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Sociodemography effect on digital financial inclusion in Indonesia: Evidence from the World Bank's Global Findex

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Abstract

Digital financial inclusion is an effective and efficient measure in accelerating financial inclusion, including in Indonesia. This study aims to analyze sociodemographic factors on the probability of digital payment usage. The data used comes from the World Bank Gallup World Poll Survey 2021 on the Global Financial Inclusion Index released by the World Bank, with 1,062 respondents. By applying logistic regression, this study explores the influence of sociodemographic factors such as gender, education, income, age, place of residence, and internet access on the probability of using digital payments. The results show an imbalance in gender, with women having a higher likelihood of using digital payments. Additionally, higher education and income levels increase the likelihood of using digital payments. However, there is an inconsistency where higher income actually reduces the likelihood of using digital payment services. On the other hand, there is a disparity in opportunities between individuals living in rural and urban areas and in accessibility to the internet. The U-shaped hypothesis regarding the relationship between age and digital payment usage is proven in this study. Overall, the results show that individuals with higher sociodemographic status are more likely to use financial technology.

Keywords: Digital Financial Inclusion, Individual Characteristic, U-shaped hypothesis

Abstrak

Inklusi keuangan digital merupakan langkah yang efektif dan efisien dalam percepatan pemerataan inkluasi keuangan tidak terkecuali di Indonesia. Penelitian ini bertujuan untuk menganalisis faktor sosiodemografi terhadap probabilitas penggunaan digital payment. Data yang digunakan berasal dari World Bank Gallup World Poll Survey 2021 mengenai Global Financial Inclusion Index yang dikeluarkan oleh Bank Dunia sebanyak 1062 responden. Dengan menerapkan regresi logistik, penelitian ini mengeksplorasi pengaruh sosiodemografi yaitu jenis kelamin, pendidikan, pendapatan, usia, wilayah tempat tinggal dan akses internet terhadap probabilitas penggunaan digital payment. Hasil penelitian menunjukan bahwa terdapat ketidakseimbangan gender, dimana perempuan lebih berpeluang dalam penggunaan digital payment. Selain itu, pendidikan dan pendapatan yang lebih tinggi meningkatkan peluang dalam penggunaan digital payment. Namun, ada inkonsisten pada pendapatan yang lebih tinggi justru menurunkan peluang penggunaan layanan digital payment. Disisi lain, ditemukan adanya ketimpangan peluang antara individu yang tinggal di wilayah pedesaan dan perkotaan serta aksesibilitas terhadap intenet. Hipotesis U-Shape hubungan antara usia dan penggunaan digital payment terbukti dalam penelitian ini. Secara keseluruhan hasil menunjukan bahwa individu dengan status sosiodemografi lebih tinggi berpeluang lebih besar untuk menggunakan teknologi keuangan.

Kata kunci: Inklusi Keuangan Digital, Karakteristik Individu, Hipotesis U-Shape

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1. Introduction

Digitalization is a new locomotive in driving inclusive economic growth, especially in developing countries like Indonesia. The huge potential of demographic bonus and internet penetration, provides an opportunity for Indonesia to increase economic growth through digital financial inclusion. Given current government policies promoting the adoption of digital or cashless payments, digital platforms have the potential to handle millions of transactions per day. This development is one aspect of Digital Financial Inclusion (DFI). Digital Financial Inclusion (DFI) includes initiatives that aim to ensure that digital financial services are accessible and cost-effective for every person and organization, regardless of their financial situation, size of institution, or geographic location (Lutfi et al., 2021). According to (Liu, Luan, Wu, Zhang, & Hsu, 2021) digital financial inclusion has a positive impact on economic growth in China with the support of internet infrastructure. The same thing was also stated by (Khera, Ng, Ogawa, & Sahay, 2021) who examined 52 developing countries.Ozturk & Ullah (2022) found a positive effect of digital financial inclusion on economic growth in 42 member countries of *the one belt road initiation* (OBRI, including Indonesia).

Digital finance is growing rapidly during the shock of the Covid-19 Pandemic. *Lockdowns* and social restrictions have forced businesses and individuals to rely on digital platforms to conduct various activities in the education, health and entertainment sectors (Wardani et al., 2023a). The shift from traditional cash-based systems to digital payment methods has had both positive and negative economic impacts. Digital payment transactions have become a cornerstone of the modern economy, changing the way individuals, businesses and governments interact financially. This motivates the financial industry to continue innovating digital financial services to keep the economy running. Limiting physical contact and conducting remote activities has increased digital payment transactions (Taghiyev et al., 2022).

Digital payments have been shown to positively affect economic growth, especially in regions where digital payment adoption is widespread. A study focusing on Indonesia during the COVID-19 pandemic found that digital payments had a significant positive influence on economic growth in several provinces, especially in Sumatra (Maharani, Romiza, Pasaribu, & Febriani, 2023). This suggests that the efficiency and convenience of digital transactions can stimulate economic activity, even in difficult times. One of the most significant benefits of digital payments is its ability to promote financial inclusion. According to Amit, (2024) by providing access to financial services for the unbanked population, digital payment systems can empower individuals and small businesses, thereby contributing to broader economic development. In this case individuals women and in rural areas can also be empowered. The use of *digital payments* in micro-enterprises helps in faster transaction processing and lower costs compared to traditional payment methods. These efficiencies can result in cost savings for businesses and consumers, which can then be reinvested into the economy (Amit, 2024).

The impact of digital payments is not limited to individual countries, digital payments also play an important role in shaping global economic trends. Digital payments play an important role in overcoming weak economic growth by supporting economic development, increasing consumer spending, and enabling economies to adapt to the rapidly changing global landscape. The expansion of cross-border e-commerce and the emergence of digital currencies, such as central bank digital currencies (CBDCs), are expected to further drive the transformation of the global economy (Liu et al., 2021) (Singh & lakra, 2025).

The utilization of digital payments has had a positive impact on the economy both at the macro and micro level. However, the level of use of digital financial services still shows significant disparities among certain social demographic groups. Several studies show that social demographic factors affect one aspect of digital financial inclusion, namely the use of digital *payments.* Social demographic factors such as age, gender, education and income affect the use of digital payments. Individuals who are younger, highly educated and have high incomes have greater involvement in the use of digital services (Nandru et al., 2021). Ghosh & Chaudhury (2022) found that individuals with higher education and higher income levels are more likely to use digital financial services than women. However, the role of women in economic empowerment is crucial. Therefore, literacy and accessibility to digital financial services are necessary for women. Women's access to digital financial services has increased their economic role post-pandemic (Mabrouk et al., 2023).

Geography and internet infrastructure are equally important factors in the equitable use of digital payments. Urban areas generally have better access to digital infrastructure, which facilitates digital financial services, while rural areas face unique challenges and opportunities that affect their digital payment behavior. In urban areas, digital financial infrastructure is more developed than in rural areas. This encourages urban individuals to use digital financial services more. They often have higher performance expectations due to better infrastructure and services (Yadav, Jain, Pathak, & Sharma, 2024). Meanwhile, based on the Global Financial Inclusion Index 2021, digital financial services and internet access in rural areas are still relatively low. Whereas with digital financial services have a positive impact on village development innovation, economic growth and village competitiveness (Purnamawati et al., 2023).

Based on the above description, further research is needed to understand the fundamental factors contributing to the digital financial service gap, particularly based on geographical differences between rural and urban areas, which, to the best of the researcher's knowledge, have rarely been studied, as well as to identify strategies to bridge this gap. To the best of my knowledge, there has been little previous research on this issue, particularly in Indonesia, using microdata from the World Bank Gallup World Poll Survey 2021 on the Global Financial Inclusion Index.

2. Research Method

This research uses micro data from the World Bank Gallup World Poll Survey 2021 regarding the Global Financial Inclusion Index issued by the World Bank as many as

1062 respondents in Indonesia. The variable used is a dummy variable. This study uses the digital payment variable as the dependent variable which is a dummy variable, worth 1 if using various types of digital payments and worth 0 if not. The independent variables consist of gender, age, income, education, region of residence (rural or urban) and internet access. The operational definition of each variable is presented in Table 1.

Table 1. Operational Definition of Variables

Variables	Description
Digital Payment	The dummy is 1 if the respondent used digital money, debit card, credit card or mobile phone to make payments, purchases, send and receive money during the past 1 year and 0 otherwise.
Gender	Dummy is 1 if the respondent is Female and 0 otherwise.
Age	Respondent's age in years
Age2	Age of respondent in years squared
Income-20% poorest	The dummy is 1 if the respondent belongs to the lowest income group and 0 otherwise.
Revenue-20% second	The dummy is 1 if the respondent belongs to the second lowest income group and 0 otherwise.
Revenue-20% middle	The dummy is 1 if the respondent belongs to the middle income group and 0 otherwise.
Revenue-20% fourth	The dummy is 1 if the respondent belongs to the second highest income group and 0 otherwise.
Income-20% richest	The dummy is 1 if the respondent belongs to the highest income group and 0 otherwise.
Education-primary	The dummy is 1 if the respondent completed primary education or less and 0 otherwise.
Education-secondary	The dummy is 1 if the respondent completed secondary education and some education above secondary and 0 otherwise.
Education-tertiary	The dummy is 1 if the respondent completed 4 years of tertiary education and received a bachelor's degree and 0 otherwise.
Regency	Dummy is 1 if the residence is in a rural area and 0 otherwise.
Internet	Dummy is 1 if you have internet access and 0 if you do not.

Source: Global Findex, 2021

The purpose of this research is to explore the influence of sociodemographic status on digital payment, for which logistic regression analysis will be used. In general, the purpose of the logit regression model is to determine the probability of an individual entering a qualitative response based on the value of a group of independent variables used in the study. The equation for the probability of an event occurring is as follows (Gujarati, 2013):

$$P_i = \frac{1}{1+e^{-Zi}} = \frac{e^Z}{1+e^Z}$$

Where $Zi = \beta_0 + \beta_{(1)} X_{i*}$

The value of $P_i$ranges from 0 to 1 and $P_i$is nonlinear to $Z_i$because $Z_i$has a range from -∞ to +∞. The equation for the probability of non-occurrence is as follows:

$$1 - P_i = \frac{1}{1+e^Z}$$

So from equations (3.1) and (3.2) a new equation will be obtained which is used to calculate the probability ratio of occurrence and non-occurrence of events. The equation can be written as follows:

$$\frac{Pi}{1+Pi} = \frac{1+e^{Zi}}{1+e^{-Zi}} = e^{Zi}$$

So $\frac{Pi}{1+Pi}$ is the odds ratio of an event occurring or not occurring. The logistic regression equation in this study is as follows:

$$L_i = \left(\frac{Pi}{1-Pi}\right) = \beta_0 + B_1 gender_i + \beta_2 age_{2i} + \beta_3 age^2{}_i + \beta_4 Income_i + \beta_5 educ_i + \beta_6 regency_i + \beta_7 internet_i + \varepsilon$$

3. Results and Discussion

3.1. Results

In this study, male, lowest income, primary education and urban are comparison variables. The income variable is classified into the 20% *poorest income quintile*, 20% *second, 20% middle, fourth 20%* and 20% *richest.* Meanwhile, education variables are classified into primary, secondary and tertiary education.

Table 2. Variable Descriptive Statistics

Variabel	Mean	Std. Dev	Min	Max
Dependent				
digitalpayment	0.391	0.488	0	1
Independent				
Wowen	0.567	0.496	0	1
men	0.433	0.496	0	1
age	38.391	14.447	15	85
age2	1682	1191	225	7225
primarysch	0.305	0.461	0	1
secondarysch	0.654	0.476	0	1
tertiarysch	0.040	0.197	0	1
poorest	0.170	0.376	0	1
second	0.177	0.382	0	1
middle	0.195	0.396	0	1
fourth	0.197	0.398	0	1
richest	0.261	0.439	0	1
Regency	1.637	0.481	0	1
Internet access	0.497	0.500	0	1

Based on the model feasibility test by looking at the *Hosmer and Lemeshow Goodness of Fit* value above, it shows that the H-L Statistics value is greater than the alpha level of 0.05. This means that the model is fit and the model is declared suitable for interpretation. The model estimation results also show a relatively small coefficient of determination (McFadden R-Squared). This can be interpreted that the impact of the cross-sectional data used has diverse data variations. Meanwhile, the Prob value (LR statistic) is smaller than the alpha level, which means that all independent variables

simultaneously affect the dependent variable. Table 3 presents the model estimation results.

Table 3. Logistic Regression Results

Variable	Koef	P Value	Odds Ratio
Age	0.064159	0.0197*	0.0182
Age2	-0.00068	0.0373*	0.0449
Wowen	0.282232	0.0742**	0.0589
20% Second	-0.12829	0.6401	0.6103
20% Middle	-0.25285	0.3727	0.3095
20% Fourth	-0.50279	0.0605**	0.0445
20% Richest	-0.22709	0.4592	0.3420
Secondary_Sch	0.241055	0.0034*	0.2183
Tertiary_Sch	1.389256	0.0135*	0.0014
Regency	0.366157	0.0000*	0.0182
Internet access	2.112788	0.0000*	0.0000
C	-3.69031	0.0000*	0.0000
McFadden R-Squared		0.187201	
Prob(LR statistic)		0.00000	
H-L Statistic		13.9898	
Prob. Chi-Sq(8)		0.1227	

*Note *Sig.5%, ** sig.10%*

3.2. Discussion

In Uddin's (2017) research, financial inclusion is influenced by the supply and demand sides. The supply side includes bank characteristics and products. While the demand side includes the level of literacy and age. In Table 2, the age variable shows a positive effect while the age squared variable has a negative and significant effect on the probability of using *digital payments.* This means that there is a parabolic pattern or nonlinear relationship. This means that at a younger age, the probability of using *digital payments* also increases. However, when it reaches the maximum age, increasing age will reduce the probability of using *digital payments*.

The results of the calculation, the maximum age of using *digital payment* is 47.2 years. In Zhou & Ye's (2023) research explains that the older the age the more financial inclusion increases. The more knowledge about various financial products and even start using them. However, the pattern goes the other way when individuals have reached the maximum limit of their productive age. Using *digital payment* is closely related to the flow of financial technology development. So the older the individual, the more difficult it will be to adapt in following the trend of financial technology which until now continues to develop. This can be proven from global findex data, the percentage of *digital payment* users is dominated by generation Y of 37.6% and Z 31.2%. While generation X is only 20% and baby boomers are 10.7%. Generation Z is the starting point for individuals to recognize and use *digital payments.* In generation Y, the positive relationship pattern begins to form until the maximum age point and in generation X the middle of the influence becomes negative. Although the older the age of individuals, the more they are targeted by digital finance initiatives, but their engagement with technology is still low due to technological concerns.

Women have a positive and significant coefficient on the digital financial inclusion indicator, which means they tend to play an active role in being included in the financial system. Women's role as financial controllers in the family encourages them to be more adaptive in using digital financial services. In research (Soekarno, et al (2020), explained that the banking industry needs to realize that women have a significant positive influence on consumer behavior. Implicitly, this confirms that consumptive behavior in women tends to be closer to digital financial services, especially *digital payments.* Inclusive digital finance signifies the empowerment of women in various business sectors. This has a positive impact on increasing investment in education, especially digital financial education, and increasing individual welfare in the long run (Cabeza et al., 2019).

The results show that there is no significant difference between the use of online transactions from the 20% poorest, 20% second, 20% middle and 20% richest income earners. However, it is interesting to discuss that the fourth 20% shows a significant negative effect. Individuals in the high income group tend to use digital payments more frequently than those in the low income group. However, those in the second highest income level may not be as accepting of digital payments, perhaps due to a sense of financial security that reduces the urgency for convenience (Veena & Epsheeba, 2023). Individuals in this income group may prioritize traditional payment methods due to concerns about security or lack of perceived need (Nurdin et al., 2023). This finding implies that digital financial inclusion measured by the use of digital payments has been equally used by all income levels of society.

In contrast, differences in education levels have a significant effect on digital financial inclusion. Individuals with a range of middle and higher education levels are more likely to use *digital payments* than individuals with basic education. Highly educated individuals have the ability to adapt and understand various financial products in the market so that they make the right decisions to access these products (Shihadeh, 2021). A study conducted by (Antonijević et al., 2023) covering 114 countries found a strong positive relationship between education and the use of digital payments, indicating that individuals with higher education levels are more likely to engage in digital transactions. They are more financially inclusive, utilizing online transactions more frequently than lower educated individuals (Wardani et al., 2023b).

While education plays an important role, other factors such as geography and internet access also influence digital financial inclusion. The results show that there are differences in the use of *digital payments* in rural and urban areas. This is also related to the finding that there are differences in internet access. Individuals in urban areas are more likely to have sufficient internet access than in rural areas. So the probability of using *digital payments* is greater. Individuals with higher education levels, aged 25-40 years are more likely to use digital payments, especially in urban areas with internet access.

High-income individuals are more likely to adopt digital payment methods, as they often have better access to technology and financial services (Petrikova & Kocisova,

2024). Studies show that internet access is a strong predictor of financial inclusion, leading to higher levels of bank account ownership and formal savings, which in turn drives the use of digital payments (Shair et al., 2024). Although in this case the use of *digital payments* does not always use cellular phones and digital money that rely on the internet network. It also includes credit cards and debit cards. This implies that the lack of internet access goes directly with the lack of availability of digital payment services. In research (Evans & Adeoye, 2016) emphasized the importance of network infrastructure in improving financial inclusion, especially in rural areas.

Based on Global Findex 2021 data, as many as 20.24% of individuals who live in rural areas and do not have internet access, and only 16.01% have internet access. What is equally interesting is that there are still individuals who do not have internet access even though they live in urban areas at 30.04%. This implies that inequality in internet access does not only occur between urban and rural areas, but beyond that. Even in urban areas there is still a gap in accessing the internet. This needs to be a concern for the government, because internet network infrastructure is an important determinant of digital financial inclusion which is the target of economic development.

4. Conclusion

This study found that sociodemographic characteristics have a significant influence on the use of digital payments as an indicator of digital financial inclusion in Indonesia. The age factor shows a non-linear relationship pattern where digital payment usage increases and then decreases. Women tend to be more active in using digital financial services than men. Education level has a significant effect, with middle and higher educated individuals more likely to use digital payments. The effect of income is inconsistent, but in the second highest income group there is a significant negative effect.

In addition, individuals who live in urban areas and have internet access have a higher propensity to use digital payments. This confirms that individuals with higher socioeconomic status have the potential to access digital financial services, especially in urban areas facilitated by adequate internet access. As an academic implication, most of the findings of this study support previous findings. The policy implication of this study is the importance of digital infrastructure and financial literacy in promoting financial inclusion more evenly. The limitation of this study is that it only uses financial inclusion data from the Global Findex in 2021 and on one aspect of digital financial inclusion.

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