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ADOPTION OF PEER-TO-PEER (P2P) FINTECH LENDING: A STUDY OF SOCIO-DEMOGRAPHIC FACTORS

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ABSTRACT

This research examines the socio-demographic factors of Peer-to-Peer (P2P) fintech lending within the Indonesian context. This research takes three different P2P Fintech lending measures: total fintech accounts, total fintech transactions, and total fintech loan disbursement. Using provincial data from 2019 to 2022, our robust panel regression found that education, internet literacy, poverty, and gender play important roles in P2P Fintech lending, specifically the total accounts and transactions. However, the total fintech loans were only determined by education and Gender. This study contributes significantly to the digital economy literature, specifically within the fintech domain, offering valuable insights for policymakers and financial authorities in Indonesia to enhance regulatory frameworks and foster a more inclusive P2P Fintech landscape.

Keywords: Fintech Lending; Socio-economic; demography; digital economy

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1. INTRODUCTION

According to The World Bank (2024), the number of people worldwide without access to formal banking services has decreased significantly from 2 billion in 2014 to approximately 1.4 billion in 2023. This reduction highlights a notable improvement in global financial inclusion. However, the situation in Indonesia contrasts starkly with this trend. Data from the World Bank (2024) indicates that a staggering 85% of the country's 275 million population remains unbanked. Through the Financial Services Authority (Otoritas Jasa Keuangan/OJK), this discrepancy has prompted the Indonesian government to implement aggressive financial inclusion policies, aiming to achieve 90% national financial inclusion by 2024. Central to this strategy is promoting Fintech as a key alternative avenue for expanding access to financial services nationwide.

As of November 2023, the collective funding of P2P lenders in Indonesia has surged to 739 trillion rupiah ($47 billion), a substantial increase from 3 trillion rupiah in January 2018 (OJK, 2024). This

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growth reflects the emergence of P2P lending as a viable solution to address the issue of financial exclusion among Indonesians (Suryono et al., 2021). P2P lending has significantly transformed the country's financial landscape, challenging traditional lending models. Its popularity continues to grow, positioning it as a credible alternative source of financing (Thakor, 2020). Yet, the Indonesian P2P fintech growth slowed in 2023, leaving a question: "What drives the adoption?" The literature argues that the platform might help the issue of an unbanked society (Bazarbash and Beaton, 2020; Morgan, 2022), which is one of the sustainable development goals (SDGs). It has revolutionized the financial industry, challenging traditional banking norms and offering new avenues for accessing credit and financial services (Thakor, 2020). However, despite the growing popularity of fintech P2P lending, a critical knowledge gap remains regarding the role of socio-demographic factors in shaping individuals' engagement with these platforms.

One of the critical research gaps lies in comprehending the impact of socio-demographic factors on individuals' participation in fintech P2P lending. While existing studies have explored various determinants of financial behavior, the specific role of socio-demographic factors, encompassing education, internet literacy, Income, and Gender, remains relatively unexplored in P2P lending. These socio-demographic factors profoundly influence individuals' financial decision-making, access to resources, and opportunities for economic advancement.

The body of knowledge generally divides socio-demography into four big dimensions: (i) education, (ii) income, (iii) gender, and (iv) accessibility (Szirmai, 2005). Each dimension is essential in financial decisions, including banking decisions (Amari et al., 2020). For instance, previous research has shown the importance of education in participation in the lending market (Chen et al., 2018). Education provides information that might influence financial preferences (Cole et al., 2014; Veerasingam and Teoh, 2023), financial literacy (Lotto, 2020; Lusardi, 2019), and awareness of alternative lending channels (Ouma et al., 2017).

Income, specifically poverty, is a significant socio-demographic factor in e-banking and fintech participation. Low-income individuals or those living in poverty often face limited financial literacy (Brahmana and Brahmana, 2016; Wagner, 2019) and reduced access to formal banking services (Thakor, 2020), hindering their engagement with e-banking or fintech solutions. This group often faces limited access to traditional financial institutions and is likelier to experience financial exclusion (Bazarbash and Beaton, 2020; Morgan, 2022). The lack of access to formal financial services intensifies the need for alternative channels, such as e-banking and fintech platforms, to bridge the gap and provide inclusive financial solutions, leading to increased fintech participation.

It is also important to acknowledge the presence of gender-based disparities that can impact access to finance. Societal norms, stereotypes, and unequal opportunities often limit women's access to quality financing (Khera, 2018; Setiawan et al., 2023), hindering their participation in e-banking or fintech. These gendered barriers can contribute to lower financial empowerment and knowledge levels among women, thereby limiting their ability to engage effectively with e-banking or fintech platforms. It is well explored under the social role theory (Pahlevan Sharif et al., 2022).

We lend the diffusion of innovation theory of Rogers (2010) as the research framework to explain how socio-demographic factors can shape individuals' attitudes and behaviors toward adopting

new innovations. As explained earlier, the logic is that socio-demographic factors such as gender, Income, and education can influence individuals' attitudes and behaviors toward fintech P2P lending. For example, this theory explains why higher-income individuals may be inclined to explore alternative lending channels while lower-income individuals may have limited participation (Kanga et al., 2022).

Our focus is addressing the impact of socio-demographic factors on P2P Fintech lending participation. To do so, we capture the participation with three key measures of P2P Fintech lending: total fintech accounts (hereafter ACCOUNTS), total fintech transactions (TRANSACTIONS), and total fintech loan disbursement (LOANS). Understanding how socio-demographic factors influence user behavior in this context can provide insights into potential barriers and opportunities for different demographic groups, enabling the design of tailored interventions to encourage greater participation and foster a more inclusive fintech ecosystem. It can shed light on the implications for policymakers, industry practitioners, and researchers in developing targeted strategies to enhance financial inclusion and consumer welfare. Therefore, the primary objective of this research is to investigate the influence of socio-demographic factors on P2P Fintech lending in the Indonesian context.

This research contributes to the literature in several ways. First, it enriches diffusion of innovation theory by investigating how socio-demographic factors like age, Income, and education influence individuals' adoption of fintech P2P lending platforms. The findings provide insight into the factors that shape the spread and acceptance of innovative financial services, which consistently affirms the theory.

Second, this study extends our understanding of how socio-demographic factors shape banking participation in the digital era. Earlier literature focuses more on Internet banking, while our study further examines it in a P2P Fintech lending context. It enhances our comprehension of the specific socio-demographic characteristics that affect individuals' attitudes and behaviors toward embracing these digital platforms. By identifying which socio-demographic segments are more receptive or resistant to fintech P2P lending, researchers can uncover patterns and trends that inform targeted strategies for promoting wider adoption and usage.

Moreover, this study aims to broaden our understanding of how socio-demographic factors shape the landscape of P2P Fintech lending. The research outcomes carry significant implications for policymakers, particularly in the domain of financial inclusion. Our findings empower policymakers to formulate targeted strategies that address the needs and challenges individuals, families, and societies face. This insight can guide the development of effective policies, regulations, and support mechanisms, cultivating an environment that maximizes the positive socio-demographic impact of P2P Fintech lending while minimizing potential risks for diverse population segments.

This research is organized as follows. The next section offers a literature review. Then, section 3 describes the data and methodology. Section 4 provides the results and analysis. Section five concludes the research by highlighting the implications, limitations, and suggestions for future research.

2. LITERATURE REVIEW

2.1. Theoretical Argument

One theoretical argument about socio-demographic factors on P2P Fintech lending is the Diffusion of Innovation theory by Rogers (2010). This theory is used to better understand technology adoption within a social-demographic context. This theory posits that technological adoption is decided by the members of a social system over time. A study from Medlin (2001) uses this theory to examine how social, organizational, and personal motivation determine the decision to use a new technology. Related to socio-demographics, Less (2003) adopts the theory by investigating the role of age, gender, race, and experience in technology adoption. Notably, most of those findings are at the individual level.

We leverage the theoretical framework of the Diffusion of Innovation by upscaling it to the provincial level, in which we take aggregate data instead of individual. The argument remains the same: Socio-demographic characteristics, such as education level, income, internet access, and poverty rate, can significantly shape individuals' attitudes, perceptions, and behaviors towards adopting P2P Fintech lending as an alternative source of finance. However, the unit of analysis is on the aggregate level, as this research seeks to unravel the intricate relationship between socio-demographic factors and P2P Fintech lending. By doing so, this study contributes to our understanding of the dynamics of technological diffusion and its implications for financial inclusion and access to alternative lending sources, ultimately informing the design of more targeted and inclusive financial services within the macro level.

2.2. Education as the socio-demography factor for P2P Fintech Lending

Development economics literature shows that countries with a more formal education population tend to adopt technology (Hooks et al., 2022). The tenet is that a province with more graduated formal education, either primary, secondary, or tertiary, has better technology adoption. A higher level of formal education equips individuals with the necessary knowledge and skills to navigate digital platforms and embrace technological advancements (Demirguc-Kunt et al., 2018). This is consistent with the study by Lee (2001), who shows that a country's educational level is important for technology readiness. The research divides the educational level into three variables: primary, secondary, and tertiary, and found a positive relationship. Given these assumed socio-demographic factors on technology participation, research suggests that education is pivotal in promoting technology innovation (i.e., Dagunga et al., 2020; Demirguc-Kunt et al., 2018; Naicker and Van Der Merwe, 2018). Similarly, research in Internet banking literature has consistently shown the importance of education on online banking services adoption (Martínez-Bravo et al., 2020; Wewege and Thomsett, 2019).

Additionally, education has been linked to improved financial decision-making abilities (Cole et al., 2014; Veerasingam and Teoh, 2023), higher levels of financial literacy (Lotto, 2020; Lusardi, 2019), and a deeper understanding of financial products and services (Ouma et al., 2017). Given these considerations, we can hypothesize that a higher proportion of the population with formal

education within a given context is positively associated with participation in P2P Fintech lending. Therefore, we hypothesize:

H_1: *Education has positive relationship with P2P Fintech lending participation*;

As we divide education into three levels: primary, secondary, and tertiary education, thus,

H_{1a}: *Primary Education has positive relationship with P2P Fintech lending participation*;

H_{1b}: *Secondary Education has positive relationship with P2P Fintech lending participation*;

H_{1c}: *Tertiary Education has a positive relationship with P2P Fintech lending participation*.

2.3. Internet Access as the socio-demography factor for P2P Fintech Lending

Literature also addresses the importance of internet access in technology adoption. For instance, Salem et al. (2019) show the importance of ACCESS in Internet banking adoption. There is also Clarke et al. (2015), which shows the relationship between ACCESS and e-commerce. The literature surmises individuals with internet access are more likely to embrace technological innovations (Mani and Chouk, 2018), demonstrate a higher level of digital literacy (Tirado-Morueta et al., 2018), and possess the necessary skills to navigate online platforms effectively (Clarke et al., 2015). With internet connectivity's increasing availability and affordability, individuals are empowered to explore and utilize digital financial services, including P2P Fintech lending platforms.

Further, previous research has highlighted the transformative role of internet access in shaping individuals' financial behaviors and preferences. It enhances financial literacy and awareness (Sabri and Aw, 2019), allowing individuals to make informed decisions and leverage the benefits of P2P Fintech lending. With greater access to financial information, borrowers can evaluate loan terms, compare options, and make more informed borrowing decisions in P2P Fintech lending. Therefore,

H_2: *Internet access has a positive effect on P2P Fintech lending participation.*

2.4. Income equality as the socio-demography factor for P2P Fintech Lending

Previous research has highlighted the significance of income as a socio-demographic factor in technology adoption. For instance, Lee et al. (2019) use the technology diffusion model to show how income significantly affects technology acceptance. Babiarz and DeVaney's (2007) finding is one of the few with a negative relationship between income and the adoption of Internet banking. At the provincial level, income is crucial in determining individuals' financial behaviors (Brahmana and Brahmana, 2016; Wagner, 2019). Higher-income levels provide individuals with increased financial capacity, allowing them to consider alternative investment and borrowing options (Kling et al., 2022; Vanek, 2006). This suggests that higher-income individuals are more likely to actively participate in P2P lending, leveraging these platforms to diversify their investment portfolios or access financing beyond traditional banking channels.

The literature also captures the distribution of wealth and income inequality on technology adoption. Faber (2019) reveals that higher poverty rates and greater income inequality may create a demand for alternative financial services. Individuals from economically disadvantaged backgrounds may be more inclined to seek out fintech platforms to access capital or generate income. Therefore,

H_3: *Income equality has positive effect on P2P Fintech lending participation*;

As we have two income equality dimensions, thus,

H_{3a}: *A higher Gini rate leads to a lower P2P Fintech lending participation.*

H_{3b}: *A higher poverty rate leads to a lower P2P Fintech lending participation.*

2.5. Gender as the socio-demography factor for P2P Fintech Lending

Diffusion of innovation theory also proposes gender as another socio-demographic factor that affects technology adoption. In our context, we argue that the proportion of the male population is important for P2P Fintech participation, as it reflects the gender composition and potential gender dynamics within the population. Gender has been found to influence financial decision-making (Fornero and Prete, 2023), risk-taking behavior (Aren and Hamamci, 2020), and investment preferences (Bapna and Ganco, 2021). These factors may contribute to a greater willingness among males to explore alternative financial platforms, such as P2P lending, as a means to diversify their investment portfolios, access financing, or seek out potentially higher returns.

Furthermore, cultural and societal norms related to gender roles and financial decision-making may also influence the relationship between gender and P2P Fintech lending. Societies with more traditional gender roles and norms that assign financial decision-making responsibilities primarily to males may see a higher uptake of P2P lending among the male population, as postulated by the social role theory of Eagly (1997). Mumu et al. (2022) found that women pursue more e-commerce than men. Gonzalez (2023) found that gender plays an important role in P2P lending. Additionally, Lin and Chen (2020) also show how gender differences are crucial in insurtech. Therefore,

H_4: *a higher proportion of the male population is positively associated with P2P Fintech lending participation*

3. METHODOLOGY

3.1. Data

The sampling frame of this research is all Indonesians who use P2P Fintech lending. We retrieve the data from the Indonesian Financial Service Authority[1] annually from 2019 to 2022. All data is provincial data, consisting of 34 provinces. The total sample of this research is pooled data from 136 year-province observations. The socio-demographic factors and other economic data are retrieved from the Indonesian Central Agency on Statistics (Biro Pusat Statistik[2]).

The rationale behind taking Indonesia as a research context is twofold. First, Indonesia is one of the few countries that pursue a digital economy, and the Indonesian government also embedded it as a national policy. The hypothesis testing from Indonesia can give a good insight into the literature, especially for learning the importance of socio-demography in the digital economy. Second, Indonesia provides comprehensive data of P2P Fintech data. We can retrieve not only P2P Fintech accounts but also TRANSACTIONS and LOANS. It creates flexibility and robustness to test the hypothesis.

3.2. Specification of Model

We specified our panel regression model based on Munusamy et al. (2012). We modified it into panel estimation by following Brahmana et al. (2022b). In Munusamy et al. (2012), the dependent variable is Internet banking adoption. We replaced it with P2P Fintech lending (Lending) and adopted the model specification with similar independent variables. The final estimation model is as follows:

$$Lending_{i,t} = \beta_0 + \beta_1 Primary_{i,t} + \beta_2 Secondary_{i,t} + \beta_3 Tertiary_{i,t} + \beta_4 Internet_{i,t} + \beta_5 Gini_{i,t} + \beta_6 Poverty_{i,t} + \beta_7 Male_{i,t} + \sum_{j=1}^{J-1} \gamma_{34,t} PROV_j + \sum_{t=1}^{T-1} \gamma_{4,t} YEAR_t + \varepsilon_{i,t} \quad \ldots\ldots\ldots [1]$$

$Lending_{i,t}$ is the dependent variable, measuring the P2P Fintech participation. $Primary_{i,t}$, $Secondary_{i,t}$, and $Tertiary_{i,t}$ are the education level, which is the portion of the provincial population that went to primary, secondary, and tertiary education. $Internet_{i,t}$ denotes internet literacy in the province. $Gini_{i,t}$ and $Poverty_{i,t}$ are the measurement for income level. Lastly, $Male_{i,t}$ denotes Gender, which is the portion of males in the population. Note that period dummies $YEAR_t$ are included as a control for common shocks.

The model estimation is run under robust panel regression by following the recommendations of Law (2018) and Petersen (2009). We checked the presence of individual effects by using the Chow test, Breusch Pagan LM test, and Hausman test. The probability values of those three tests resulted in a value lower than 5%, resulting in the Fixed Effect model. The Chow Test and Breusch Pagan LM test surmise that our model is more appropriate for Random Effect or Fixed Effect. Meanwhile, the Hausman test reveals the endogeneity of the Individual effect, resulting in choosing the Fixed Effect over the Random Effect.

We also ran the classical linear regression model diagnostic test for the unbiased and efficient estimator. The results show that ViF is lower than 10, implying no multicollinearity issue. However, the heteroscedasticity and autocorrelation tests reveal lower than 5% probability values. We rectify the issue by taking the White test's robust standard error into the model. For brevity, we do not show all the tests in the manuscript.

3.3. Measures

The measurements are adopted from Munusamy et al. (2012) and Brahmana et al. (2022a). We use three different measures for P2P Fintech lending adoption: (1) ACCOUNTS, (2) TRANSACTIONS, and (3) LOANS. We re-estimate the model to test each measure.

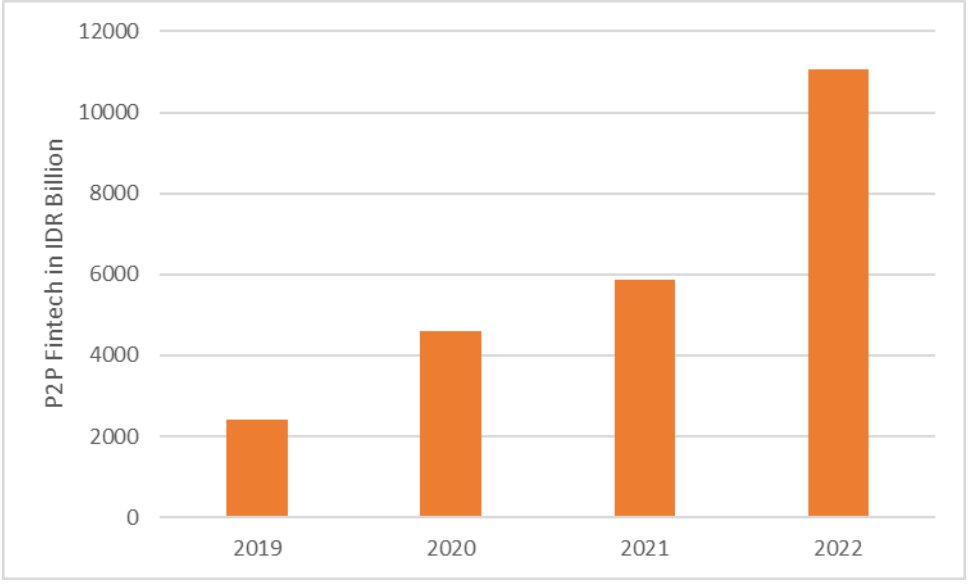
Following Munusamy et al. (2012), the socio-demographic factors are divided into education, Income, and Gender. We add internet literacy to make the estimation more rigorous. All independent variables are at a percentage level. The education dimension is divided into (1) primary, (2) secondary, and (3) tertiary. Primary is the portion of the population that went to primary education or elementary school in Indonesia. Secondary is the portion of the population that went to secondary education or, in Indonesia, called as high school (from Junior to High School). Tertiary education is the portion of the population who went for a diploma or undergraduate program. Income level is measured by the gini rate and poverty level.
Additionally, Gender is measured by the proportion of the male population in the province. Because the research context is the digital economy, we introduce internet access as another factor: the proportion of the population with internet access. The complete list of definitions is in Table 1.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

Table 1 reports the summary statistics for all variables. We also add information on P2P Fintech lending in nominal at the end of the table. For the dependent variables, P2P Fintech lending, the table shows a mean value of 12.66 for the total account. Total P2P Fintech loan has a mean value of 6.18 with a 14.41 total transaction average. If we look at the nominal value, it shows 11 billion transactions yearly with a total loan value of IDR 5,981 Billion (USD 428 Million). Relatively, the total loan value from P2P Fintech lending is minuscule, even compared to the Rural Banking industry, which is IDR125,000 Billion (USD 8.9 Billion). However, the growth of fintech loans has grown exponentially, from IDR 2,396 Billion in 2019 to IDR 11,067 Billion in 2022 (361% growth. Refer to Figure 1)

Figure 1: Growth of P2P Fintech Lending Credit



For the independent variables, Primary shows a mean value of 95.49. This means an average of 95.49% of the Indonesian population attends elementary school. The secondary school has a mean value of 87.10, implying that the percentage of Indonesians who go to high school is 87.1%. Meanwhile, the table also shows that only 63.46% of Indonesians went to colleges or universities. Table 1 also shows the internet access mean value of 84.78%, implying that most Indonesians have internet access. In terms of Income, the gini rate has a mean value of 0.35, and the poverty rate is 10.44%. The mean value of 0.35 suggests that, on average, the population has moderate income inequality. As a benchmark, the Asia region has a gini rate of 0.447. This implies that Indonesia has better income equality than its peers in Asia. For the poverty rate, the mean value of 10.44% indicates that approximately 10.44% of the population lives below the poverty line. Southeast Asia region has a poverty rate of 13.6% in 2022. Therefore, Indonesia has relatively better economic terms, as it suggests that a smaller proportion of the population is facing economic hardships. The last independent variable, Gender, shows that Indonesia's population consists of 51% males, the same as the World male proportion.

Table 1: Summary Statistics

Variable	Definition	Mean	Std. Dev.
Fintech Lending Variables			
No of Account (LN)	Lognormal of Total P2P Fintech Lending Account	12.66	1.71
No of Transaction (LN)	Lognormal of Total P2P Fintech Lending Transactions	14.41	1.89
Total Fintech Loan (LN)	Lognormal of Total P2P Fintech Lending Loans	6.18	1.99
Socio-demographic factors			
Primary (%)	Proportion of the provincial population went to primary education	95.49	4.01
Secondary (%)	Proportion of the provincial population went to secondary education	87.10	6.23
Tertiary (%)	Proportion of the provincial population went to tertiary education	63.46	10.80
Internet Literacy (%)	Percentage of Internet users in the province	84.78	13.10
Gini Rate (%)	Provincial Gini Rate	0.35	0.04
Poverty (%)	Provincial Poverty Rate	10.44	5.35
Male (%)	Percentage of the male population in the province	51	1
P2P Fintech Lending in Nominal (Additional Information)			
No of Account (in billion)	Nominal value of Total P2P Fintech Lending Account	1.73	5.03
No of Transaction (in Billion)	Nominal value of Total P2P Fintech Lending Transactions	11.66	32.29

No of Loans (in Billion)	Nominal value of Total P2P Fintech Lending Loans	5981.27	30243.79

Table 2 reports the correlation matrix, showing the univariate relationship between two variables. We analyze the correlation in two ways. First is the correlation between the dependent variable and independent variables. The coefficients have expected signs. Higher education level, better internet access, better income inequality and income level, and lower male population are positively associated with P2P Fintech lending. This tallies the argument that financial inclusivity only belongs to the middle or higher class because they have access to the lending market with their education, internet facility, and income level. Meanwhile, those provinces with poor education, internet access, and Income are associated with low participation in P2P Fintech lending.

Second, the high coefficient correlation among the dependent variable measures implies the robustness of the measures as an alternative proxy. Finally, the coefficient correlations among independent variables are relatively small, except among the education variables. However, it would not harm our estimation model because the Variance Inflation Factor (VIF) scores are lower than 10. This implies no collinearity issue despite the high coefficient correlation among the education variables.

Table 2: Correlation Matrix

	Account	Transaction	Loan	Primary	Secondary	Tertiary	Internet Literacy	Gini	Poverty
Account	1								
Transaction	0.99	1							
Loan	0.84	0.81	1						
Primary	0.41	0.47	0.30	1					
Secondary	0.39	0.45	0.29	0.86	1				
Tertiary	0.38	0.43	0.39	0.69	0.84	1			
Internet Literacy	0.54	0.61	0.40	0.79	0.72	0.64	1		
Gini	0.32	0.26	0.31	-0.16	-0.03	0.08	0.01	1	
Poverty	-0.32	-0.36	-0.37	-0.58	-0.48	-0.52	-0.68	0.30	1
Male	-0.13	-0.09	-0.36	-0.16	-0.14	-0.18	-0.07	-0.34	0.03
DV	Account	Transaction	Loan						
VIF	3.96	3.96	3.96						

4.2. Regression Results

We empirically test all the hypotheses and provide the results in Table 3. First, it shows all education levels significantly impact P2P Fintech lending, except secondary education on LOANS. All the education coefficients are positive, implying that regions with a higher proportion of their population having completed primary, secondary, or tertiary education tend to experience greater adoption of P2P fintech lending. In simpler terms, areas with educated populations across all educational levels have favorable conditions for the adoption of Fintech P2P platforms.

For instance, Table 3 reveals the positive relationship between primary education and P2P Fintech lending ACCOUNTS (β=0.13 $p<0.01$), TRANSACTIONS (β=0.10 $p<0.01$), and LOANS (β=0.10 $p<0.05$). This suggests that in societies with a greater proportion of the population having completed primary education, there tends to be higher adoption of P2P Fintech lending. Essentially, the more individuals with primary education in a society, the greater the level of P2P Fintech lending observed.

Table 3 also reports the positive relationship between secondary education on P2P Fintech lending ACCOUNTS (β=0.08 $p<0.01$) and TRANSACTIONS (β=0.07 $p<0.01$), but not LOANS. This suggests that in provinces with a higher number of secondary education graduates, there is an increase in both P2P Fintech accounts and transactions, reflecting the influence of education levels on financial behavior.

For tertiary education, we found a positive relationship with P2P Fintech lending, like ACCOUNTS (β=0.02 $p<0.01$), TRANSACTIONS (β=0.04 $p<0.01$), and LOANS (β=0.06 $p<0.01$). Practically, these findings suggest that as the number of tertiary education graduates in a province increases, so does the adoption of P2P Fintech lending. Therefore, we conclude that education plays a crucial role in shaping P2P Fintech lending patterns, aligning with the diffusion of innovation theory.

The positive relationship suggests that individuals with formal education are more likely to be financially savvy (Lotto, 2020; Lusardi, 2019), empowering them to make informed financial decisions and assess the benefits of P2P Fintech lending over traditional options. Regions prioritizing education tend to have populations with greater technological proficiency (Marrocu & Paci, 2012), leading them to be more receptive to innovative financial technologies. Higher levels of education promote a culture of financial and technological awareness, facilitating the adoption of digital financial services like P2P Fintech lending.

Moreover, education is frequently linked with increased income levels and higher socio-economic status (Bazarbash and Beaton, 2020; Ouma et al., 2017). Provinces with well-educated populations often boast a larger middle class and, hence, enjoy greater technology adoption. This assertion is supported by empirical research by Szopiński (2016), who demonstrated a positive association between education and online banking services adoption.

Regarding internet access, the results show a positive relationship between internet access and P2P Fintech lending ACCOUNTS (β=0.03 $p<0.0$) and TRANSACTIONS (β=0.04 $p<0.01$). This indicates that a society with high internet access would increase P2P Fintech adoption, specifically

in terms of the number of accounts and transactions. However, internet access does not have any significant impact on the loan.

We interpret the positive association between internet access and P2P Fintech lending in two ways. First, internet access expands the reach and availability of financial services, especially in areas where traditional banking infrastructure may be limited (Bazarbash and Beaton, 2020; Morgan, 2022). As more individuals gain access to the internet, they are empowered to explore alternative financial solutions, including P2P Fintech lending platforms. The convenience and accessibility offered by online platforms make P2P lending an attractive option for individuals who may have been excluded or underserved by traditional banking channels. From the aggregate level (provincial), the availability of internet access overcomes traditional barriers, such as physical distance and limited brick-and-mortar infrastructure (Ali, 2022), enabling society to participate in P2P lending activities and access much-needed credit or investment opportunities.

Second, internet access facilitates information sharing and financial literacy (Sabri and Aw, 2019). Online platforms provide a wealth of resources and educational materials related to P2P Fintech lending, enabling individuals to learn about its benefits, risks, and procedures (Clarke et al., 2015; Tirado-Morueta et al., 2018). This sense of connectivity and trust encourages individuals in the province to participate in P2P lending, knowing they are part of a wider network that facilitates secure and reliable financial transactions. Hence, it leads to an increase in P2P Fintech lending participation.

We also provide evidence regarding the income factors. Our findings reveal that the gini rate has an insignificant relationship with P2P Fintech lending. Income equality would not change the P2P Fintech lending. One possible explanation for this observation is that individuals, irrespective of their position within the income distribution, may perceive P2P lending as a viable alternative source of financing. Whether a society experiences high or low-income inequality, individuals may still seek P2P lending platforms to access credit or invest their funds. Furthermore, P2P lending platforms often rely on technology and digital infrastructure, which may be accessible across different income levels. Consequently, income inequality may not have a substantial impact on access to or usage of P2P lending platforms.

Meanwhile, the poverty rate has positive effects on P2P Fintech lending ACCOUNTS ($\beta=0.24$ $p<0.01$) and TRANSACTIONS ($\beta=0.34$ $p<0.01$). A decrease in the poverty rate would lead to a decrease in P2P Fintech lending, which parallels Brahmana et al. (2022a). A society with better Income would not seek P2P Fintech lending as the source of financing. Instead, they will apply the credit from traditional banking (Brahmana et al., 2022a).

The positive relationship between the poverty rate and P2P Fintech lending can be understood through several mechanisms. Firstly, individuals residing in provinces with higher poverty rates may have limited access to traditional financial services, leading them to seek alternative means of financing, such as P2P Fintech lending. Additionally, P2P Fintech lending platforms may be perceived as more accessible and flexible compared to traditional lending institutions, making them attractive options for individuals in economically disadvantaged provinces.

We theorized the lack of significant effect of the Gini rate on P2P Fintech lending on the nature of P2P Fintech lending. Unlike traditional financial institutions, P2P Fintech lending platforms may

operate under different principles, such as crowd-based funding or peer-to-peer transactions. These platforms might appeal to individuals across different income levels, irrespective of the overall income inequality within a province.

Finally, Gender also has positive impacts on P2P Fintech lending ACCOUNTS (β=0.2632 $p<0.01$) and TRANSACTIONS (β=0.5187 $p<0.01$), but a negative relationship with LOANS (β=-1.069 $p<0.01$). Table 3 reveals that a higher portion of males in society would increase the account and transaction of P2P Fintech lending. However, it would decrease the total loans.

Table 3: Regression Results

	Account	transaction	loan
PRIMARY	0.13***	0.10***	0.10**
	(0.03)	(0.02)	(0.04)
SECONDARY	0.08***	0.07***	0.02
	(0.02)	(0.02)	(0.03)
TERTIARY	0.02**	0.04***	0.06***
	(0.01)	(0.01)	(0.02)
INTERNET	0.03***	0.04***	0.01
	(0.01)	(0.01)	(0.02)
GINI	0.76	-3.51	4.08
	(3.16)	(3.90)	(7.11)
POVERTY	0.22***	0.34***	0.14
	(0.08)	(0.08)	(0.16)
MALE	0.2632**	0.5187***	-1.1069***
	(0.0978)	(0.1178)	(0.2559)
CONSTANT	-26.34***	-36.69***	44.77***
	(4.33)	(6.82)	(14.86)

Note: *, **, and *** denote significant level at 10%, 5%, and 1%, respectively. All stated figures are beta coefficients. Those inside parentheses are robust standard errors.

4.3. Robustness Check: Quantile Regression

We further examine the relationship by conducting quantile regression, which was developed by Koenker and Bassett (1978). Quantile regression addresses the limitation of OLS regression, which only estimates the mean effect of socio-demographic factors on P2P Fintech lending. This research argues there is a potential non-normality of P2P Fintech lending across the province; therefore, the quantile regression has the ability to discern the effects of socio-demography along the entire range of P2P Fintech lending distribution, especially the extreme upper-lower tails (Koenker and Hallock, 2001).

The quantile regression is tested on five different percentiles: 10th, 25th, 50th,75th, and 90th percentile. We estimate the quantile regression on all three P2P Fintech lending measures. The quantile regression results in Tables 4, 5, and 6 reveal the considerable heterogeneity in the relationship between socio-demographic factors and P2P Fintech lending. It also shows different conclusions at different levels of percentile.

Table 4, for example, reports the quantile regression with a P2P Fintech lending account (ACCOUNTS) as the dependent variable. The findings reveal fascinating insights about the relationship between primary education and P2P Fintech lending across different percentiles. Specifically, the results show that Income has a positive association with ACCOUNTS up to the 75th percentile, implying that provinces with a population with more primary education graduates, ranging from the lower to the middle segments of the distribution, tend to have ACCOUNTS. The statistical significance of the primary education variable disappears at the 90th percentile. This indicates that the relationship between primary education and P2P Fintech lending weakens or becomes less influential in a province with a high population portion of primary education. It suggests that those provinces with the top 10% of the primary education distribution would not pursue ACCOUNTS. Similarly, Table 4 also reports that tertiary education and ACCOUNTS have a positive relationship up to the 50th percentile. This indicates that those provinces with the top 50% of the tertiary education distribution would not have more P2P accounts.

Only secondary education has a fully positive effect on ACCOUNTS across the percentiles, implying that a higher portion of secondary education in a province is associated with higher levels of ACCOUNTS across the distribution. Therefore, the insights from education's effects on accounts are twofold. First, education level is an important factor for ACCOUNTS, meaning that a province with a high level of education would lead to higher participation in ACCOUNTS. Second, a province with a high education participation demography would not always have high ACCOUNTS. The impact of education on ACCOUNTS disappears in a province with a high participation in education.

Meanwhile, the effect of ACCESS and MALE on ACCOUNTS disappears at the 10th percentile. It indicates that improved internet access and a higher male population are associated with higher levels of ACCOUNTS, particularly in the middle and upper parts of the distribution, as indicated by the significant effects at the 25th, 50th, 75th, and 90th percentiles. Practically, a province with shallow internet access and a male population would not impact ACCOUNTS.

The positive coefficient associated with the poverty rate indicates that higher levels of poverty in a province are associated with higher levels of P2P Fintech lending across the entire distribution. This finding suggests that provinces with higher poverty rates tend to have increased levels of engagement in P2P Fintech lending activities. The consistent significance of the poverty rate across all percentiles underscores the broad impact of poverty on P2P Fintech lending. Meanwhile, the gini rate conclusion remains intact, with no significant relationship between the gini rate and ACCOUNTS.

Table 4: Quantile Regression with No of Fintech Account as the dependent variable

	q10	q25	q50	q75	q90
PRIMARY	0.18***	0.16***	0.13***	0.10**	0.08
	(0.05)	(0.04)	(0.03)	(0.04)	(0.05)
SECONDARY	0.09***	0.09***	0.08***	0.08***	0.08***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
TERTIARY	0.03*	0.02**	0.02**	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
INTERNET_LIT	0.02	0.02*	0.03***	0.03**	0.03**
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
GINI	2.45	1.77	0.73	-0.35	-0.97
	(4.96)	(3.67)	(2.64)	(3.63)	(4.77)
POVERTY	0.21*	0.22**	0.22***	0.23**	0.23*
	(0.12)	(0.09)	(0.07)	(0.09)	(0.12)
MALE	0.1478	0.1945	0.2653***	0.3388***	0.3811**
	(0.1612)	(0.1196)	(0.871)	(0.1181)	(0.1550)

*Note: *, **, and *** denote significant level at 10%, 5%, and 1%, respectively. All stated figures are beta coefficients. Those inside parentheses are robust standard errors.*

We proceed with our analysis with the number of P2P Fintech lending transactions (TRANSACTION) as the dependent variable. Table 5 reveals the findings, which have a similar conclusion to Table 3. Primary, secondary, and tertiary education have positive relationships with TRANSACTIONS. The results indicate that education positively affects all five percentiles (10th, 25th, 50th, 75th, and 90th) of TRANSACTIONS. This suggests that as the proportion of the population in a province who have received formal education increases, there is a corresponding increase in P2P Fintech lending activities across the distribution, consistent with our earlier findings.

The conclusion is also the same regarding internet access, where there is a positive association between internet access and transactions across all five percentiles. As the proportion of the population in a province with internet access increases, there is a corresponding increase in P2P Fintech lending activities across the distribution.

For Income as a socio-demography factor, the quantile regression results indicate a positive effect of poverty on all five percentiles of TRANSACTIONS. This implies that as the poverty rate in a province increases, there is a corresponding increase in P2P Fintech lending activities across the entire distribution. Meanwhile, the gini rate remains with no effect on TRANSACTION.

Finally, Table 5 also shows the positive effect of MALE on TRANSACTION. The results indicate that the proportion of the male population in a province has a significant effect on all five percentiles of TRANSACTIONS. It could reflect gender differences in financial decision-making,

risk-taking behaviors, or employment patterns that impact individuals' engagement in P2P Fintech lending.

Table 5: Quantile Regression with No of Fintech Transaction as the dependent variable

	q10	q25	q50	q75	q90
PRIMARY	0.13***	0.12***	0.10***	0.09***	0.08*
	(0.04)	(0.03)	(0.02)	(0.03)	(0.04)
SECONDARY	0.07**	0.07***	0.07***	0.07***	0.07**
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
TERTIARY	0.05***	0.05***	0.04***	0.04***	0.04**
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
INTERNET_LIT	0.04**	0.04***	0.04***	0.04***	0.04***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
GINI	-4.41	-4.07	-3.48	-3.04	-2.62
	(5.93)	(4.41)	(3.02)	(3.91)	(5.70)
POVERTY	0.33***	0.34***	0.34***	0.35***	0.36***
	(0.12)	(0.09)	(0.06)	(0.08)	(0.12)
MALE	0.4794***	0.4942***	0.5198***	0.5391***	0.5575***
	(0.1542)	(0.1148)	(0.0785)	(0.1019)	(0.1482)

*Note: *, **, and *** denote significant level at 10%, 5%, and 1%, respectively. All stated figures are beta coefficients. Those inside parentheses are robust standard errors.*

Table 6 reveals the results of P2P Fintech lending loans (LOANS) as the dependent variable. As aforementioned above, ACCOUNTS, TRANSACTION, and LOANS are conceptually different. ACCOUNTS denotes user or borrower accounts on the P2P Fintech lending platform. TRANSACTION denotes financial activities conducted within those accounts. Meanwhile, LOANS represent the financial agreements on total borrowed credits. This explains why the results for LOANS are always different from ACCOUNTS and TRANSACTIONS.

Table 6 shows that only tertiary education is an important socio-demography factor. The effects appear at the 25th percentile, implying that provinces with a greater proportion of university-educated individuals exhibit increased LOANS activities across these specific percentiles. However, the positive effect of education is not observed at the 10th percentile, suggesting that at the lower end of the distribution, education may not have a statistically significant impact on LOANS.

Table 6 also shows that MALES is another important socio-demographic factor for LOANS. However, the coefficient is negative, implying support for the female population as the customers for LOANS. The findings can be interpreted that as the proportion of males in a province increases, there is a corresponding decrease in the level of P2P Fintech lending activities across the distribution.

One intriguing finding from Table 6 is the Internet access and poverty rate, where their effects on loans disappeared. The results of OLS regression show the two variables have positive effects on LOANS. However, the quantile regression results report that no significant effects of internet access and poverty rate on P2P lending were observed. This discrepancy between the two regression models suggests that the relationships between these variables and P2P lending might differ across different segments or percentiles of the lending distribution. The absence of significant effects of internet access and poverty rate in the quantile regression analysis suggests that the influence of these variables on P2P lending may vary at different points of the lending distribution. It is possible that the impact of internet access and poverty rate on P2P lending is more nuanced and dependent on other factors that come into play at specific lending percentiles.

Table 6: Quantile Regression with No of Fintech Loans as the dependent variable

	q10	q25	q50	q75	q90
Primary	0.09	0.09	0.10**	0.1	0.11
	(0.09)	(0.07)	(0.05)	(0.07)	(0.08)
Secondary	0.01	0.01	0.02	0.03	0.04
	(0.06)	(0.05)	(0.03)	(0.05)	(0.06)
Tertiary	0.05	0.05**	0.06***	0.07***	0.07**
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)
internet_lit	0.01	0.01	0.01	0.01	0.01
	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
Gini	-3.21	-0.88	3.78	9.1	11.29
	(11.63)	(9.20)	(6.39)	(8.83)	(11.05)
Poverty	0.24	0.2	0.14	0.07	0.04
	(0.28)	(0.22)	(0.15)	(0.21)	(0.27)
Male	-1.04***	-1.06***	-1.10***	-1.15***	-1.17***
	(0.3467)	(0.2745)	(0.1876)	(0.2636)	(0.3293)

Note: *, **, and *** denote significant level at 10%, 5%, and 1%, respectively. All stated figures are beta coefficients. Those inside parentheses are robust standard errors.

5. CONCLUSION

This study examines the impact of socio-demographic factors on P2P Fintech lending participation within the Indonesian context. This research extended the research to focus on P2P Fintech lending. The participation of P2P Fintech lending is measured in three ways: (1) total fintech accounts, (2) transactions, and (3) loan disbursements. Through robust panel regression analysis, we found that education, internet literacy, poverty, and Gender significantly influence P2P Fintech lending, particularly in terms of total accounts and transactions. Interestingly, the total fintech loans were primarily determined by education and Gender. In the context of the Diffusion of Innovation theory, our findings enhance our understanding of how new financial technologies spread. By showing

how education and gender impact P2P Fintech adoption, we argue that technology adoption is more about personal factors than social factors.

We place the novelty of the research into its contribution to the body of knowledge and its implication for policymakers. Regarding the contribution to the literature, this research reveals the importance of socio-demographic factors for P2P Fintech lending participation. Furthermore, this research enhances our understanding of the diffusion of innovation theory. The findings highlight the significant roles played by education, internet literacy, poverty, and Gender in shaping P2P Fintech lending participation. This study adds to the existing literature on the digital economy, specifically in the fintech sector, and provides a deeper understanding of the factors driving the adoption of innovative financial technology. Additionally, our findings reveal that socio-demographic factors might be crucial to increasing the accounts and transactions of P2P Fintech lending, but they are trivial for total loan disbursement of P2P Fintech lending.

The implications of this research are relevant to policymakers and industry players in the fintech sector. The identified socio-demographic factors, such as education and internet access, can guide policymakers in formulating strategies to promote financial inclusion and technology adoption. Efforts to improve access to education and digital literacy programs can help bridge the digital divide and facilitate greater participation in P2P Fintech lending. Moreover, recognizing the influence of poverty and Gender on adoption patterns can inform targeted interventions to ensure equal access and opportunities in the fintech ecosystem. Industry players can leverage these findings to refine their marketing strategies, develop tailored products and services, and enhance user experiences to attract and retain customers in the P2P Fintech lending space.

However, our findings still need to be validated due to their limitations. For instance, our study takes aggregate provincial-level data, which may mask variations within provinces and overlook individual-level dynamics. Future research could consider incorporating finer-grained data, such as individual-level surveys or transaction-level data to provide a better understanding of the factors influencing P2P Fintech lending adoption. Additionally, this study focused on socio-demographic factors, but other contextual variables, such as regulatory frameworks or cultural influences, could also play a role in shaping adoption patterns. Exploring these contextual factors and their interactions with socio-demographic factors would provide a more comprehensive understanding of the adoption process.

Furthermore, the study primarily examined the association between socio-demographic factors and adoption outcomes. To deepen our understanding, future research could investigate the underlying mechanisms through which these factors influence adoption, such as the mediating role of financial literacy or the moderating effects of trust and perceived risk. Lastly, this study examined the influence of socio-demographic factors on P2P Fintech lending adoption, but it did not delve into the potential implications for financial inclusion, risk management, or the broader socio-demographic impacts of fintech lending. Future research could explore the long-term effects of P2P Fintech lending adoption on borrowers' financial well-being, the stability of the financial system, and the overall socio-demographic development.

NOTES

1. All P2P Fintech lending data is retrieved from the Indonesian Financial Service Authority website: https://www.ojk.go.id/id/kanal/iknb/data-dan-statistik/fintech/Default.aspx
2. All socio-demography factors data is retrieved from the Indonesian Central Agency on Statistics website: https://www.bps.go.id/

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