79.37	113.4
GER for Upper Secondary Education	170.0	88.24	5.94	73.35	98.75
Total Internet Penetration	170.0	83.38	11.07	35.14	99.33
Open Unemployment Rate (OUR)	170.0	5.11	1.73	1.79	10.95

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Processed by the author using Stata 18 (2025)

The natural logarithm (ln) was applied to financial and economic variables (like Fintech Outstanding, Bank SME Loans, and GRDP per capita) to normalize their distribution and allow the regression coefficients to be interpreted as elasticities. This observed disparity in the data strengthens the relevance of the fixed effects panel regression model in capturing structural variations between provinces effectively and underlies the need for further analysis of the influence of productive financing on poverty.

The analysis of the Main Model Estimation Results (Table 2) reveals a sharp and consequential contrast in financing effectiveness. The key variable, *ln_FintechProductiveOutstanding*, exhibited a negative and highly significant elasticity of -0.8987 ($p<0.01$). This robust finding strongly indicates that a 1% increase in productive fintech financing is associated with an almost 0.9% decrease in poverty levels. This empirically validates the premise that fintech serves as an effective financial inclusion tool, successfully bypassing traditional barriers to reach unbanked populations and support productive micro-ventures that directly impact household welfare.

Table 2 Results Estimate Regression Fixed Effects: Main Model

Variables	Coeff.	Std. Error	p -value
ln_FintechProductiveOutstanding	- 0.8987	0.1529	0.0***
ln_OutstandingSMELoanBankID	0.2439	0.1464	0.098
ln_NumberofBankBranches	1.6269	0.9317	0.083
ln_GRDPPerCapitaThousandRupiah	1,9014	0.4524	0.0***
GER for Upper Secondary Education	- 0.1758	0.0265	0.0***
GER for Lower Secondary Education	- 0.0195	0.0077	0.004***
GER for Primary Education	- 0.0601	0.042	0.089

Internet Penetration Total	- 0.0229	0.0179	0.204
Open Unemployment Rate	- 0.2202	0.072	0.012**

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.
Source: Processed by the author using Stata 18 (2025)

A Micro-Mechanism View Conversely, conventional MSME bank credit (ln_OutstandingSMELoanBankID) was found to be statistically insignificant (β=0.2439,p=0.098) in reducing poverty. This finding, while contrasting with classical financial deepening theories, can be explained through the micro-mechanism of credit rationing prevalent in the formal banking sector. Traditional banks rely heavily on collateral and formal credit histories to mitigate risk—assets that poor households and informal MSMEs inherently lack.

Consequently, at the micro-level behavior, subsistence entrepreneurs are effectively "screened out" of the formal banking system due to high administrative barriers and information asymmetry. As supported by OJK data (2023), the majority of bank financing is absorbed by established, bankable businesses rather than the vulnerable populations living below the poverty line. Thus, while aggregate bank credit may grow, it circulates within the non-poor segment of the economy (the "intensive margin"), failing to provide the capital injection needed for the poor to exit the poverty trap (the "extensive margin").

Regarding macroeconomic controls, the variable ln_GRDPPerCapita yielded an anomalous, yet structurally revealing result: a positive and highly significant coefficient of 1.9014 ($p<0.01$) on poverty. While this contradicts the standard "trickle-down" economic hypothesis, it aligns with the phenomenon of "exclusive growth" often observed in developing economies characterized by high inequality. In the Indonesian context, this suggests that provincial economic growth is driven primarily by capital-intensive sectors—such as mining, commodities, or high-tech services—that generate high aggregate value but offer limited labor absorption for the low-skilled poor. This structural disconnect means that rising average income does not automatically translate into broad-based poverty reduction; instead, growth in these sectors can lead to a "growth without equity" scenario where the benefits are concentrated among the urban elite and capital owners, while the cost of living rises for the poor.

Empirical evidence from recent Indonesian studies corroborates this interpretation, particularly regarding the extractive industries. Anwar et al. (2023) conducted research focusing on resource-rich regions, specifically East Luwu, documenting that while the mining sector makes substantial contributions to regional GRDP, it has not significantly reduced local poverty or unemployment. They attribute this disconnect to the sector's nature as an 'enclave economy' with weak linkages to local livelihoods and limited labor absorption. Furthermore, disaggregated analyses indicate that poverty reduction is highly sensitive to growth in labor-intensive sectors like agriculture and services, whereas aggregate growth driven by capital-intensive mining often exhibits a weak correlation with poverty reduction due to widening income inequality. Consequently, the positive coefficient in this model serves as evidence that provincial growth engines are increasingly capital-intensive, leading to a situation where increases in average output per person coincide with persistent poverty among groups excluded from these high-productivity sectors.

This finding resonates with the development paradox described by Todaro and Smith (2015), who argue that without specific inclusion policies, macroeconomic growth can inadvertently marginalize the poor. When growth is concentrated in capital-heavy sectors, it often leads to rising costs of living (inflation) without a corresponding increase in the wages of the bottom 40% of the population. Consequently, the benefits of increased economic output are not equitably distributed, widening the disparity and statistically associating higher GRDP with persistent or even visible poverty rates in resource-rich but labor-poor provinces.

Similarly, the Open Unemployment Rate (OUR) exhibited a negative and significant coefficient ($\beta = -0.2202, p = 0.012$), a result that seemingly contradicts the standard Phillips curve logic where higher unemployment typically links to higher poverty. This anomaly can be interpreted as a 'labor-market paradox' that reflects Indonesia's high prevalence of working poverty and labor informality rather than a violation of economic theory. As noted by Todaro and Smith (2015), in developing economies like Indonesia, the poorest individuals cannot afford the "luxury" of being openly unemployed due to the lack of generous social safety nets. Consequently, when economic conditions deteriorate, they do not remain unemployed but are forced to accept any form of subsistence work—such as petty trading, scavenging, or low-yield agriculture—to survive. This phenomenon of 'working poverty' keeps the official open unemployment rate low while poverty levels remain high. Conversely, higher open unemployment rates are often a phenomenon of more urbanized, wealthier provinces where educated job seekers have the family financial resilience to remain unemployed while searching for formal sector jobs. Thus, the negative correlation reflects a dual-economy phenomenon where low unemployment figures often mask high levels of vulnerable, low-income informal employment.

Recent empirical and conceptual work strongly supports this structural interpretation. A World Bank technical report on Indonesia's labor market emphasizes that having a job is often insufficient to escape poverty; a significant share of workers remain poor despite being employed, primarily due to low-productivity informal work. Indonesian economists have further noted that recent declines in national poverty and open unemployment have come "at the cost of rising informality," indicating that the labor market adjusts to shocks through job quality degradation rather than joblessness. This dynamic is corroborated by international research, such as Günther and Launov (2012), who scrutinize informal employment in developing countries. They argue that for a significant segment of the population, the informal sector serves not as a preferred opportunity but as a "last resort" for those rationed out of the formal labor market. Therefore, the negative coefficient for OUR in this model should be interpreted as evidence that poverty in Indonesia is driven more by low-quality, informal employment than by open unemployment per se, reinforcing the need for future research to complement OUR with indicators of underemployment to fully capture labor-market vulnerabilities.

Human Capital and Social Mobility In terms of social variables, the model confirmed the critical necessity of human capital investment. The Gross Enrollment Ratio (GER) for Upper Secondary Education showed a negative and significant coefficient (-0.1758). This underscores education's role as a structural determinant of long-term social mobility.

Access to secondary education equips the workforce with the skills necessary to transition from subsistence activities to higher-value employment, thereby directly reducing poverty rates over time.

The variable for Internet Penetration (Internet Penetration Total) showed no significant correlation with poverty reduction (β=−0.0229, p=0.204). This result highlights a critical "digital usage gap" at the household level. While physical connectivity (infrastructure) has expanded across provinces, the productive utilization of the internet remains low among low-income groups. Without adequate digital literacy, households often limit internet usage to consumptive activities (social media and entertainment) rather than income-generating activities such as e-commerce or digital marketing. This behavioral disconnect suggests that infrastructure availability alone is insufficient; without the human capital to leverage digital tools for economic gain, the mere presence of the internet does not automatically translate into improved welfare.

To further investigate the spatial dynamics of fintech, the Regional Heterogeneity Model (Table 3) reinforced the robustness of these findings across geographies. The analysis confirmed fintech's uniform anti-poverty effect, with ln_Fintech_West significant at -0.9600 (p<0.01) and ln_Fintech_East exhibiting a slightly higher elasticity at -1.0418 (p<0.01).

Table 3 Results Estimate Regression Fixed Effects: Model Fintech West And East

Variables	Coeff.	Std. Error	p -value
ln_Fintech_West	- 0.96	0.1255	0.0***
ln_Fintech_East	- 1.0418	0.1043	0.0***
ln_GRDPPerCapitaThousandRupiah	1.9235	0.4093	0.0***
GER for Upper Secondary Education	- 0.1829	0.0263	0.0***
GER for Lower Secondary Education	- 0.0197	0.0076	0.011**
Open Unemployment Rate	- 0.2277	0.0676	0.001***

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Processed by the author using Stata 18 (2025)

This higher elasticity in the Eastern regions is a crucial finding. It suggests that a 1% increase in P2P financing in these more financially constrained and underdeveloped areas yields a marginally larger impact on poverty reduction than in the West. This validates fintech's strategic importance in reducing regional disparity. By effectively filling the significant financing void left by conventional institutions in Eastern Indonesia, fintech acts not just as a substitute, but as a powerful tool for equitable development, bridging the spatial divide that has long characterized Indonesia's economy.

5. CONCLUSION

The empirical findings derived from the Fixed Effects (FE) panel data regression provide robust evidence that productive peer-to-peer (P2P) lending plays a significant role in alleviating poverty across Indonesian provinces. The results affirm that P2P lending, as a digital financial innovation, stands out as an effective mechanism for

economic inclusion. The negative and significant coefficient indicates that a 1% increase in productive fintech financing could reduce the poverty rate by approximately 0.9%. This pattern remains consistent even after accounting for regional heterogeneity, where fintech's impact appears slightly stronger in the eastern provinces than in the western provinces. This suggests that fintech not only complements the financial sector but also bridges critical gaps left by traditional banking systems, especially in underdeveloped and digitally deprived regions.

In contrast, conventional MSME bank credit reveals no statistically significant effect on poverty reduction. The result reflects persistent issues of bureaucratic rigidity, collateral requirements, and risk aversion within the banking industry, constraining its outreach to micro and informal enterprises. This finding aligns with global trends noted by the World Bank (2022) and Allen et al. (2016), where financial exclusion persists primarily among the unbanked and informal sectors. Furthermore, an unexpected but revealing result emerged: economic growth, measured through GRDP per capita, shows a positive relationship with poverty. This outcome suggests that Indonesia's recent growth has been uneven, with its benefits concentrated among higher-income groups while the poor remain excluded from formal economic participation.

The analysis also underscores the critical role of education and labor dynamics in poverty reduction. The variable for upper secondary education (Gross Enrollment Ratio) shows a strong negative and significant relationship with poverty levels, emphasizing education's role as a structural determinant of social mobility. Similarly, regional differences in unemployment rates show mixed but insightful results; urban provinces exhibit higher unemployment rates coexisting with lower poverty, hinting at the presence of informal labor absorption that traditional statistics might underestimate. These anomalies point to the multidimensional nature of poverty and the need for more disaggregated and micro-level investigation in future research.

From a policy perspective, the first priority is to mitigate the rising risks of moral hazard and over-borrowing inherent in digital credit. The Financial Services Authority (OJK) is advised to accelerate the implementation of a mandatory, real-time inter-platform data sharing framework. Indonesia can draw lessons from India's 'Account Aggregator' (AA) framework, which allows financial data to be shared consensually across institutions. By adopting a similar centralized 'Fintech Data Center,' lenders can view a borrower's total debt exposure across all platforms in real-time, effectively preventing the 'loan stacking' behavior that leads to default.

Second, regarding consumer protection, measures must be tightened to curb predatory practices that erode welfare gains by moving from generic supervision toward explicit market-conduct rules. International experience offers a stark warning: China's P2P lending sector initially saw explosive growth due to loose oversight, but this was followed by widespread fraud and systemic over-indebtedness, eventually forcing regulators to impose strict borrowing caps and aggressive licensing requirements. To prevent similar instability, Indonesia should look to the United Kingdom, where the Financial Conduct Authority (FCA) successfully mitigated debt spirals by imposing a binding price cap on high-cost short-term credit, limiting interest and fees to 0.8% per

day and capping the total cost of credit at 100% of the principal. While Indonesia has made progress through OJK's regulations on maximum "economic benefit," recent analyses suggest that over-indebtedness persists among vulnerable borrowers. Therefore, adopting more granular caps and rigorous transparency standards—specifically for small-ticket consumer loans—is essential to ensure digital credit functions as a tool for empowerment rather than extraction.

Third, to address the structural inefficiency of traditional banking identified in the empirical results, regulatory policy should actively incentivize bank–fintech partnership models such as channeling or co-lending. Research on Asian markets indicates that these hybrid models successfully combine the balance-sheet strength and low funding costs of regulated banks with the data-driven scoring and agility of fintech platforms. In the domestic context, the OJK has already established guidelines for channeling cooperation between rural banks (BPR/BPRS) and fintech platforms to accelerate financing to the unbanked. Market reports confirm that banks adopting these channeling mechanisms have successfully scaled credit distribution to underserved segments while maintaining non-performing loan ratios below 5%. Policymakers should further standardize these collaborations through tax incentives or simplified approval processes to close the credit access gap that conventional banking has struggled to address independently.

Fourth, digital literacy programs must be re-engineered from general education to specific "risk competency" training. Following the example of the Philippines' *National Strategy for Financial Inclusion 2022–2028*, literacy initiatives should be integrated directly into the digital ecosystem rather than treated as a separate educational campaign. The Bangko Sentral ng Pilipinas, for instance, employs targeted interventions focusing on cybersecurity and the responsible use of digital services to reduce vulnerability to scams. Drawing on this approach, Indonesian regulators could mandate that prospective borrowers complete short, gamified modules on effective interest rates and repayment obligations before loan disbursement. This human-capital-centered safeguard ensures that expanded digital access translates into informed borrowing and durable welfare gains, rather than fragile consumption booms built on unsustainable debt.

Finally, policymakers must reconsider current growth paradigms by adopting the principles of inclusive growth. Given the anomalous finding that GRDP growth correlates with higher poverty, future strategies must target fiscal programs specifically toward low-income households and MSMEs in lagging regions. This includes continuous investment in digital infrastructure to support the fintech ecosystem. Future research should extend this inquiry by utilizing micro-level datasets to capture household-level welfare outcomes and expanding the observation period beyond 2024 to assess long-term post-pandemic effects. Through these pathways, fintech lending can evolve from a mere financial technology solution into a cornerstone of sustainable and inclusive development in Indonesia.

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