FINANCIAL INCLUSION OF HOUSEHOLDS IN INDONESIA

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ABSTRACT

There is extensive attention on financial inclusion and its benefits, recently strategy to stimulate financial inclusion has focused on innovation and technology penetration. This paper analyzes the effect of financial inclusion on a household's income and the role of cellphone and internet access in household financial inclusion in Indonesia. We develop the financial deprivation of each household to calculate financial exclusion. The Indonesia Family Life Survey year 2014 data are utilized in this paper. Our methodology is Ordinary Least Square (OLS) to examine how the role of financial institutions affects a household's income. In the second model, we use Probit estimation to determine the likelihood of household financial deprivation due to cellphone and internet access. We also check the robustness of previous models using Propensity Score Matching (PSM) estimation. Our estimation results found that financial exclusion has a highly significant impact on a specific group of households. With middle-level income households, the financial exclusion would deprive income of almost 80 percent. This finding explains that middle welfare households benefited more from financial inclusion than households in the poorest and the wealthiest group. Another result found that cellphone and mobile banking significantly impact decreasing financial deprivation, respectively.

1. INTRODUCTION

Financial inclusion has a significant role in the welfare of households, regardless of their income level. Financial inclusion improves the household's lives (Dev, 2006), invests in the families' education, expands the family's business, manages risks and builds resilient financial shock (Bruhn & Love, 2014; Burgess et al., 2005); Dev, 2006; Dupas & Robinson, 2013). Financial inclusion has a principal role in developed and developing countries (Zhang and A. Posso, 2017). Previous studies stated that access to transaction and saving accounts and payment facilities increases savings, empowers women, and encourages investment and consumption (Ashraf et al., 2010; Dupas & Robinson, 2013; Riswanto et al., 2018); (2) access to credit positively affects consumption, as well as employment status, income, and mental health (Angelucci et al., 2013; Banerjee et al., 2015; Karlan et al., 2016); (3) while access to insurance encourages riskier agricultural practice, increases income and children's school days (Cole et al., 2013; Karlan et al., 2014).

There is extensive attention on financial inclusion and its benefits; however, very few empirical studies have investigated the remaining issue. Is financial inclusion higher household welfare as a microeconomic concept, especially at the household level? Many studies have different concepts and treat financial inclusion as a macroeconomic variable. Such as Chibba (2009) presented a qualitative review of a series of case studies from developing countries to conclude that the rising availability of financial institutions seems to be an essential conduit for inclusive development and poverty reduction. Sarma (2008) and Sarma and Pais (2008) use an index of financial inclusion for 49 countries to describe a broad relationship between financial inclusion and human development. In another study using their financial inclusion indicator in 37 developing countries, Park and Mercado Jr (2015), investigated the impact of financial inclusion on poverty and income inequality. The result stated that financial inclusion significantly reduces poverty and income inequality. Remain studies use microfinance as a proxy for financial inclusion. They studied the relationship between macroeconomic indicators and financial inclusion (Dev, 2006; Zhang, 2017; Zhang & Posso, 2017).

Similar to the previous studies, financial development is essentially an input variable because it refers to establishing institutions that facilitate transactions by extending credit (World Bank, 2015). On the other hand, financial inclusion is characterized by households and businesses using financial services (World Bank, 2015). Second, previous studies focus on the effect of financial

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development at a macroeconomic level. Macroeconomic studies help determine the overall effect of financial development or inclusion in a nation. However, they cannot shed light on how individuals or households experience the effects of inclusion within their communities.

Based on this background, this study attempts to analyze the role of financial inclusion as a microeconomic analysis, especially on household income in Indonesia. We focus only on Indonesia, where 64% of unbanked people use informal financial institutions (World Bank, 2014). The other reason is that the various types of financial inclusion in Indonesia have different purposes and targets in Figure 1. Indonesian National Survey on Financial Literacy and Inclusion (SNLKI) conducted by Indonesia Financial Service Authority found that literacy rate is related to monthly personal income. Samples with an income of more than IDR3,500,0000 have a higher financial literacy score. On the other hand, the lower-income samples have a lower financial literacy score. This finding is in line with the fact that cell phones and internet access could be a shortcut and help them access financial products and services.

Figure 1: Financial Literacy Rate in Percentage (%)
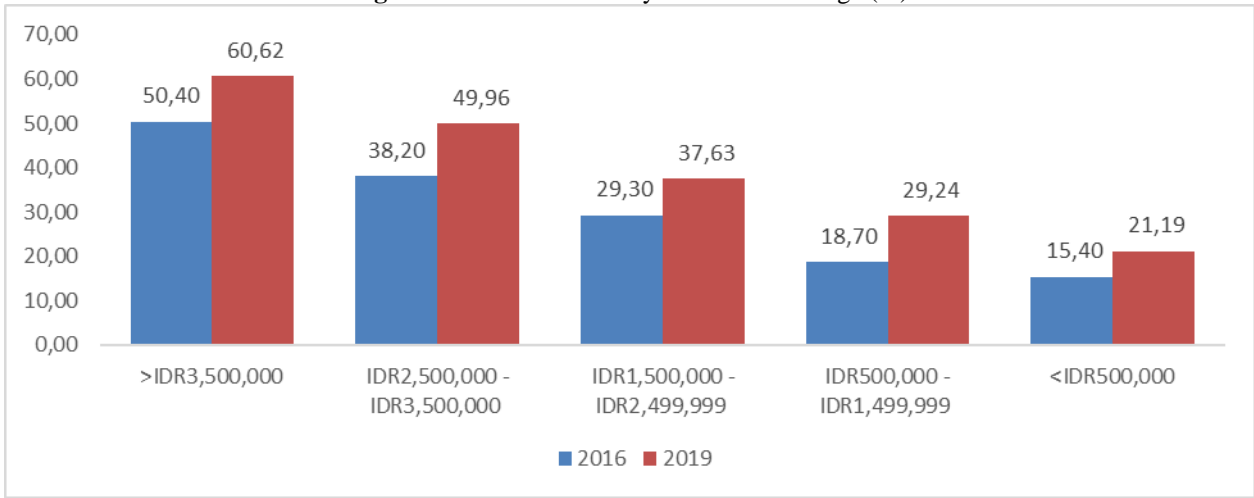
Source: Indonesia Financial Services Authority (2020), N= 12,773

Table 1 presents Global Financial Inclusion Index (FINDEX) data that explains the demography of Indonesian people using digital services. According to this data, Indonesian people increased their utility using digital services1 from 22.4 percent to 34.6 percent from 2014 to 2017. This index also explains that 60 percent richest-sample increase significantly compared to 40 percent poorest-sample. These numbers indicate that the growing number of the richest is much more penetrating in digital service than the poorest group sample. Interestingly, the female sample had a higher number in digital services utilization, which means that females were enabled by this way of service in financial products than the male group.

Table 1: Proportion of Adults uses Digital Services in 2014 and 2017

Sample Group	2014	2017
All Sample	22.4	34.6
By subgroups:		
In labor force (% age 15+)	25.1	38.5
Out of labor force (% age 15+)	17.6	27.9
Income; 40% percent poorest (% age 15+)	10.2	21.5
Income; 60% richest (% age 15+)	30.4	43.4
Male (% age 15+)	21.6	33.7
Female (% age 15+)	23.1	35.5
Rural (% age 15+)	15.7	33.4
Older adults (% age 25+)	21.1	34.2
Young adults (% age 15-24)	26.6	36.0

Source: Global Financial Inclusion database (2018), N= 100,000

This study uses financial deprivation as a financial exclusion in our analysis and uses a method adapted from Zhang & Posso (2017). We modified our financial deprivation into four categories based on data availability. We create financial deprivation score that consists of four dimensions; credit, saving, insurance, and transaction. The majority of the population does not have access to formal financial institutions (Asuming et al., 2019). This finding implies that financial deprivation is still a significant issue in lower-middle-income countries. To capture this issue, we use financial deprivation rather than financial inclusion. Besides, financial deprivation can help us comprehend why Indonesian people are still deprived of financial products and services.

This research has two purposes. First, we aim to investigate the impact of financial inclusion on household expenditure. Then, we explore the role of mobile phone by its functions: as communication and financial activities (mobile banking) to household's income. Moreover, we also analyze the impact of internet access on a household's income. Financial inclusion on this study is indicated as endogenous variable, then we check the robustness test using Propensity Score of Matching (PSM).

The rest of the paper proceeds as follows. Section II presents literature reviews. Part III offers our data and empirical method. Finally, section IV of this paper sets data, results, and the last section is concluding remarks. This paper employed the Indonesia Family Life Survey (IFLS) data in the last wave (2014). From our preferred specification, the result indicates that financial exclusion significantly impacts a particular group of households. With middle-level income households, the financial exclusion would deprive the household's income of almost 80 percent. This finding explains that middle-income households benefited more from financial inclusion than those in the poorest and wealthiest households. In robustness check uses PSM estimation we find that financial inclusion has significant effect on household welfare in excluded households in financial products and services.

2. LITERATURE REVIEW

Financial inclusion is increasingly recognized as an essential part of promoting growth and reducing poverty in several countries. This concept has been proven by several countries committed to Financial Inclusion Plans (Demirguc-Kunt et al., 2018a). Apart from the importance of financial inclusion in the world economy, this information is very limited to the poor and marginalized groups (Asuming et al., 2019; Beck et al., 2015). In several previous studies, Demirguc-Kunt et al. (2018) conducted a comprehensive analysis of financial inclusion from various countries. Access to finance is used in account ownership, savings, borrowing, and financial transactions. The results show that 50% of adults over 15 already have bank accounts at formal financial institutions. Furthermore, Demirgüç-Kunt et al. (2020) stated that increased access to financial inclusion was driven by the use of cell phones and the development of digital money in society.

Meanwhile, several studies show that in low-income countries, most of the population does not have access to formal financial institutions (Asuming et al., 2019). For instance, Triki dan Faye (2013) looked at financial inclusion behavior in Africa. They found that the development of mobile technology had a significant impact on financial inclusion. Ownership of a cell phone has led to a change from a person who did not have a bank account to having access to formal financial services. Therefore, cell phones and internet access play an important role in financial inclusion in accessing banking.

Financial inclusion determinants also focus on individual and household characteristics, such as age, education, and family welfare. Asuming et al. (2019) stated that age is essential for accessing and using financial services. It is indicated that young people tend to access more financial services than older people. Age can determine interactions with other factors, such as income, wealth, and education, explaining access to financial inclusion. Poor people, younger people and those from rural areas may have lower access financially (Allen et al., 2016). In the Indonesia context, previous researches are not sufficient to explain households' financial inclusion condition, for instance, the ability of cellphone and internet access for rural households, which have remote issues and often to use informal institutions than formal financial institutions. Despite being somewhat limited, the literature examining the link between financial inclusion and cellphone owning and internet access confirms this ambiguity. A study from (Lenka & Barik, 2018) explains that people living in rural areas have a negative impact on their financial inclusion because of their limited access to infrastructures. This finding indicates that cellphone and internet access could provide two sides impact. First, it could cut the transaction cost to reach near financial institutions. Second, it could have nothing impact on their financial inclusion because internet access and cellphone network are not available in remote areas, including rural areas, and Indonesia mostly has remote and small islands.

3. RESEARCH DESIGN

This study applies two methods that could answer this study's purposes. First, we examine OLS to investigate the impact on household welfare based on the ten-quintile household per capita expenditure. Second, we utilize Probit estimation to find the impact of having cellphone and internet access on the financial inclusion rate. Then, we examine Propensity Score Matching (PSM) to assure with another method that treatment group or deprived household effect of financial inclusion to their welfare.

4.1. *Indonesia Context*

Based on Global Financial Inclusion Index (2014), 64 percent of unbanked people use informal financial institutions. The reasons are various; no bank around, takes time and cost to the nearest branch, higher cost for a small transaction, low financial literacy, unmet products and the factor culture and habit. Meanwhile, from the supply side, banks did not prefer grass-root customers due

to; higher costs for setting up new branches in remote areas, complex processes, significant transactions and high formality for unbanked people.

On the other hand, Indonesia has an opportunity for increasing household financial inclusion. Mobile phone subscribers in Indonesia were more than 310 million in 2014 and 13 million poor households have cellphone (Bank Indonesia, 2014). According to World Bank (2018), females have a more considerable number using digital services, which means this product enables females to increase their utilization of financial products and services.

4.2. Data

This study uses data from the Indonesian Family Life Survey (IFLS) wave 5 in the survey period 2014. IFLS has been an ongoing longitudinal survey since 1993. IFLS provides rich set information on individuals, households, and communities. Demographic, social economy and characteristics of each level are included in IFLS data. IFLS represents 83 percent of Indonesia's population living in 13 provinces and 262 districts. This study focuses on the data on the financial inclusion of households concerned about the household head as our respondent for answering the questionnaire in the IFLS data set. We found 6 321 households as our sample in this study regarding various characteristics and information.

Table 2: Variables Descriptions

Variable	Definition
Dependent Variables	
Household's Income	Per capita expenditure in a household per month
Covariates	
Financial Inclusion	Dummy that takes the value of 1 if the household having 50 or more in deprivation score and 0 is otherwise
Age	Age of the respondent in years
Year of Schooling	Years of schooling of the respondent
Marital status	Dummy that takes 1 if respondent is married and 0 otherwise
Gender	Dummy that takes 1 if respondent is male and 0 otherwise
Internet access	Dummy that takes 1 if respondent access internet and 0 otherwise
Internet source	Dummy that takes 1 if internet source from mobile phone and 0 otherwise
Cellphone	Dummy that takes 1 if household having cellphone
Household size	The number of household members
Ln Asset	Logarithm total asset of household
Ownership of family business	Dummy that takes 1 if respondent is having family business and 0 otherwise
Business profit (ln)	Logarithm total business profit of household
Religion	Dummy that takes 1 if respondent is a Moslem and 0 otherwise
Community characteristics	
Distance of bank	Distance to nearest bank BRI (km)
Residence area	Dummy that takes the value of 1 if the respondent lives in urban area and 0 otherwise.

Source: Indonesia Family Life Survey (IFLS) 2014

4.3. Construction of Financial Inclusion Variable

Table 3 summarises the dimensions of financial inclusion. To explain financial inclusion, we use the opposite context to determine household deprivation in financial or financial exclusion. Consist of four dimensions, financial deprivation has been scored as financial exclusion. We developed these criteria based on a previous study (Zhang & Posso, 2017). We create financial deprivation score that consists of four dimensions; credit, saving, insurance, and transaction. The majority of the population in lower and middle-income countries have no access to formal financial institutions (Asuming et al., 2019). This finding implies that financial deprivation is still a significant issue in lower-middle income countries. To capture this issue, we use financial deprivation rather than financial inclusion. Besides, financial deprivation can help us comprehend why Indonesian people are still deprived of financial products and services.

Apply Zhang and A. Posso (2017), dimension of financial exclusion divided into four dimensions and proposed similar weight with our weight. Unlike Zhang and A. Posso (2017), this study does not provide checking account data due to limited data in IFLS. We use transactions to explain the deprivation if a household does not have a bank account in a formal financial institution. The transaction is one of four dimensions that Zhang and A. Posso (2017) use. We change this dimension into formal or informal institutions for borrowing and saving as households' transactions. If a household chooses a formal institution, the households have a checking account in a formal financial institution. While the households choose an informal institution for their borrowing and saving activities, the households do not have a checking account on a formal institution. This dimension also explains the awareness or trust of the households to use a formal financial institution.

The second dimension is saving for explaining household does not have saving/deposit/stock. We do not differentiate the kind of debt and equity due to limitations in IFLS data. Intuitively, households forego current consumption to increase future consumption to maximize inter-temporal utility. Macroeconomic studies traditionally incorporate savings into financial inclusion indicators with deposits per 1000 adults (Mialou et al., 2017). A microeconomic approach to measuring savings is similar. We can determine access to savings with variables that capture whether households have access to bank term deposits, stocks, funds, bonds and others. The next dimension is credit, macroeconomic studies have typically included measures such as the proportion of people who receive credit as a measure of this dimension (Sarma, 2008). A microeconomic counterpart can similarly be based on whether a household or individual has a loan or credit card.

Finally, households also use financial services for insurance to help build resilience against covariate and idiosyncratic shocks (Bodie et al., 2009). This need can be met through purchasing various kinds of insurance products, including life, health, and property insurance. By and large, macroeconomic studies usually do not include insurance controls. Our microeconomic approach can capture this information with whether households have access to insurance services.

Table 3: Dimensions, Indicators, Deprivation of Thresholds and Weight for *Fi*

Dimension (Weight)	Indicator	Deprived if…
Transaction (1/4)	**Formal or informal choice to borrowing and saving**	**Household does not have saving or borrowing in formal financial institution**
Saving (1/4)	**Saving/deposit/Stock**	**Household does not having saving/deposit/stock**
Credit (1/4)	**Loan**	**Household does not having loan**
Insurance (1/4)	**Private health insurance**	**Household does not having private health insurance**

Source: Zhang and A. Posso (2017) modified by authors.

Dimension has weight numbers for scoring. Each dimension scored 25 percent. The maximum deprivation score is 100 percent, and the minimum is 0 percent. Fifty percent becomes our cut-off, which is equivalent to half all dimensions. We categorized households as deprived in financial if they get 50 percent or more in total, vice versa. To simplify the method of the PSM model, we form Fi into a dummy variable. Label 1 if the household was deprived or financially excluded and label 0 if household well financial inclusion.

4.4. Empirical Models

3.4.1 Financial Inclusion Rate and Its Impact on Household Welfare

To answer the first aim of this study, we consider Zhang and A. Posso's (2017) dimension of financial exclusion and treat the result to understanding the impact of financial inclusion rate on household welfare using Ordinary Least Square (OLS) as a basic model. Suffer from endogeneity problem, model 1 also tested with Propensity Score Matching (PSM) based on Rosenbaum and Rubin (1983) in robustness check section (table 8). In using PSM method this study divides the samples into two; Treatment and Control groups. The treatment is a group of households with more than 50 percent deprivation score. The control group, on the other hand, is a group of households that have a deprivation score of less than 50 percent. Propensity Score Matching is applied to match the households with similar characteristics and criteria. We use deprivation scores, social-economic status, and community characteristics. This matching found 3245 households as the treatment group and the rest of the sample as the control group (3136 households).

Referenced Zhang and A. Posso (2017), we conduct the main equation below:

$$Y_{ij} = \beta_0 + \beta_1 F_{ij} + \beta_2 X_{ij} + \varepsilon_{ij} \tag{1}$$

Y_{ij} is dependent variables which income for household *i*. The model explains *Fi* (financial inclusion) using financial deprivation regarding four dimensions discussed in table 3. At the same time, *Xi* s a vector of control variables that have previously explained movement in household income. Control variables included household size (members), age, education, gender, marriage (married and others), religion (Islam, Christian, Buddhist, Khong Hu-Chu, Hindu), rural-urban, ownership of a family business, the distance to the nearest bank, participation in the local community. The variable *Fi* is measured depending on how the concept is used. This study uses two approaches for defining *financial deprivation* as financial exclusion. First, we use the World Bank's definition of financial inclusivity as access to valuable and affordable financial products and services that meet an individual's needs for transactions and payments, savings, credit, and insurance (World Bank, 2017). In the second concept, we use proxies for each component by finding microeconomic counterparts to measures used in a more extensive macroeconomic literature of financial inclusion.

Financial inclusion is hypothesized will leads to more income-earning opportunities. However, it remains plausible that an increase in income could allow households to gain access to financial services and become financially included. This study investigates the financial inclusion rate and its impact on Indonesian households' welfare.

One of the various concepts of financial inclusion is the capacity of an individual to gain access to financial services that allow an individual to purchase goods and services. This proxy is usually used in macroeconomic studies to define financial inclusion indicators. Use the size of the 'banked' population or the proportion of people with access to a transaction account (Park & Mercado Jr, 2015; et al., 2017; Sarma, 2008; Massara & Mialou, 2014; Park & Mercado Jr 2015; Ariyadi, 2021; Sarma, 2008). Meanwhile, a microeconomic approach is measured with variables that determine whether a household or individual has access to a checking account or simply for the transaction. It is a simple concept but has significance for understanding the ability of households to survive in poverty issue.

3.4.2 The Role of Having Cellphone and Internet Access on Household Financial Inclusion

The second purpose of this study is to find the opportunity of having cellphone to household financial inclusion rate. Using probit model, we conduct the equation of probit model as follow:

$$F_{ij} = \beta_0 + \beta_1 Cellphone_{ij} + \beta_2 Internet\ access_{ij} + \beta_3 Internet\ Sources_{ij} + \beta_4 X_{ij} + \varepsilon_{ij} \qquad (2)$$

$$P(Y = 1|X)_{ij} = G(\beta_0 + Cellphone_{ij} + \beta_2 Internet\ access_{ij} + \beta_3 Internet\ Sources_{ij} + \beta_4 X_{ij} + \varepsilon_{ij} \qquad (3)$$

To estimate dependent variables, F_{ij} s deprivation scores that convert into dummy variables using previous analysis (dummy one if household financial exclusion more than 50 percent; dummy 0 for household financial exclusion less than 50 percent). Model (3) will answer our purpose: cellphone and internet access could help households increase their financial inclusion rate. We controlled data from households characteristics and considered owning cellphone, internet access, and internet sources.. X_{ij} is a vector of covariate variables.

4. RESULT AND ANALYSIS

4.1. Descriptive Analysis

Table 4 reports summary statistics for 6,381 households in the survey, compared to Indonesia's population. We found that 83.71 percent of respondents were married based on the classification results. Most of the samples are living in an urban area. Compared to rural areas, the differentiation of urban and rural areas is not significant. Furthermore, we also regarded formal or informal institutions where households save and borrow money, with 52.29 percent of respondents reporting that they are placed in formal financial institutions.

Table 4: Descriptive Statistics

Variable	Observation	Mean	Std. dev
Financial institution	6,381	0.5085	0.4999
Formal or Informal instutition	6,381	0.5229	0.4995
Saving and loan community	6,381	0.0368	0.1883
Using Mobile Banking	6,381	0.6644	0.4722
Marital status	6,381	0.8371	0.3692
Age	6,381	46.061	13.074
Religion	6,381	0.8998	0.3002
Gender	6,381	0.8481	0.3589
Year of Schooling	6,381	7.5191	4.4279
Residence area (urban/rural)	6,381	0.5195	0.4995
Internet Access	6,381	0.1799	0.3841
Source of Internet Access	6,381	0.1418	0.3489
Household size	6,381	3.8227	1.6845
Total Asset (ln)	6,381	17.6869	2.0588
Participation in Community Meeting	6,381	0.1387	0.3456
Ownership of family business	6,381	0.4245	0.4943
Business profit (ln)	6,381	7.3369	8.0361

Source: Authors' calculations based on IFLS data (2014)

4.2. Financial Inclusion Rate and Its Impact on Household Per Capita Expenditure

According to the financial deprivation score, we categorized households into two groups, financially excluded and financially included. Table 5 shows how many samples are categorized as financially excluded below the financial deprivation threshold (Table 3). Forty-nine percent of households are excluded in financial products and services or below financial deprivation thresholds. It means that these households are deprived in two out of four dimensions.

Table 5: Financial Inclusion Rate Based on Financial Deprivation Treshold

Category	Frequency	Percent
Financial Excluded	3,136	49.15%
Financial Included	3,245	50.85%

Source: Authors' calculations based on IFLS data (2014)

The results in table 6 use the OLS regression to present an estimation of financial inclusion in household per capita expenditure. We use the robust standard error to control for potential heteroscedasticity in all estimations. Column (1) shows that financially excluded households have a lower income than financially included households. These results follow expectations consistent with the findings of previous macroeconomic studies (Bruhn & Love, 2014; Zhang & Posso, 2017).

This study also regarding Quantile Regression classified households by their total asset as welfare endowment. Column (2) - column (9) we keep in the household is based on their total asset's 10th to 90th quantiles. It aims to calculate the various point presentations of the overall conditions. We use total assets as a proxy for household wealth classification to avoid a conservation bias of using total income. The results show that financial exclusion has a more significant effect on the welfare of middle-level households. The 20th to 80th quintile of households has greater access to financial inclusion. However, financial inclusion can positively affect the amount of per capita household expenditure. This finding implies that the best treatment for policy in financial inclusion could be applied in middle-income households, regarding the most significant coefficient of financial inclusion impacts.

This study finds that financial exclusion significantly impacts a particular household group. Among middle-income level households, the financial exclusion would deprive household income of almost 80 percent. This finding explains that middle-income households benefit more from financial inclusion than those in the poorest and wealthiest households. The findings of this study impact the policymaker to be sensitive in certain groups of households. The most significant impact of financial exclusion with different behaviors will deprive middle-income households. For further research, we suggest that shock variable, especially natural disaster, is better included in this topic. It would explain a household's resilience to prevent income deprivation and poverty.

Table 6: Regression Analysis Financial Exclusion

Variable	Dependent variable: Log Per capita expenditure									
	OLS	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Fi	-0.0547***	-0.0679***	-0.0754***	-0.0768***	-0.0782***	-0.0780***	-0.0776***	-0.0765***	-0.0740***	-0.0687***
	(0.0137)	(0.0139)	(0.0139)	(0.0140)	(0.0140)	(0.0140)	(0.0140)	(0.0140)	(0.0139)	(0.0138)
Age	0.0041***	0.0055***	0.0054***	0.0057***	0.0058***	0.0058***	0.0059***	0.0058***	0.0054***	0.0039***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Year of Education	0.0248***	0.0283***	0.0288***	0.0289***	0.0289***	0.0289***	0.0292***	0.0294***	0.0281***	0.0237***
	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)	(0.0020)
Saving and Loan	-0.0678**	-0.0639**	-0.0655**	-0.0661**	-0.0647**	-0.0654**	-0.0653**	-0.0632**	-0.0666**	-0.0730**
	(0.0307)	(0.0313)	(0.0316)	(0.0316)	(0.0317)	(0.0317)	(0.0317)	(0.0316)	(0.0317)	(0.0315)
Marital Status	-0.1146**	-0.1055***	-0.0879***	-0.0891***	-0.0908***	-0.0887***	-0.0903***	-0.0910***	-0.0920***	-0.0924***
	(0.0213)	(0.0215)	(0.0215)	(0.0216)	(0.0216)	(0.0216)	(0.0216)	(0.0216)	(0.0215)	(0.0212)
Religion	-0.1533***	-0.1617***	-0.1588***	-0.1587***	-0.1562***	-0.1535***	-0.1579***	-0.1588***	-0.1593***	-0.1248***
	(0.0215)	(0.0221)	(0.0223)	(0.0224)	(0.0225)	(0.0225)	(0.0224)	(0.0224)	(0.0225)	(0.0220)
HH size	-0.1141***	-0.1048***	-0.1010***	-0.0991***	-0.0985***	-0.0981***	-0.0984***	-0.0999***	-0.1010***	-0.1044***
	(0.0061)	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0062)	(0.0061)
HH member <15 years	-0.0591***	-0.0668***	-0.0713***	-0.0730***	-0.0732***	-0.0736***	-0.0733***	-0.0719***	-0.0714***	-0.0693***
	(0.0092)	(0.0094)	(0.0095)	(0.0095)	(0.0095)	(0.0095)	(0.0095)	(0.0095)	(0.0095)	(0.0093)
HH member > 65 years	-0.1242***	-0.1327***	-0.1369***	-0.1392***	-0.1400***	-0.1389***	-0.1393***	-0.1387***	-0.1350***	-0.1350***
	(0.0147)	(0.0151)	(0.0151)	(0.0152)	(0.0152)	(0.0152)	(0.0152)	(0.0152)	(0.0152)	(0.0147)
Employee	0.0027**	0.0029***	0.0029**	0.0029**	0.0029**	0.0029**	0.0029**	0.0029**	0.0030***	0.0024**
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
Business	0.1245**	0.1394***	0.1409***	0.1424***	0.1428***	0.1444***	0.1444***	0.1422***	0.1401***	0.1319***
	(0.0138)	(0.0140)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0141)	(0.0139)
Agriculture	-0.0085	-0.0172**	-0.0235***	-0.0261***	-0.0275***	-0.0277***	-0.0271***	-0.0254***	-0.0238***	0.0181**
	(0.0078)	(0.0080)	(0.0080)	(0.0080)	(0.0080)	(0.0080)	(0.0080)	(0.0080)	(0.0080)	(0.0078)
Internet Acceess	0.1861***	0.1978***	0.2081***	0.2057***	0.2039***	0.2036***	0.2063***	0.2035***	0.2033***	0.1797***
	(0.0200)	(0.0204)	(0.0204)	(0.0205)	(0.0205)	(0.0205)	(0.0205)	(0.0206)	(0.0204)	(0.0200)
Cellphone	0.1764***	0.1881***	0.1878***	0.1877***	0.1866***	0.1897***	0.1896***	0.1878***	0.1831***	0.1776***
	(0.0166)	(0.0167)	(0.0168)	(0.0168)	(0.0169)	(0.0169)	(0.0169)	(0.0169)	(0.0168)	(0.0166)
Urban	0.1169***	0.1250***	0.1210***	0.1190***	0.1191***	0.1197***	0.1214***	0.1214***	0.1193***	0.1008***
	(0.0153)	(0.0156)	(0.0156)	(0.0157)	(0.0157)	(0.0157)	(0.0157)	(0.0157)	(0.0156)	(0.0153)
Asset	0.0626***	-0.2195***	-0.1572***	-0.0949***	-0.0805***	-0.0696***	0.0126	0.0885***	0.1754***	0.3753***
	(0.0049)	(0.0225)	(0.0202)	(0.0219)	(0.0203)	(0.0202)	(0.0200)	(0.0199)	(0.0211)	(0.0226)
Cons	12.7251***	13.7448***	13.7286***	13.7129***	13.7073***	13.6963***	13.6865	13.6820***	13.7084***	13.7727***
	(0.0969)	(0.0563)	(0.0563)	(0.0562)	(0.0562)	(0.0563)	(0.0564)	(0.0562)	(0.0562)	(0.0551)
Num	6,381	6,381	6,381	6,381	6,381	6,381	6,381	6,381	6,381	6,381
Prob > F	0	0	0	0	0	0	0	0	0	0
R-squared	0.342	0.318	0.3132	0.3095	0.3089	0.3085	0.3074	0.3092	0.3145	0.3368

Source: Authors' calculations based on IFLS data (2014)

Notes: Q_10 to Q_90 represent quantiles from 10 to 90. This table shows the results of from OLS using a binary variable Fi for financial inclusion. Fi is 1 if the household deprivation score is higher than 50 percent and 0 other ***, **, * represent significance at the 1 percent, 5 percent, 10 percent level, respectively

4.3. The Role of Having Cellphone and Internet Access to Financial Inclusion

This section provides the role of having a cellphone to financial inclusion as second purpose of this study. Using probit estimation, we found that having a cellphone and mobile banking provides households with financial includes. Meanwhile, the source of internet access (internet from a cellphone or not) does not significantly affect financial inclusion on the household level. Table 7 sums up our result of the role of having cellphone and internet access to household financial inclusion. This finding is in line with the Global Financial Index database (Demirguc-Kunt et al., 2018b) that most adults use mobile phones to access financial services, such as transferring and receiving money. Internet access and internet source are requirements to households for accessing mobile banking. The likelihood of households using mobile banking is significantly higher than households that do not use mobile banking.

The unexpected result is also found in this section. The gender of the household head also affects the financial inclusion of a household. If the household head is a woman, the likelihood of this household is categorized as financial included. This finding parallels Fletschner & Mesbah (2011) that women more understand formal financial institutions when they control more family assets. This result provides to fill the opportunity that mobile phone subscribers in Indonesia are more than 310 million in 2014, and 13 million poor households have a cellphone (Bank Indonesia, 2014). This strategy is in line with the success story from Kenya. M-Pesa (Kenyan Money Transfer System) improves individual outcomes by promoting banking, increasing transfers and decreasing cash transfer using Western Union (Mbiti & Weil, 2011).

Table 7: Probit Estimation on The Impact of Having Cellphone and Internet Access to Household Financial Inclusion in Indonesia

FI	Coefficient.	Robust Std. Err.	dy/dx (Marginal Effects)
Having cellphone	-0.2673***	0.0414	0.0163
Internet access	-0.3282***	0.0911	0.0354
Internet sources	0.1326	0.0970	0.0384
Using mobile banking	-0.2089*	0.1197	0.0470
Year of education	-0.0422***	0.0046	0.0018
Residence area	-0.2274***	0.0334	0.0132
Marital status	-0.2682***	0.0607	0.0236
Gender	0.1699***	0.0608	0.0241
Age	-0.0042***	0.0014	0.0005
Religion	0.0595	0.0542	0.0216
Household size	-0.0351***	0.0102	0.0040
_cons	1.0356***	0.1176	

Source: Authors' calculations based on IFLS data (2014)
*Notes: This table shows the results of from Probit estimation using a binary variable Fi for financial inclusion. Fi is 1 if the household deprivation score is higher than 50 percent and 0 other ***, **, * represent significance at the 1 percent, 5 percent, 10 percent level, respectively.*

4.4. Robustness Test

The previous discussion discussed the endogeneity problem in selecting potential models. Following previous research conducted (Churchill & Marisetty, 2020; Zhang & Posso, 2017), we conducted a Propensity Score Matching (PSM) test with multiple matching algorithms. This

analysis aims to prove that the treatment group could improve their welfare using financial inclusion.

The results showed that the PSM assumption was fulfilled; the ATT (average treatment effect on the treated) score was -0.030 at the 1 percent significance level. This figure is close to the actual OLS coefficient (-0.055). Furthermore, using radius as the matching radius algorithm shows ATT (-0.093). It is indicated that household welfare is about 9% lower in the financially excluded category than households in the included category. It states that household expenditure and the level of welfare affect household characteristics in accessing financial inclusion.

The results indicate that financial inclusion has a positively and robust influence on per capita expenditure; this effect can be found in all households with different welfare levels. Furthermore, as household consumption expenditure increases, this impact appears to be weaker. It is indicated that households with the highest and lowest incomes do not benefit from financial inclusion more than people at other levels. In this condition, financial inclusion has not thoroughly helped reduce the problem of household inequality.

Table 8: Results from PSM with Different Matching Method

Mathing Method	ATT (average treatment effect on the treated)	
	Observed Coefficient	Standard Error
Nearest Neighbour	-0.030***	0.023
Radius	-0.093***	0.017
Stratified	-0.044***	0.017
Kernel	-0.052***	0.016
Local Linear Regression	-0.083***	0.015
Baseline Result		
OLS	-0.055***	0.013

Source: *Authors' calculations based on IFLS data (2014) ***represent significant at the 1 percent level. Bootstrapped standard errors in parentheses.*

4.5. Discussion

Taking the previous problem, how financial inclusion can improve welfare, including meeting necessary household consumption. Empirically our findings can show that financial inclusion has a positive effect on per capita expenditure, and this effect can be found at all different levels of welfare. Because the amount of consumption per capita is used as a determinant of household welfare, this shows that financial inclusion can improve household welfare and reduce poverty. This finding is in line with Chibba (2009) and Zhang & Posso (2017) state that financial inclusion effectively reduces poverty. Besides, by involving the decisive role of the microfinance industry (Tran et al., 2018; Astuti et al., 2022) in reducing poverty. Low and middle-income households benefit more from financial inclusion than those in the poorest and wealthiest positions. Poor and vulnerable households lack a strategy for overcoming shocks, while the wealthiest households are rarely affected by income or expenditure shocks in Indonesia. Besides, households at the lowest level have less access to finance, and they assume that accessing finance will make them more miserable. However, if this interpretation is correct, overall financial inclusion can increase resilience to financial shocks and potentially increase the equity of business ownership. This finding is also proved by PSM analysis result that treatment group has a more significant impact on boosting their household welfare by financial inclusion.

Another variable that we emphasize is the role of cellphone and internet access to household financial inclusion. The result proves that cellphone and internet access decrease the probability of household financial deprivation regardless of household income. This finding implies that cellphone ownership and internet access provide information and access to financial institutions. These variables make households efficiently use financial products and services. For instance, open a bank account using mobile banking and get information on financial products through the internet as a primary activity in using financial products.

Furthermore, we assume that the mechanisms behind financial inclusion in improving household welfare can be carried out through several stages. This finding is in line with (Dupas & Robinson, 2013; Zhang & Posso, 2017) findings that households can increase access to transactions, ownership of a bank account, having savings, access to payment facilities, empowering women, and encouraging investment and consumption activities as an advance in using financial products and services.

5. CONCLUSION

This study has two purposes; first, it investigates the financial inclusion rate and its impact on Indonesian households' welfare. The second purpose of this study is to determine the role of having cellphone and internet access on their financial inclusion. This study finds that financial exclusion significantly impacts a particular household group. Among middle-income level households, the financial exclusion would deprive household income of almost 80 percent. This finding explains that middle-income households benefit more from financial inclusion than those in the poorest and wealthiest households. The findings of this study impact the policymaker to be sensitive in certain groups of households. The most significant impact of financial exclusion with different behaviours will deprive middle-income households. For further research, we suggest that shock variable, especially natural disaster, is better included in this topic. It would explain a household's resilience to prevent income deprivation and poverty.

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