Determinant Factors of Financial Inclusion: Empirical Evidence in Indonesia using GMM

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Financial inclusion is a process of involving people who do not have access to formal financial services. When a country is financially inclusive, economic activity in a country can depend on banking transactions and have greater financial sustainability and more effective monetary policy. The main objective of this research is to identify the factors that determine the level of financial inclusion in Indonesia and to suggest policy measures to increase the level of inclusion. This research uses the method Generalized Method of Moments (GMM) on 14 sharia banks full-fledge and Islamic bank units in Indonesia in the period 2010 to 2019. The results of this study found that bank size and deposit rates had a positive effect on the level of financial inclusion. Empirical findings also show that inflation has a negative and significant effect on financial inclusion.

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INTRODUCTION

Over the last few decades, there have been many efforts made by national institutions to increase inclusive public finance by offering financial services that are easily accessible to the public and in collaboration with other institutions. These include non-governmental organizations, cooperatives, private and government banks, insurance companies, telecommunications, post offices and other business service providers. These institutions provide various service points or points of sale as a new business model. However, this new service can only be utilized if one has an account (Shem *et al.*, 2012).

Financial inclusion refers to access and use of various financial products and services by all people at affordable prices, even for disadvantaged and low-income groups (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018). Financial services such as savings, loans, insurance, and payment systems that can be accessed by all levels of society are able to maintain their financial needs and strengthen the country's economic growth (Lal, 2018). Financial inclusion has proven to play an important role in economic development and financial system stability. When a country is financially inclusive, its economic activities depend more on banking transactions and have greater financial sustainability and more effective monetary policies (Mehrotra & Yetman, 2015). This allows individuals and companies to invest in education, save for retirement, take advantage of business opportunities, and insure against risks (Demirgüç-Kunt, 2008). It also improves the efficiency and accessibility of financial services in a safe, convenient, secure and cost-effective way (Ikram & Lohdi, 2015), especially in the banking sector (Rusydiana et al., 2019). Financial inclusion is recognized as a continuous process to improve the quality, quantity and efficiency of financial intermediary services (Babajide, Adegboye, & Omankhanlen, 2015).

In assessing financial inclusion in each country, there is an index for achieving financial inclusion every year, and Indonesia is no exception. In Indonesia, the financial inclusion index is still low. Indonesia's Financial Inclusion Index over the age of 15 reaches 36.1 (World Bank, 2014). This data means that only around 36.1 percent of Indonesian people access and use savings products at formal financial institutions, in this case banks. Compared to the level of financial inclusion in ASEAN countries, Indonesia's position is still far below that of Singapore, Malaysia and Thailand. Indonesia, as the country with the largest population in ASEAN (World Bank, 2019), should be even better at taking advantage of this large population to increase financial inclusion, with the hope that all levels of society can improve their welfare.

This study aims to identify the factors that influence financial inclusion in Indonesia. Most empirical studies regarding financial inclusion focus primarily on developing countries (Andrianaivo & Kpodar, 2012; Kim, Yu, & Hassan, 2018). Factors that influence access to formal finance have been identified in empirical research from the following studies: (Chikalipah, 2017; Datta & Singh, 2019; Hajilee, Stringer, & Metghalchi, 2017; Nizam, Karim, Sarmidi, & Rahman, 2020; Uddin, Chowdhury, & Islam, 2017; Vo, Van, Vo, & McAleer, 2019).

LITERATURE REVIEW

Various studies have been conducted to find the causes, consequences and solutions of financial inclusion. Honohan (2008) examined financial inclusion in 160 countries to assess the effect of country characteristics such as gross national income (GNI), age dependency ratio, and population density on financial inclusion. The results show that gross national income (GNI), age dependency ratio, and population density significantly reduce access to finance, temporarily *mobile subscription* and the quality of institutions significantly improves access to finance. Chikalipah (2017) investigated the determinants of financial inclusion in Sub-Saharan Africa (SSA) using multiple linear regression. The empirical findings in this study indicate that illiteracy is a major barrier to financial inclusion in SSA. Using the GMM method, Kumar (2013) identifies the status of financial inclusion in India and the factors that influence it. The results of this study concluded that the level of branch network of financial offices had a significant positive effect on financial inclusion. In another country-level study in Peru, Cámara and David (2015) used microdata from surveys and found that vulnerable groups such as women and people living in rural areas are more excluded from using financial services. Their study also found that age, gender, education, and income level also influence an individual's perception of whether to use formal financial services or not.

Nizam, Karim, Sarmidi, & Rahman (2020) investigated the effect of financial inclusion on company growth (889 companies) in ASEAN-5 countries (Malaysia, Thailand, Philippines, Indonesia, and Vietnam) using a regression estimation technique *threshold*. The results show a non-monotonic effect on

the growth relationship of financial inclusion companies. The impact of financial inclusion on company growth is significantly negative once a certain threshold point is reached.

METHOD

This research is quantitative using panel data regression analysis. The use of panel data forms the basis for the process of estimating research data, namely its use in obtaining characteristics over time and between individuals. Panel data regression is able to minimize collinearity between variables and maximize degrees of freedom in increasing efficiency (Firdaus, 2011). The method to be used in this study is dynamic panel data regression using the approach *Generalized Method of Moment* (GMM) Arellano-Bond. Panel data analysis can be used in dynamic models, where the dependent variable does not only depend on exogenous variables, but also on the lag of the dependent variable (Dasril, 2015). This model was chosen because of the data *cross-section* bigger than data *time-series* (N > T). In addition, GMM is also a dynamic estimator that corrects for heteroscedasticity, serial correlation, and cross-sectional dependence unlike the application of purely static models (FEM, REM and OLS) which fail to eliminate the problem of heterogeneity in the model.

The advantage of this method is that it can determine the short-term effects and long-term effects. Inclusion of the dependent variable's lag into the independent variable gives a difference in the model estimators. In addition, in dynamic panel data regression, according to Anderson and Hsiao (1982) in Syahrul (2011) the estimation method can be used *Instrumental Variables* (IV), namely by instrumenting variables that are correlated with *error*. There are two estimation procedures in the GMM framework, viz *first-different* GMM (FD-GMM or AB-GMM) and *system* GMM (SYS-GMM). Then proposed a serial correlation test based on GMM residues and compared with the Sargan test. The GMM Arellano-Bond estimation method produces unbiased, consistent and efficient estimates.

Data

The data used in this study uses secondary data in the form of panel data, namely a combination of *cross section* and *time series*. The data used is a sample consisting of a combination of Islamic Commercial Banks (BUS) and Islamic Business Units (UUS) in Indonesia, totaling 14 banks in the period 2010 to 2019. The data is in the form of annual statistics obtained officially from the financial reports of each Islamic bank and *World Development Indicators* (World Bank).

Next, the estimation process will be carried out by specifying the model that can be formulated in this study. The modeling is as follows:

$$LN\_TDP_{it} = \alpha + \delta LN\_TDP_{it-1} + \beta_1 LN\_SIZE_{it} + \beta_2 CIR_{it} + \beta_3 INTD_{it} + \beta_4 LRA_{it} + \beta_5 AGE_{it} + \beta_6 LN\_GNI_{it} + \beta_7 INF_{it} + \varepsilon_{it} \qquad (1)$$

Table 1: List of Variables

Variable	Symbol	Proxy	Sources
Financial Inclusion	LN_TDP_{it}	Natural Logarithm of Bank Total Deposits	Uddin, Chowdhury, & Islam (2017); Hajilee, Stringer, & Metghalchi (2017)
Bank Size	LN_SIZE_{it}	Natural Logarithm of Total Assets	Kosmidou (2008); Beck & Brown (2010); Kumar, Thrikawala, & Acharya (2021)
Cost to Income Ratio	CIR_{it}	Operating Income Operating Expense Ratio (BOPO)	Pasiouras & Kosmidou (2007); Kumar *et al.* (2021)
Margin Deposit	$INTD_{it}$	Deposit Margin Ratio	Pasiouras & Kosmidou (2007)
Literacy Level	LRA_{it}	Literacy Level Ratio	Evans & Adeoye (2016); Uddin *et al.* (2017); Hajilee *et al.* (2017)
Age Dependency Ratio	AGE_{it}	Dependence Ratio (Comparison of people aged 15 and under and people aged over 64 to the working age population of 15-64)	Honohan (2008); Park & Mercado (2015); Datta & Singh (2019)
Gross National Income	LN_GNI_{it}	Natural logarithm of Gross National Income per capita	Honohan (2008); Park & Mercado (2015)
Inflation	INF_{it}	Consumer Price Index Growth (*yoy*)	Rojas-Suarez (2010); Park & Mercado (2015); Kumar *et al.* (2021)

α	= Intercept	ε	= error
β	= Coefficient	i, t	= i-th country, t-th year

RESULTS AND ANALYSIS

Modeling of the determinant effect on financial inclusion is carried out using the GMM Arellano-Bond dynamic panel data. This model uses independent variables that are proxied by bank size variables, *cost to income ratio*, deposit margin, literacy rate, dependency ratio, GNP, and inflation. Estimation using the GMM Arellano-Bond method was carried out involving 14 Islamic banks from 2010 to 2019. In obtaining the model coefficient estimator, the GMM model was used *two-step system*. Parameter estimation results can be obtained in Table 1 below.

Table 2: GMM estimation result

Variable	Coefficient	Z	Std. Error
LN_TDP (-1)	-2.431199	-0.95	2.560134
C	167.8499	0.72	233.4678
LN_SIZE	7.230226	2.04*	3.538874
CIR	0.0040751	0.22	0.0188627
INTD	0.8614897	3.37**	0.2559144
LRA	0.0666373	0.16	0.427578
AGE	-1.179767	-0.6	1.958295
LN_GNI	-22.30242	-1.2	18.57765
INF	-0.1704754	-2.24**	0.0760308
Hansen test stat (p-value)	2.24 (0.692)		
AB-test orde 2 (p-value)	1.26 (0.209)		
Long term			
LN_SIZE	2.107201	3.44**	0.61192
INTD	0.251075	1.15	0.217475
INF	-0.04968	-1	0.049926

Note: The asterisk sign (*,**) indicates a significant variable at the 5% and 1% significance level

The GMM estimation results in Table 1 above show that the variables that have a significant relationship to financial inclusion in the short term are bank size (SIZE), margin deposit (INTD), and inflation (INF). First, bank size shows a positive and statistically significant relationship to financial inclusion in the short and long term. Thus, a 1 percent percentage increase in bank size will result in an increase in financial inclusion of 7.23 percent in the short term, and 2.1 percent in the long term. These results are in line with the research of Demirgüç-Kunt & Klapper (2012) and Uddin *et al.* (2017) on financial inclusion in 160 countries. Second, margin deposit (INTD) depicts a positive and significant relationship to financial inclusion in the short term only. A 1 percent increase in deposit margin leads to an increase in financial inclusion of 0.86 percent in the short term. The results of this study are in line with Park & Mercado (2015). Lastly, inflation (INF) shows a significant negative relationship to financial inclusion in the short term only. Thus, a percentage increase in inflation of 1 percent will result in a decrease in financial inclusion of 0.17 percent in the short term. These results are in accordance with the research of Rojas-Suarez (2010), Evans & Adeoye (2016), and Vo*et al.* (2019).

Classical assumption test

To assess whether the research instrument is valid or not, you can use the Hansen Test. The Hansen test results are 2.24 and P-*Value* of 0.692 greater than the five percent significant level. So, the decision is not significant and it can be concluded that H0 cannot be rejected, which means that the instrument variables in the research model are valid or the number of instrument variables is more than the number of parameters estimated. The Hansen Test hypothesis is:

H0: Conditions *overidentifying restrictions* in valid model estimates (instrument variables are not correlated with *error*); and

H1: Conditions *overidentifying restrictions* in the estimation of the model is not valid.

To identify whether these two models have a serial correlation or not, the Arellano-Bond test can be used. The criteria for the consistency of the estimator are that there is no second-order serial correlation from *error* and endogenous variables in the equation *first difference*. In the estimation model, the second-order test statistic (AR (2)) is 1.26 and P-*Value* of 0.209 greater than the five percent significant level. So, the decision on the model is to fail to reject H0 which means that the parameter estimates produced by the two models are consistent or there is no second-order serial correlation from *error* and endogenous variables in the equation *first difference*. The Arellano-Bond Test hypothesis is:

H0: There is no serial correlation between Δv_{it} and Δv_{it-2} (*random walk*); and

H1: There is a serial correlation between Δv_{it} and Δv_{it-2}

DISCUSSION

The results found that bank size has a positive impact on the formation of bank deposits. These results prove the findings of Demirgüç-Kunt & Klapper (2012) and Uddin *et al.* (2017) indicated that larger banks have greater ability to reach a wider audience and increase financial inclusion. The results of the study also reveal that there is a positive and significant relationship between deposit interest and financial inclusion. These results are consistent with findings from Kosmidou (2008) which explains that according to theory, high deposit rates are expected to encourage people to save and be able to increase financial inclusion in a country. Then, inflation has a significant negative effect on financial inclusion, confirming the findings of Rojas-Suarez (2010), Evans & Adeoye (2016), and Vo *et al.* (2019) regarding the impact of inflation on financial inclusion. The negative relationship to inflation indicates that economic volatility and rising price levels can reduce the level of financial access. However, this result contradicts Bakari *et al.* (2018) which states that inflation has a positive effect on financial inclusion in African countries, because the transfer of money from financial institutions to other financial institutions (banks to be precise), can be a challenge for central banks related to the amount of money offered. The central bank can supply a higher amount of money than the economy needs because of the new money flowing into the banks. This can create inflation indirectly.

CONCLUSION

Financial inclusion is the ability to access and use various financial products and services by the community in a country or region. Financial services such as savings, loans, insurance, and payment systems that can be accessed by all levels of society are able to maintain their financial needs and strengthen the country's economic growth. Financial inclusion plays an important role in economic development and financial system stability. When a country is financially inclusive, its economic activities depend more on banking transactions and have greater financial sustainability and more effective monetary policies. The main objective of this research is to identify the factors that determine the level of financial inclusion in Indonesia. In relation to these objectives, this study found that bank size and deposit rates have a positive effect on the level of financial inclusion. Empirical findings also show that inflation has a negative and significant effect on financial inclusion.

In order to ensure mass access to financial services, this study suggests developing human capital in a sustainable manner. Information or literature regarding finance has been proven to play an important role in overcoming informal loan (credit) problems, and being able to minimize the associated risks. Basically, people who are educated are able to know about the benefits of using the formal financial system, and they are more likely to use it. Therefore, policy alternatives must be designed to communicate the benefits of financial services to the general public and make them financially literate.

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