ECONOMICS
& Sociology

DOES FINANCIAL INCLUSION ALLEVIATE HOUSEHOLD POVERTY? EMPIRICAL EVIDENCE FROM INDONESIA

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ABSTRACT. This study's contribution to literature is presenting empirical evidence on the impact of financial inclusion, meaning elimination of barriers to accessing financial services, on poverty at the household level in developing countries, using Indonesia as a case study. This is a significant problem for developing countries such as Indonesia, which faces high poverty, even though it has achieved rapid financial development. Using the Binary Logistic (Logit) model and data from approximately 300,000 households from the 2017 Indonesian National Social and Economic Survey (Susenas), this research reveals that financial inclusion decreases households' probability of absolute poverty. Furthermore, financial inclusion can compensate for a lack of assets, a limited number of non-agriculture occupational opportunities in rural areas, and low education levels of household heads. In addition, financial inclusion has the potential to reduce incentives for poor, low-skilled rural people to migrate to urban areas in search of non-agricultural employment opportunities. Policy recommendations based on the results found are twofold. First, for people who are vulnerable to poverty, financial inclusion should be enhanced, especially for poor women-headed farming households in rural areas. Second, for policy-makers concerned with urbanization of low-skilled poor migrants, enhancing financial inclusion in rural areas is needed to help reduce urbanization pressures.

Introduction

Many transitional and developing nations are undergoing financial development. Ttransition economies of Central and Eastern Europe, as well as the of former Soviet Union have made significant progress in development of their financial sectors from communist systems since the 1990s (Cojocaru, Falaris, Hoffman, & Miller, 2016). Meanwhile, financial sectors of Latin America and the Caribbean have become more developed, complex and diversified since the 1990s (Didier & Schmukler, 2013), whereas most African countries liberalized their financial sectors between the 1980s and late 1990s (Otchere, Senbet, & Simbanegavi, 2017). And since the 1980s and especially during the 1990s, developing economies in Asia have made significant strides in financial development, making their financial sectors the most developed ones among developing countries (Didier & Schmukler, 2014). Similarly to many other developing countries in Asia, Indonesia has achieved significant financial development since the 1980s (Grenville, 2004).

The main objective of economic development is poverty reduction. Many scholars have underlined the fact that poverty is certainly a major issue in developing countries, but policies to promote economic growth do not always result in the improvement of lives for the poor (Todaro & Smith, 2012). Furthermore, notwithstanding the progress made, poverty reduction remains to be one of the most important items on the agenda for development as specified in the Sustainable Development Goals (SDGs) (United Nations, 2016). Meanwhile, megatrends such as the capacity to tap financing for development may alter the ability of achieving the SDGs (Dugarova & Gülasan, 2017); therefore, alternative channels that can reduce poverty should be considered.

There is a growing body of literature examining the link between financial development and poverty reduction. Jalilian and Kirkpatrick (2002) studied the impact of financial development on poverty in developing countries. Furthermore, Jalilian and Kirkpatrick (2005) provided empirical evidence on the causal relationship between financial development and poverty reduction in a panel of developing countries. Odhiambo (2009) looked into the causal relationship between financial development and poverty reduction in Kenya, while Uddin et al. (2014) analyzed the relationship between financial development and poverty reduction in Bangladesh. Boukhatem (2016) conducted a cross-country study of low and middle-income countries to examine the impact of financial development on poverty reduction. Whereas Majid et al. (2017) studied the relationship between financial development, economic growth and poverty reduction in Indonesia.

Although Indonesia has achieved substantial financial development, it still faces significant poverty. According to the data from the Central Statistical Agency of Indonesia (Badan Pusat Statistik) as shown in Graph 1, Indonesia has achieved a remarkable decline in absolute poverty. In 1970, around 60 percent of the Indonesians lived under absolute poverty. This number decreased dramatically to around 15 percent in 1990, which was far below the proportion of the world population living under absolute poverty at the time (35 percent). One of the main goals of the recently expired Millennium Development Goals (MDGs) was halving extreme poverty. In 1990, the global proportion of extreme poverty was around 35 percent. This number fell markedly to 10.7 percent in 2013 (World Bank Group, 2016). Although interrupted by the Asian financial crisis which erupted 1997, extreme poverty in Indonesia also fell from its 1990 figure. However, unlike prior to 1997, the proportion of those living under extreme poverty in Indonesia (which in 2013 was 11.47 percent) was above the global average of 10.7 percent. And according to (Yusuf and Sumner, 2017), poverty reduction in Indonesia slowed after the 2000s, along with an increase in inequality.
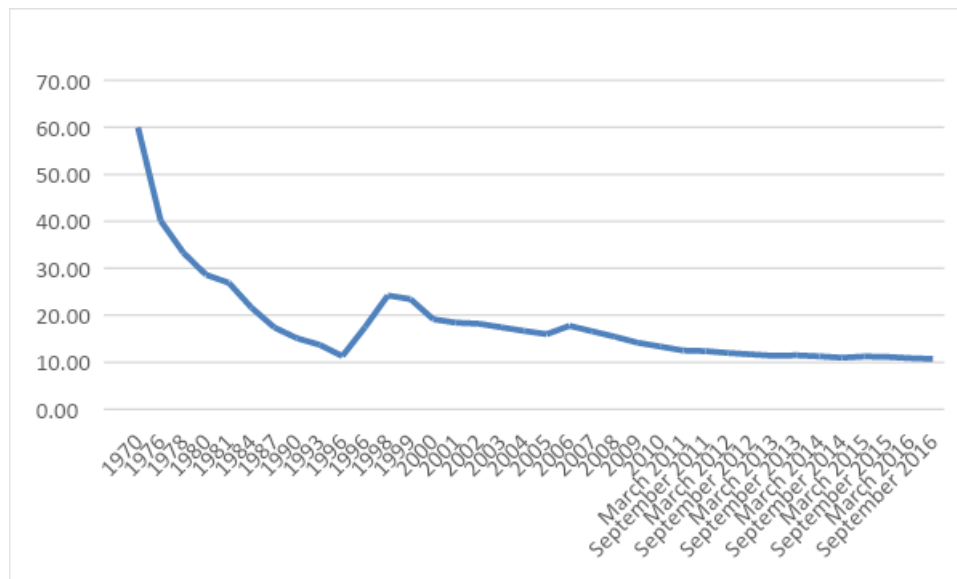
Graph 1. Percentage of the Indonesians living below the national poverty line

Source: The Central Statistical Agency of Indonesia (Badan Pusat Statistik)

Furthermore, the poverty rate in Indonesia has also been relatively high compared to neighbouring developing countries in the Southeast Asia region. According to data from the Asian Development Bank, extreme poverty rates in Malaysia, Vietnam, Thailand and Indonesia in 2016 were 0.4 percent, 7 percent, 8.6 percent and 10.6 percent respectively, while according to data from the World Bank, the real GDP per capita in Malaysia, Vietnam, Thailand and Indonesia in 2016 were approximately USD 9,502, USD 2,185, USD 5,907 and USD 3,570 respectively.

Given that Indonesia has attained considerable financial development, but poverty levels still remain significant, this implies that there could be other channels through which financial development may impact poverty reduction that needs to be explored further. Such a channel might be financial inclusion. According to Bank Indonesia (2014), financial inclusion is defined as eliminating barriers of access to financial services. Indeed Chibba (2009) argued that financial inclusion presents additional and supplementary solutions to fight poverty, while Kiendrebeogo and Minea (2016) have claimed that access to financial services unequivocally reduces poverty.

Some studies have associated financial inclusion with poverty reduction, but literature is still lacking, with mixed results, and empirical findings are still scarce. Beck and Demirgüç-Kunt (2008) conducted a critical review of the literature related to the nexus of financial inclusion and poverty reduction, but this paper admitted that empirical evidence at the household level for this topic is still lacking. Using aggregate data, Park and Mercado (2015) conducted a panel study on financial inclusion and poverty in 37 developing countries in Asia. Similarly, Neaime and Gaysset (2018) used aggregate data to analyze the effect of financial inclusion on poverty and income inequality in eight countries in the Middle East and North Africa. Furthermore Mader (2018) made a critical review of the literature and, because the current state of the literature lacks convincing empirical evidence, argued against the view of financial inclusion as an instrument to alleviate poverty.

The contribution of this study is to provide empirical evidence on the issue of whether financial inclusion affects poverty. But unlike previous studies, the current analysis focuses on the household level. This approach is motivated by the limitations of previous studies on the nexus of financial inclusion and poverty presented above, which have yielded

inconclusive results. The limitations of the previous studies stem from the fact that many of them employed aggregate data in their analysis. It should be noted that financial inclusion is concerned with individual firms and households (Allen, Demirguc-Kunt, Klapper, & Martinez Peria, 2016). Therefore a more fruitful method of supplying convincing empirical evidence about whether financial inclusion indeed affects poverty is to instead conduct the analysis at the household level. To the best of the authors' knowledge, there are currently no studies that have comprehensively analyzed the effect of financial inclusion on absolute poverty using nationwide household-level data in developing countries, especially in Indonesia. The current study attempts to fill this gap in the literature.

The rest of this study is structured in the following sequence. Section 1 presents a review of the literature. Section 2 provides the empirical framework used in the study, while Section 3 discusses the research findings and their implications and Section 4 provides a discussion. Finally, the last section concludes the paper and gives some policy recommendations.

1. Literature review

An important part of policy making with the goal of eradicating poverty is an analysis of the factors that influence poverty. There is a growing body of literature studying the socio-economic factors that can affect household poverty. Mukherjee and Benson (2003) found that the level of education, especially for women, affects the poverty of households in Malawi, and households engaged in non-farming occupation have a lower probability of being poor. Similarly, Geda et al. (2005) concluded that the lack of or low level of education of heads of households is associated with a greater probability of being poor in Kenya. This paper also found that female-headed households are more likely to be poor. Furthermore the larger the number of household members, the greater the likelihood that the household is poor. And being employed in the agriculture sector increases the likelihood of poverty. Fagernas and Wallace (2007) discovered that in Sierra Leone, people living in rural areas are more likely to be poor. In addition, this paper found that working in the agriculture sector is an indicator of a higher probability of poverty, while more educated heads of households are associated with a lower probability of poverty. Adjasi and Osei (2007) found that in Ghana, a household is less likely to be poor if the head of the household is educated, and if the household is located in an urban area. Also, households whose head works in an agricultural field is more likely to be found poor. De Silva (2008) found that a low level of education level of the heads of households increased the likelihood of being poor in Sri Lanka. The same study also found that a greater household size, a female head of household, and a household located in a rural area were all associated with household poverty. Achia, Wangombe and Khadioli (2010) concluded that in Kenya, the higher the level of education of the head of the household, the lower the probability that a household was poor. Furthermore this paper found that households in rural areas are more likely to be poor. In addition, household size increases the probability of being poor. Finally, Dartanto and Nurkholis (2013) found that in Indonesia, education, household size, access to electricity, shocks to health, sector of occupation and assets owned all had an effect on household poverty.

There is a relatively large and growing body of literature that examines the link between financial development and poverty reduction across countries. Jalilian and Kirkpatrick (2002) found a link between financial development and poverty reduction in developing countries. Furthermore Jalilian and Kirkpatrick (2005) discovered that in developing countries, the causal relationship runs indirectly, i.e. from financial development to economic growth, to poverty reduction. The same paper also found that the impact of financial development on poverty reduction is more pronounced in low-income countries.

Similarly, Beck, Demirgüç-Kunt and Levine (2007) found that the development of the financial sector is related to the alleviation of poverty. Boukhatem (2016) concluded that financial development directly influences poverty reduction in low and middle-income countries. In addition to cross country studies, studies have analyzed the relationship between financial development and poverty in specific countries. Odhiambo (2009) found a one directional causal relationship from financial development to poverty reduction in Kenya. Uddin et al. (2014) found that in Bangladesh there is a non-linear long-run relationship between financial development and poverty reduction. Majid et al. (2017) found an equilibrium long-run relationship between financial development, economic growth and poverty in Indonesia.

Some studies have also found a relationship between financial development and poverty reduction, but in these cases, the link is not unequivocal. Perez-Moreno (2011) found a one-directional causality between the development of the financial sector and poverty reduction in developing countries, but only for the period of 1970s-1980s. This paper warned that the links between financial sector development and poverty reduction are influenced by specific historical, economic, political and social factors, thus cannot be taken as general conclusions. While Dhrifi (2015) found that financial development does not have a positive impact on poverty for low and middle income countries. The same study found that financial development is only beneficial for poverty reduction in high-income countries, where it reduces income inequalities. Donou-Adonsou and Sylwester (2016) found that bank development helps reduces the poverty headcount ratio and the poverty gap, while microfinance does not appear to have an influence on poverty reduction in the aggregate level. Kiendrebeogo and Minea (2016) discovered that financial development in the CFA Franc Zone is associated with a decrease in of the percentage of the poor. However, unstable financial development may reduce the virtue of financial development on poverty. In addition, this paper notes that better access to savings unequivocally reduces poverty. Park and Shin (2017) concluded that, up to a point, the development of the financial sector has contributed to a decrease in income inequality. However as the development of the financial sector has continued, it contributed to increased income inequality. This paper also found that increasing the inclusiveness of financial services has a positive effect on decreasing income inequality.

The mixed findings from analysis of the nexus between financial development and poverty, as explained above, imply that there could be other channels through which financial development may reduce poverty that needs to be explored further. One such possible channel is financial inclusion. Bank Indonesia (2014) defines financial inclusion as eliminating barriers of access to financial services. The World Bank through the Global Financial Inclusion Index, has formulated indicators of financial inclusion. The indicators are the proportion of the adult population (aged 15 years and above) that own an account in a formal financial institution, the proportion of the adult population that saves and borrows from a formal financial institution, and the proportion of the adult population which saves and borrows from an informal financial institution (Demirgüç-Kunt & Klapper, 2012).

However studies analyzing the relationship between financial inclusion and poverty are still relatively sparse, and there is a lack of empirical evidence at the household level. Therefore, results are still not conclusive. Beck and Demirgüç-Kunt (2008) found that improving financial inclusiveness plays a vital role in enhancing economic growth and decreasing poverty. However, the same paper admitted that the empirical evidence of this result at the household level is still lacking. Park and Mercado (2015), using aggregated data, conducted a panel study on financial inclusion, which consists of eliminating barriers to access to financial services, and poverty in developing countries in Asia. The study found that financial inclusion significantly reduces poverty. However, Neaime and Gaysset (2018), who also used aggregated data, found that financial inclusion decreases income inequality but does

not have a significant effect on poverty in the Middle East and North Africa. Furthermore Mader (2018) made a critical review of the literature and argued against the conclusion that financial inclusion could be an instrument to alleviate poverty. This paper pointed out that current empirical evidence showing that financial inclusion indeed affects poverty reduction is lacking and not convincing.

The aim of the current work is to provide convincing empirical evidence on whether or not financial inclusion alleviates poverty. But unlike previous studies, the current study focuses on data on the household level with a nationwide scope.

2. Data and Methodological approach

This study employs Indonesian household survey data taken from The National Social and Economic Survey (Susenas) 2017 conducted by the Central Bureau of Statistics of Indonesia (Badan Pusat Statistik). Susenas is a large-scale nation-wide cross sectional representative survey capturing the conditions of the social economy in all regions within Indonesia (Pratomo, 2018). Susenas data consists of approximately 300,000 households spread out across all 34 provinces and 514 cities and regencies in both rural and urban areas within Indonesia (Badan Pusat Statistik, 2017).

This study applies the Binary Logistic (Logit) model. The Logit model was developed to estimate the probability of a binary response based on one or more regressors (Máté, Sarihasan, Popp, & Oláh, 2018). In a binary logit model, the dependent variable is binary, meaning the dependent variable has the value of "1" if it has certain characteristics or has the value "0" if it does not. The logit model has the virtues of being able to overcome many assumption restrictions of linear models, such as that the binary dependent variable is not required to be distributed normally, as well as homoscedasticity of the errors. Furthermore, a linear relationship between dependent variables and the explanatory variables are not required (Gavurova, Huculova, Kubak, & Cepel, 2017). The logit model is estimated using the maximum likelihood estimation method. In addition, the logit model is useful in understanding the relative effect of households characteristics on poverty status of the household (Dartanto & Nurkholis, 2013). This model is useful for exploring the determinants of poverty based on different characteristics of households. Indeed, the Logit model has been applied in various studies analyzing determinants of poverty (see for examples Thompson and McDowell (1994), Coulombe and McKay (1996), Deutsch and Silber (2006), Mok, Gan, and Sanyal (2007), de Silva (2008), Achia et al. (2010), Imai, Gaiha, and Kang (2010), Sekhampu (2013) and Dartanto and Nurkholis (2013). In the current study, special attention is paid to whether financial inclusion affects the probability of a household being in severe poverty. Based on the definition from the Central Bureau of Statistics of Indonesia (Badan Pusat Statistik), a household is defined as is in absolute poverty if its monthly household income is below the poverty line. This model would also provide information on what sort of intervention could enable households to escape from extreme poverty.

The study uses twelve variables in its analysis. These variables were selected based on the literature, which has explored factors influencing poverty as presented in the previous section. The first variable of this study, which constitutes the dependent variable in the logit model, is household economic status (ST), which is a dichotomous variable defined as follows.

$$ST = \begin{cases} 1: \text{household is in absolute poverty} \\ 0: \text{otherwise} \end{cases} \qquad (1)$$

Following the method used by The Central Bureau of Statistics of Indonesia, a household is defined as in absolute poverty based on their monthly per capita household expenditure, which is differentiated between those living in urban areas with those in rural areas. The second variable considered in this study is the ownership of an account in a formal financial institution (ACC). This variable is also a binary dummy variable, which has a value 1 (one) if at least one household member has a bank account and 0 (zero) if not. The third variable in this analysis is business credit originating from a formal financial institution (FRM). This variable is also a binary dummy variable, whose value is 1 if the respective household has business loans originating from a formal financial institution and 0 if otherwise. The fourth variable is business loans originating from the non-formal financial institution (NFRM). This variable is again a binary dummy variable, which is 1 if the particular household has a business loan originating from a non-formal financial institution and 0 if otherwise. The fifth variable in the analysis is the size of the household, which is measured in the number of household members (SIZ). The sixth variable is the level of educational attainment of the head of the household (EDU), represented by the length of the study measured in years of formal schooling. The seventh variable of the analysis is the sector in which the head of the household works (JOB). This is a binary dummy variable which has a value of 1 if the head of the household works in an agricultural sector and a value of 0 if not. Another variable is residential area (CLA), which is a dummy variable with a value of 1 if the household is in an urban area and value of 0 if the household is in a rural area. The ninth variable examined in this study is gender (GEN). This is a binary dummy variable which has a value of 1 if the head of the household is male and 0 if female. The tenth variable is access to electricity for the household (ELCT). This is also a binary dummy variable, with a value of 1 if the household uses electricity for lighting 0 if not. The next variable employed in this study is whether or not a household has incurred any health shocks (SICK). This is also a binary dummy variable, which has a value of 1 if a household member suffers health problems and a value of 0 if otherwise. Finally, the last variable is household assets (ASSET). Following Dartanto and Nurkholis (2013), this variable is measured by the physical size of a household, measured in square meters.

As a note, among the variables mentioned above, three are concerned with financial inclusion; ownership of an account in a formal financial institution (ACC), access to credit from a formal financial institution (FRM) and access to credit from an informal financial institution (NFRM). Although this might not be the most representative list for financial inclusion measures, this is in line with Demirgüç-Kunt and Klapper (2012).

The Logit Model employed for this analysis can be written as the following equation.

$$LN\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 ACC_i + \beta_2 FRM_i + \beta_3 NFRM_i + \beta_4 SIZ_i + \beta_5 EDU_i + \beta_6 JOB_i + \beta_7 CLA_i$$
$$+ \beta_8 GEN_i + \beta_9 ELCT_i + \beta_{10} SICK_i + \beta_{11} ASSET_i + \varepsilon_i \tag{2}$$

P_i is assumed to be a Bernoulli random variable defined as the probability that the variable *ST* takes the value of *1* conditional on *Z*, which can be written succinctly in the following equation

$$P_i = E\left(ST = 1|Z_i\right) = \frac{1}{1+e^{-Z_i}} \tag{3}$$

The random variable Z follows a logistical cumulative distribution function. For the analysis at hand, the random variable Z can be written as the following equation.

$$Z_i = \beta_0 + \beta_1 ACC_i + \beta_2 FRM_i + \beta_3 NFRM_i + \beta_4 SIZ_i + \beta_5 EDU_i + \beta_6 JOB_i + \beta_7 CLA_i$$
$$+ \beta_8 GEN_i + \beta_9 ELCT_i + \beta_{10} SICK_i + \beta_{11} ASSET \qquad (4)$$

Whereas $1 - P_i$ is the probability that the variable *ST* take s the value of zero, while the expression $\frac{P_i}{1-P_i}$ is the odds ratio that a particular household falls into the category of a severely poor household (*ST=1*). In addition, the marginal change in probabilities is defined as the random variable ε_i which is assumed to follow a normal distribution with mean zero and variance $\frac{1}{N_i P_i (1-P_i)}$, and N_i is the number of households (see Gujarati and Porter (2009)). As a note, Equation 3 and Equation 4 will be used to compute the predicted probability of a household being severely poor based on the estimation results. The predicted probability is then used to compute the odds ratio of a household being severely poor.

3. Conducting research and results

Results of estimation show that financial inclusion reduces absolute poverty. Table 1 presents the estimation results of the binary logistical (Logit) model. Focusing on the three last rows of Table 1, the value of the McFadden Pseudo R^2 is relatively small, which is due to a large number of observations in the sample. In addition, the Omnibus-test and the Hosmer-Lemeshow test (HL-test) results show that the explained variances of the data are significantly greater than the unexplained variance (Máté et al., 2018). Furthermore, according to Gujarati and Porter (2009), goodness fit measures such as the McFadden Pseudo R^2 are of secondary importance in binary logit models. What matters is the expected signs and the statistical significance of the estimated coefficients. From the signs of the estimation results in Table 1, it is shown that a higher education level of the head of households (EDU), living in urban areas (CLA), being male (GEN), and have access to electricity (ELCT) and more assets (ASSET) tends to be negatively related with the likelihood of a household being in absolute poverty . Meanwhile, larger household size (SIZ), working in an agricultural sector (JOB), and suffering health shocks (SICK) tend to be positively related to the probability that a household is severely poor. Interestingly for the three variables relating to financial inclusion, (ownership variables (ACC), access to credit in formal financial institutions (FRM), and access to credit in non-formal financial institutions (NFRM), are negatively related with the likelihood that a households is in absolute poverty. All these results are significant, with a 1% level of significance, except for health shocks (SICK) which is significant with a 2.5% level of significance.

To interpret and gain further insight into the Logit analysis results, the predicted probability and odds ratio was computed and reported for households, differentiated by their various social-economic characteristics. The predicted probability was computed by employing Equation 3 and Equation 4, as written in the previous section. The predicted probability was further used to compute the odds ratio for a household being in absolute poverty.

The computation results are presented in Table 2.

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Table 1. Logit Model Estimation Results

Variable	Coefficient	S.E	Wald	p-value
SIZ	0.397121	0.0036	12141	0.000
EDU	-0.070437	0.0015	2093	0.000
JOB	0.279018	0.0146	363	0.000
CLA	-0.480255	0.0165	847	0.000
GEN	-0.322272	0.0188	294	0.000
ELCT	-0.41045	0.0230	319	0.000
SICK	0.035466	0.0139	6.54	0.011
ASSET	-0.007734	0.0002	1564	0.000
ACC	-1.02184	0.0165	3818	0.000
FRM	-0.192362	0.0216	79.14	0.000
NFRM	-0.188616	0.0249	57.32	0.000
constant	-1.806688	0.0313	3326	0.000
Total Observations				297,276
McFadden R-squared				0.1626
HL-test				388***
Omnibus test				32,501***

Source: authors' estimates.
Note: ***: significance at 1%.

Table 2 consists of six segments corresponding to six household characteristics. The first segment in Table 2 shows the predicted probability and odds ratio of being in absolute poverty for households with the following characteristics: the number of members of the household is 6, the head of the household has no educational attainment, the household is in a rural area, the head of the household's occupation is farming, the household has no access to electricity and consists of very few assets (measured as the area of the house itself with an area of 16 m^2). In segment 1 of Table 2 it is shown that in households with such low levels of social-economic characteristics, the odds of a female-headed household being in absolute poverty are high (2.08), with a predicted probability of approximately 68 percent.

Furthermore, a household's likelihood of being in absolute poverty is also affected by the gender of the head of the household. This is consistent with the findings of de Silva (2008). The first segment of Table 2 also shows that the odds and predicted probability for a female-headed household being in absolute poverty (2.08 and 68 percent, respectively) are larger than those for male-headed households (with odds ratio and probability of 1.5 and 60 percent, respectively).

Educational attainment of the head of a household reduces the chance of the household being in absolute poverty. From Segment 1 of Table 2 it is shown that, as the level of educational attainment of the head of the household rises from zero to 12 years, the odds of a women-headed household with such characteristics being in absolute poverty fall from 2.08 to 0.89. Similarly for a male-headed household, the odds of being in absolute poverty fall from 1.5 to become 0.65, with increased educational attainment.

Financial inclusion has an important impact on the chance that a household is in absolute poverty, and to some extent can compensate for a lack of formal schooling of the head of poor households. Financial inclusion is characterized by the households owning an account in a formal financial institution (ACC = 1), or having access to credit from a formal or non-formal financial institution (FRM =1 and NFRM = 1, respectively). Interestingly, Segment 1 of Table 2 shows that for female-headed household without any level of educational attainment, the odds of being in absolute poverty fall sharply from 2.08 to 0.51 with financial inclusion. More interestingly, this odds ratio value is smaller than for households with a female head of household that with 12 years of formal schooling, but which are financially excluded (0.89). Similarly, the odds of being in absolute poverty for male-

headed households with the characteristics mentioned above but no formal educational attainment, fall sharply with financial inclusion from 1.5 to 0.37. This value is almost half that of a household with a male head who attained 12 years of formal education, but which is financially excluded (0.65). This result shows that, at least to some extent, financial exclusion can compensate for a lack of formal schooling of the head of households.

Access to electricity affects the probability of households being in absolute poverty. To test for the robustness of the results of the impact of financial inclusion on poverty, the characteristics of households were modified further with findings from the poverty determinant literature. Dartanto and Nurkholis (2013) found that electricity is an important determinant of poverty. Following the finding from this paper, we modified the characteristics of the households to incorporate the availability of electricity (ELCT =1). Segment 2 of Table 2 shows that the odds of being in absolute poverty for a female-headed household, in which the household head has no formal education, that has access to electricity (1.38) are lower than for female-headed households with similar characteristics, but without electricity (2.08). A similar pattern is shown for male-headed households.

Even with access to electricity, financial inclusion still has an important impact on poverty. Similar to cases without access to electricity, Segment 2 of Table 2 also shows that the odds of households being in absolute poverty fall as the head of household attains more formal education. From Segment 2 of Table 2 it is shown that for rural female-headed households, the odds of being in absolute poverty fall from 1.38 to 0.59, while for rural male-headed households, the odds of being in absolute poverty fall from 0.99 to 0.42 as the level of formal education attainment rises. Interestingly, for female-headed households with electricity but without any level of educational attainment, the odds of being in absolute poverty fall sharply to 0.33 with financial inclusion. These odds are smaller than those of households with a female head of the household with 12 years of formal schooling, in which the household has access to electricity but is financially excluded (0.59). More intriguingly, the odds for households with such characteristics but without electricity, with financial inclusion (0.51) are also lower. Similarly, the odds of being in absolute poverty for male-headed households with the characteristics above plus access to electricity, but with no formal education, falls sharply with financial inclusion (0.24). This magnitude is almost half that of the odds of a household with with electricity with a male head with 12 years of formal education, but is financially excluded (0.42). More interestingly the odds for households with such characteristics without access to electricity, but with financial inclusion (0.37), are also lower. These results show that, with respect to poverty, financial inclusion can compensate for limited access to electricity for the poor households.

A household's chance of being in absolute poverty is also affected by the availability of non-agricultural occupational opportunities in rural areas. As a further robustness check of the results, consider the third segment of Table 2, which illustrates households with characteristics similar to those in the second segment of the table, but in which rural households engage in non-agricultural activities. Consistent with results found by Mukherjee and Benson (2003), Geda et al. (2005), Fagernas and Wallace (2007), Adjasi and Osei (2007) and Dartanto and Nurkholis (2013), the current analysis shows that engaging in non-agricultural activities results in a decrease of the odds of a household being in absolute poverty.

Table 2. Predicted Probability and Odds Ratio

	probability and odds ratio	Female-headed household				Male-headed household			
		EDU (years)			financial inclusion	EDU (years)			financial inclusion
		0	5	12		0	5	12	
segment 1	**Rural, Agricultural Household with 6 Members, no Electricity and area of house 16 m2**								
	probability	68%	59%	47%	34%	60%	55%	39%	27%
	odds ratio	2.08	1.46	0.89	0.51	1.5	1.05	0.65	0.37
segment 2	**Rural, Agricultural Household with 6 Members, with Electricity and area of house 16 m2**								
	probability	58%	49%	37%	25%	50%	41%	30%	20%
	odds ratio	1.38	0.96	0.59	0.33	0.99	0.7	0.42	0.24
segment 3	**Rural, Non-agriculture Household with 6 Members, with Electricity and area of house 16 m2**								
	probability	51%	42%	31%	20%	43%	35%	25%	16%
	odds ratio	1.04	0.73	0.45	0.25	0.75	0.53	0.32	0.18
segment 4	**Urban, Non-agriculture Household with 6 Members, with Electricity and area of house 16 m2.**								
	probability	39%	31%	22%	14%	32%	25%	17%	10%
	odds ratio	0.64	0.45	0.27	0.15	0.46	0.32	0.2	0.11
segment 5	**Rural, Agriculture Household with 6 Members, with Electricity and area of house 36 m2.**								
	probability	54%	45%	34%	23%	46%	38%	27%	17%
	odds ratio	1.18	0.83	0.51	0.29	0.85	0.6	0.36	0.21
segment 6	**Rural, Agriculture Household with 6 Members, with Electricity and area of house 77 m2.**								
	probability	46%	38%	27%	18%	38%	31%	21%	13%
	odds ratio	0.86	0.6	0.37	0.21	0.62	0.44	0.27	0.15

Source: author's calculations

This can be seen in Segment 3 of Table 2, where the odds of a rural female-headed household, with access to electricity, whose head has no formal education but has a non-agricultural occupation, being in absolute poverty (1.04) are lower than for rural female-headed households with access to electricity whose head has no formal education and an agricultural occupation (1.38). Similarly, the odds of being in absolute poverty for a rural male-headed household with access to electricity, whose head has no formal education but has a non-agricultural occupation (0.75) are lower than for rural male-headed households with access to electricity, whose head has no formal education and an agricultural occupation (0.99).

Financial inclusion also has an important impact on poverty when taking non-agricultural occupations into consideration, and to some extent can compensate for limited availability of non-agricultural occupational opportunities for the poor in rural areas. Like the two previously presented cases, Segment 3 of Table 2 shows that as educational attainment of the head of the household increases, the odds ratio of households being in absolute poverty falls. This is true for both genders of the head of household, with female-headed households having a larger odds ratio of being in absolute poverty than male-headed households. Interestingly, even if the head of a household does not have any education attainment,

financial inclusion results in a significant drop of the odds of the household being in absolute poverty. Segment 3 of Table 2 shows that the odds ratio for rural female-headed household being in absolute poverty falls from 1.04 to 0.25, while for male-headed households, the odds ratio falls from 0.75 to 0.18 with financial inclusion. Another interesting point to note is that financial inclusion can compensate for the non-availability of non-agricultural occupation opportunities. Comparing Segment 3 with Segment 2 of Table 2 shows that the odds of being in absolute poverty for female-headed households with access to electricity, no formal education, and an agricultural occupation but with financial inclusion (0.33) are lower than the odds for a female-headed rural household whose head has 12 years of formal schooling and a non-farming occupation but is financially excluded (0.45). Likewise, the odds of being in absolute poverty for a rural male-headed household whose head has no formal schooling, has an agricultural occupation occupation, but has financial inclusion (0.24) are still lower than the odds for rural male-headed households with 12 years of formal education, access to electricity, and non-agricultural occupations, but that are financially excluded (0.32). This result shows that financial inclusion can reduce the risk of absolute poverty for rural households with agricultural occupations. In addition this result implies that financial inclusion can compensate for the limited availability of non-agricultural occupations in rural areas.

Place of residence (rural or urban) affects the chance of households being in absolute poverty. As further robustness check of the results, we considered the case of households with characteristics similar to the case shown in Segment 3 of Table 2, but adding the characteristic that the households live in urban areas. Scholars found that living in urban areas versus living in rural areas is an important determinant of poverty in developing countries (see for examples Geda et al. (2005), Adjasi and Osei (2007), de Silva (2008), Achia, Wangombe and Khadioli (2010). Indeed as shown by comparing the results in Segment 3 with Segment 4 of Table 2, for female-headed households with the head having no formal education, the odds of being in absolute poverty are much lower if such households are in urban areas (0.64) than if those are in rural areas (1.04). A similar pattern is shown for male-headed households.

Furthermore financial inclusion also has an important impact on poverty when taking into account living in urban areas, and it has the potential to reduce the incentive of urbanization for low skilled rural poor households. Similarly to the results from the previous three segments, Segment 4 of Table 2 shows that as educational attainment of a household's head increases, the odds ratio of the household being in absolute poverty falls. This is true when taking the gender of the head of household into consideration, with a female-headed households having a larger odds ratio than male-headed households. Intriguingly, even if the head of the household does not have any educational attainment, financial inclusion results in a significant drop in the odds of a household being in absolute poverty. This is shown in Segment 4 of Table 2 where the odds ratio for an urban female-headed households fall from 0.64 to 0.15, while for an urban male-headed household, the odds ratio falls from 0.46 to 0.11. Enigmatically, comparing Segment 3 with Segment 4 of Table 2, the odds of being in absolute poverty for rural female-headed households with access to electricity, whose head has no formal education and a non-agricultural occupation, but has financial inclusion (0.25) are lower, than the odds for an urban female-headed household whose head has 12 years of formal schooling but is financially excluded (0.27). Likewise, for a rural male-headed household with access to electricity, whose head has no formal education and engage in non-agricultural occupation, but has financial inclusion (0.18), the odds of absolute poverty are lower than for an urban male-headed households with 12 years of formal education and a non-agricultural occupation but is financially excluded (0.2). This results show that financial inclusion can potentially compensate for disadvantages in terms of the risk of poverty for those living in rural areas as compared to living in urban areas. Thus to some extent financial

inclusion has the potential to help to reduce the incentives for urbanization for low-skilled poor rural households.

Ownership of assets reduces the risk of households being in absolute poverty. Consider the case of households with characteristics similar to those in Segment 2 of Table 2 as presented above, but adding the assets that the households own. Dartanto and Nurkholis (2013) found that ownership of more assets results in a lower chance of households being in absolute poverty. For the purpose of this analysis, the area of the dwelling of the household was increased from 16 square meters to 36 square meters. Indeed, as found in the literature, an increase in assets decreases the odds of households being severely poor. This can be seen by comparing the results from Segment 2 with Segment 5 of Table 2. The odds of being in absolute poverty for rural female-headed households with a head having no education but more assets (1.18) are lower than households with fewer assets (1.38). As a further robustness check of this result, we increased the size of the household to be 77 square meters (which corresponds to the average size of all households included in the survey). Similar with the cases in Segment 5 of Table 2, segment 6 of table 2 shows that the odds of being in absolute poverty for rural female-headed households with the head having no education (0.86) are even lower than in the two previous cases. Similar patterns is seen for male-headed households.

Furthermore financial inclusion can compensate to some extent for a lack of assets. In addition, as in the previous four cases, Segment 5 of Table 2 shows that as education attainment of the household head increases, the odds ratio of a household being in absolute poverty falls. This is true when taking the gender of the head of household into consideration, with female-headed households having greater odds of being in absolute poverty than male-headed households. As in the other four cases presented above, the odd of a household being in absolute poverty decrease with financial inclusion. Segment 5 of Table 2 shows that the odds of being poor are lower for rural female-headed households whose head has no formal education but has financial inclusion (0.29), than female-headed households whose head has 12 years of formal schooling, but are financially excluded (0.51). Interestingly, comparing Segment 2 with Segment 5 of Table 2 shows that the odds of being in absolute poverty for rural female-headed households whose head has no formal schooling with fewer assets (16 m^2 house) but with financial inclusion (0.33) are lower, than a female-headed rural households with more assets (36 m^2 house) and 12 years of formal schooling but that is financially excluded (0.51). Likewise, the odds for rural male-headed households with few assets (16 m^2 house) and no formal education but with financial inclusion (0.24) are lower than for rural male-headed households whose head has 12 years of formal schooling, with dwelling of 36 square meters (more assets) but that are financially excluded (0.36).

Finally, even when the asset of the household are increased to 77 square meters, financial inclusion produces a lower probability of being in absolute poverty. Comparing Segment 2 with Segment 6 of Table 2 shows that the odds of being in absolute poverty for rural female-headed households whose head has 12 years of formal schooling with more asset (77 m^2 house) than in Segment 5 of Table 2 but there are financially excluded (0.37) are still higher than for rural female-headed households with very few assets (16 m^2 house) but with financial inclusion (0.33). Similarly, for rural male-headed households with a head with 12 years of schooling, with dwellings of 77 square meters, of dwelling place but that are financially excluded, the odds of being in absolute poverty (0.27) are still higher than the odds for households with few assets (16 m^2 house) whose head have no formal education but with financial inclusion (0.24). The results from the two paragraphs above show that, at least to some extent, financial inclusion can compensate for a lack of assets of poor households.

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4. Discussions

The main purpose of this analysis is to provide empirical evidence of the impact of financial inclusion on poverty at the household-level in developing countries. This problem is significant for developing countries, such as Indonesia which face high poverty but have achieved rapid financial development.

The results show that gender of the household head affects the probability of a household being in absolute poverty. Similarly, educational attainment of the household head reduces the chance of the household being in absolute poverty. In addition, the availability of non-agricultural occupational opportunities affect the chance of a household being poor. Furthermore, the place of residence (rural or urban) affects the probability of households being in absolute poverty, while ownership of assets reduces the risk of households being in absolute poverty. These results are consistent with the findings in the literature.

More importantly, based on our results, we found that financial inclusion reduces poverty. More specifically, financial inclusion can to some extent compensate for a lack of formal schooling of the head of a household. Furthermore, it can compensate for a limited availability of non-agricultural occupational opportunities for in rural areas. Financial inclusion can potentially compensate for disadvantages in terms of risk of poverty from living in rural areas compared to living in urban areas. This may reduce the incentive of urbanization for low-skilled poor rural residents. Moreover, financial inclusion can also, to some extent, compensate for a household's lack of assets. Even without access to electricity, it was found that financial inclusion still has an important impact on a household's poverty. The reason for these findings is that with financial inclusion, the poor may have access to credit and can pursue other supplementary non-farm productive opportunities in their area. Furthermore, with financial inclusion, the poor have access to risk management products which can meet their needs. Without an inclusive financial system, the poor have to rely solely on their personal earnings. This would in turn, contribute to persistent poverty, income inequality, and lower growth (Demirgüç-Kunt & Klapper, 2012).

Moreover, the findings of the study revealed that financial inclusion has the potential to reduce the risk of poverty no matter the gender of the household head. In particular the results show that increasing financial inclusion decreases the risk of poverty for women-headed households in various social-economic conditions. The reason for this finding is that financial inclusion can enhance female empowerment (Allen et al., 2016).

Considering the evidence from the study, as well as taking poverty vulnerability into account, a policy recommendation can be put forward: in short, financial inclusion should be enhanced. In particular, financial inclusion should target poor households, especially poor women-headed farming households living in rural areas. In addition, for policy-makers concerned with the urbanization of low-skilled poor migrants, the expansion of financial inclusion in rural areas has the potential to help reduce urbanization pressures, because it has the potential to help decrease incentives for poor and low-skilled rural inhabitants to migrate to urban areas in search of non-agricultural employment opportunities. Furthermore, based on the results of the analysis, we also suggest that policy makers in developing countries consider financial inclusion as an important development strategy to combat poverty. And, with this in mind, they should formulate policies and regulations which encourage and facilitate financial institutions in expanding their services to the poor in rural areas, who are currently excluded from financial services.

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5. Conclusion

This study has provided a contribution to the literature by presenting empirical evidence of the impact of financial inclusion on absolute poverty at the household level in a developing country, using Indonesia as a case study. This problem is of significance for developing countries like Indonesia, which faces a significant rate of absolute poverty, even though it has achieved rapid development of its financial sector. By employing a binary logistical regression and primary data of 300,000 recently surveyed households conducted by The Central Statistical Agency of Indonesia (BPS), this paper found that social and economic characteristics affect the chance of households being in absolute poverty. This result is in line with the findings from existing literature. More importantly, this study found that financial inclusion significantly decreases households' probability of being in absolute poverty. In addition, it found that financial inclusion to some extent can compensate for a lack of formal schooling of the head of a household. This study also found that even with limited access to electricity, financial inclusion still can have an important impact on poverty. Furthermore, the finding indicates that financial inclusion can, to some extent, compensate for the limited availability of non-agricultural opportunities for rural households. Moreover, the results found that financial inclusion has the potential to reduce the incentive for urbanization for rural poor households. Finally, the study found that financial inclusion to some extent can compensate for a lack of assets of poor households. Considering the findings from the study, plus taking poverty vulnerability into account, it is recommended that financial inclusion be enhanced and target poor households, especially poor women-headed farming households living in rural areas. In addition, for policy-makers concerned with the urbanization of low-skilled poor migrants, financial inclusion expansion in rural areas has the potential to help reduce urbanization pressures, because it has the potential to help reduce incentives for poor and low-skilled rural inhabitants to migrate to urban areas in search of non-agricultural employment opportunities.

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