

## The linkage between globalisation and financial inclusion: Do inequality and institutions matter?

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### Abstract

This paper examines the effect of the globalization threshold on financial inclusion in 40 selected countries during 2000-2018. A principal component analysis (PCA) and a static panel threshold (SPT) are utilized. There are three dimensions and one aggregation of financial inclusion indicators assessed by PCA, while the globalization threshold is estimated under static panel threshold regression. **Findings/Originality:** The findings exhibit six countries with strong financial inclusion and eight countries with weak financial inclusion during study periods. Furthermore, the threshold effect of globalization has a significant impact on the financial inclusion index. The robustness checking employs panel cointegration test exhibits that inequality and some institutions indicators have a significant impact on financial inclusion both in the short-run and long-run. The policy implication suggests that governments should increase the financial inclusion index level during the globalization period, decrease inequality, and improve institutions' quality.

### Introduction

Inaccessible financial products and services have become one of the most pressing issues in developing and developed countries. It stifles the channeling of capital, which then hampers the growth of the overall economy. The World Bank (2017) suggests expanding access to and greater transaction account usage as the first two steps toward financial inclusion. These can be done, for example, through financial market reform, innovation by players in the financial industries (which includes the adoption of mobile and digital payments), as well as reducing the gender gap in account ownership. While promoting financial inclusion is an essential task for policymakers, they can also benefit from better understanding its multidimensional nature and whether structural and institutional changes may have impacted potential users from entering the financial market.

One key aspect of financial inclusion is that it consists of two parts: the supply and the demand for financial products and services. The supply side includes financial services such as bank branches and ATMs in rural areas, which eventually affects the demand side regarding the ownership and use of financial products. However, the demand side is also influenced by households' socio-economic situation, cultural habits (e.g., the perception of interest as usury in specific communities), and legal constraints, to name a few. Such interlinked nature of financial inclusion has created an opportunity for researchers to estimate a multidimensional index of financial inclusion at the country level (e.g., Kim, 2015; Yorulmaz, 2018), subnational level (e.g., Sanjaya & Nursechafia, 2016; Sethy, 2016) and even at the individual level (e.g., Delechat, Newiak, Xu, Yang, & Aslan, 2018; Xu, 2019).

Many of the studies on financial inclusion used the method developed by Sarma (2008, 2012), where the variable was constructed as a normalized inverse Euclidean distance of each entity

(e.g., a country's) financial inclusion situation from its ideal. This method is noted for assigning equal weight for each dimension that enters the index. Therefore, further adjustments were made by subjectively assigning different weights or using a completely different method (Arora, 2010; Gupte et al., 2012). There are three typical dimensions of financial inclusion: penetration, availability, and use of bank products. One of the latest methods to estimate financial inclusion index is to use principal component analysis (PCA) to obtain factor loadings (Lenka & Barik, 2018; Yorulmaz, 2018), where the weights are assigned objectively—i.e., they depend on how well each *variable* can explain variations in each dimension of financial inclusion. So rather than subjectively assigning each variable to a particular dimension, PCA allows one variable to be part of one or more dimensions, but with different weights, while maintaining variables' independence.

Away from the issue surrounding the construction of financial inclusion index, empirical investigations have confirmed the association between financial inclusion and economic development, such as economic growth and income inequality. In a cross-country study, Kim (2015) found the critical effect of a multidimensional index of financial inclusion in altering the relationship between economic growth and income inequality, from negative (trade-off between growth and inequality) to positive (reducing inequality and promoting growth), across OECD countries from 2004-2011. This finding is supported by Sethi and Acharya (2018), who found a long-run relationship between financial inclusion index with economic growth across 31 countries (many are non-OECD countries) from 2004-2010. In the context of developing Asian countries, the financial inclusion index was also negatively correlated with income inequality and poverty (Park & Mercado Jr., 2015). Meanwhile, in India's country-level study (Dahiya & Kumar, 2020), only the usage dimension of financial inclusion has a positive association with economic growth, whereas the multidimensional index does not seem to be important in explaining economic growth.

Financial inclusion is also related to the quality of institutions. In a cross-country study throughout 1985-2014, financial inclusion (as represented by the number of deposit account per 1000 adults) is positively associated with the quality of formal institution (as proxied by governance indicator from Kaufmann, Kraay, & Mastruzzi et al., 2010) and financial sector strategies adopted in each country (Melecky & Podpiera, 2020). The governance indicator measures a formal institution's quality, a composite of six dimensions, ranging from the rule of law to voice and accountability, and has been an important predictor for financial sector outcomes (e.g., Barajas, Beck, Dabla-Norris, & Yousefi, 2013). The informal institution also appears to be positively related to the financial inclusion index (Xu, 2019). In Xu's study, informal institutions are proxied by generalized trust taken from Wave 6 of the World Values Survey and other explanatory variables such as income quintile, associated with the individual level's financial inclusion index. The study also tackles the issue of endogeneity by instrumenting trust to population density and share of Protestants, both argued to be relevant and satisfy the exclusion restriction criterion. Overall, these studies observe the relationship between institution and financial inclusion. However, as will be seen in the next paragraph, institutions are also related to financial development which, arguably, is closely related to financial inclusion.

Financial development is associated with the supply side of financial inclusion, and factors that contribute to the former may explain the latter, albeit indirectly. A dynamic panel data study on financial development in European countries over 1989-2016 shows that financial globalization and low quality of institutions have a detrimental effect (Nasreen, Mahalik, Shahbaz, & Abbas, 2020). Globalization in the economic, social, and political fields has been on the rise since the 1970s, receiving a particular boost after the end of the Cold War. There is growing interest in how it is impacting the financial development in various countries. The proxy for financial globalization is based on the modified version of the KOF globalization index divided into *de facto* and *de jure* measures (Gygli, Haelg, Potrafke, Sturm, 2019). The former is a composite index of various measures, such as the share of foreign assets and liabilities and the share of international equity

investment assets and liabilities relative to the country's GDP. While the latter used two indices of capital account openness and a measure of trade barrier as proxied by the presence of regulations that control capital movements and foreign ownership. Whereas the quality of institutions is a summative measure of four variables that capture market institutions regarding market clearing, market regulating, market stabilizing, and market legitimization.

Additionally, financial development seems to be a factor that drives economic growth and instrumental in reducing income inequality among the countries in the euro area over 1985-2013 (Baiardi & Morana, 2018). The authors also noticed an inverse-U relationship between inequality and income growth. However, it remains to be seen whether financial globalization, institutional quality, or income inequality directly impact financial inclusion and whether it has any effect, if at all, in emerging economies outside Europe. One study suggests that financial globalization would lead to worse financial inclusion (Dymski, 2005). This assertion was built on the idea that, due to financial globalization, an integrated market would change the financial firm's strategic operations, specifically in the form of homogenization and stratification of financial market practices that cater to different segments of the consumers. However, to the best of our knowledge, there are no empirical (statistical) investigations on this prediction due to the lack of data on organizational change at the firm's level.

In the context of subnational (province-level) Indonesia, financial inclusion was found to have some correlations with inclusive growth and income inequality (Aginta, Soraya, & Santoso, 2018; Sanjaya & Nursechafia, 2016). Inclusive growth was defined as the ability to access health and educational services. In both studies, financial inclusion was calculated using Sarma (2008, 2012) approach that assigns equal weights to all of the different dimensions of the index. Financial inclusion also seems to have heterogeneous effects, where it was associated with lower income inequality in mining- and manufacturing-based provinces but not in agricultural-based provinces.

This study contributes to the literature by estimating a multidimensional financial inclusion index and relates it with a novel construct of an optimal level of globalization index and different governance dimensions in 40 selected countries. The empirical results should then capture a broader spectrum of institutions and globalization than in previous studies while keeping the possibility that these variables may have idiosyncratic impacts on different financial inclusion dimensions.

## Methods

The study focuses on 40 selected countries during 2000 - 2018. The countries were identified from the World Economic Situation and Prospects (United Nations) and World Inequality Report (the World Bank). Moreover, those countries are classified into some categories, such as emerging countries, developing countries, and developed countries. Thus, this study selects around 40 countries as a sample. This period is chosen regarding the financial inclusion and globalization issues among countries and institutions' significant economic issues.

The variables that reflect banking penetration are debit card ownership (% age 15+) and credit card ownership (% age 15+). In contrast, those that reflect banking services/availability are commercial bank branches per 100,000 adults and ATMs per 100,000 adults. Those that reflect banking usage are domestic credit to the private sector (% of GDP) and gross domestic savings (% of GDP). Some of the variables used in this study are based on best practices in the literature. For example, globalization is reflected in the KOF globalization index, trade openness, and foreign direct investment (see, e.g., Dymski, 2005; Gygli, Haelg, Potrafke, & Sturm, 2019; Nasreen et al., 2020). See Table 1 below for the description and sources for each of the variables used in this study.

**Table 1.** Description of variables

Variables	Descriptions	Sources
Countries	Algeria, Argentina, Bangladesh, Bolivia, Brazil, Bulgaria, Central African Republic, Chile, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, Ghana, India, Indonesia, Malaysia, Mexico, Morocco, Nicaragua, Pakistan, Peru, Philippines, Portugal, Romania, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, United Kingdom, United States, Uruguay, Vietnam, and Zambia.	United Nations and the World Bank
Financial Inclusion Index ( <i>pcfi</i> )	An aggregation of financial inclusion dimensions constructed using PCA	
Banking penetration ( <i>pc1</i> )	A composite index of the banking penetration dimension using PCA	The World Bank and Authors calculation
Banking services/availability ( <i>pc2</i> )	A composite index of the banking services/availability dimension using PCA	
Banking product usage ( <i>pc3</i> )	A composite index of the banking product usage dimension using PCA	
Trade Openness ( <i>to</i> )	Trade Openness (% GDP)	World Development Indicator
FDI Net Inflows ( <i>fdini</i> )	FDI Net Inflows (BoP, current US\$)	( <a href="https://datacatalog.worldbank.org/dataset/world-development-indicators">https://datacatalog.worldbank.org/dataset/world-development-indicators</a> )
Per capita Income ( <i>ic</i> )	Per capita Income (current US\$)	
Gini Index ( <i>gini</i> )	Gini index measures the extent of income inequality (0 implies perfect equality, 100 implies perfect inequality)	
KOF Globalisation Index ( <i>kofgi</i> )	The KOF index measures the economic, social, and political dimensions of globalization.	KOF ( <a href="https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html">https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html</a> )
Voice and accountability ( <i>va</i> )	<i>va</i> captures citizen's ability to participate in choosing their government as well as various dimensions of freedom	
Political Stability and Absence of Violence ( <i>psav</i> )	<i>psav</i> captures the likelihood of political instability and violence (including terrorism)	World Governance Indicator
Government Effectiveness ( <i>ge</i> )	<i>ge</i> captures public and civil service quality, their independence of political pressure, policy formulation quality, and government's credibility	( <a href="https://datacatalog.worldbank.org/dataset/worldwide-governance-indicators">https://datacatalog.worldbank.org/dataset/worldwide-governance-indicators</a> )
Regulatory Quality ( <i>rq</i> )	<i>rq</i> captures the government's ability to enhance the private sector as well as to formulate and promote policies	
Rule of Law ( <i>rl</i> )	<i>rl</i> captures the quality of law enforcement, protection of rights, and other aspects of the rule of law	
Control of Corruption ( <i>cc</i> )	<i>cc</i> captures the quality of public institutions regarding state capture and corruption	

The following parts of this sub-sections discuss the PCA used to construct the financial inclusion index, the static panel threshold model used to estimate the threshold effect of globalization on financial inclusion, and the panel cointegration test used in the robustness check.

### Principal Component Analysis

Financial inclusion can be measured using several indicators that can be grouped into three dimensions: banking penetration, banking services/availability, and banking usage. Most empirical investigations aggregated these indicators to generate a multidimensional financial inclusion index and associated it with macroeconomic indicators such as economic growth and inequality and institutions' quality.

This study follows the procedure in Yorulmaz (2018) that utilizes PCA to obtain three financial inclusion dimensions and one composite index. To obtain each dimension's weight, we need to find the correlation structure and identify the latent factors. These factors are then rotated to obtain the factor loadings, of which its matrix can be grouped to obtain financial inclusion dimension  $D_i$ , where subscript  $i$  refers to the three dimensions mentioned previously. Finally, the dimensions are aggregated as:

$$pcaf_i = \Pi_{i=1}^3 D_i \quad (1)$$

A positive value of  $pcaf_i$  indicates a strong financial inclusion for a particular country, whereas a negative value indicates a weak financial inclusion.

### Static Panel Threshold

Hansen (1999) introduced a threshold model that can be used to investigate the effect of a shock on the relationship between variables in a panel setting. In this study, the KOF globalization index  $kofgi$  is treated as the shock (or targeted) variable that enters the financial inclusion ( $FI$ ) regression as follows:

$$FI_{it} = (\theta_1 kofgi_{it} + \lambda_1 Y_{it})I(kofgi_{it} \leq \gamma) + (\theta_2 kofgi_{it} + \lambda_2 Y_{it})I(kofgi_{it} > \gamma) + \varepsilon_{it} \quad (2)$$

where subscripts  $i$  and  $t$  refer to the country identifier and period, respectively. Three dimensions of  $FI$  ( $pc1$ ,  $pc2$ ,  $pc3$ ) and one composite index ( $pcaf_i$ ) are investigated in the regressions.  $Y$  is a set of other explanatory variables that consist of per capita income ( $ic$ ), Gini index for income inequality ( $gin$ ), net inflows of foreign direct investment ( $fdini$ ), trade openness ( $to$ ), and a set of governance variables ( $G$ ).  $fdini$  can reflect the heterogeneity of inequality amongst countries. Indeed, there is a various level of inequality in 40 selected countries as a result of  $fdini$ . Variables in  $G$  measure the perception of a country's agents (households, firms, and organizations, including public and non-governmental organizations) on a number of dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law and control of corruption.

Regressing equation (2) will result in two regimes separated by the threshold  $\gamma$ :

$$FI_{it} = \begin{cases} \theta_{10} + \theta_{11} kofgi_{it} + \varepsilon_{it} & \text{if } kofgi_{it} \leq \gamma \\ \theta_{20} + \theta_{21} kofgi_{it} + \varepsilon_{it} & \text{if } kofgi_{it} > \gamma \end{cases} \quad (3)$$

The threshold regression will exhibit three categories, such as lower-level, optimal level, and upper level. The main concern is the significance of the threshold effect. The threshold effect occurs when the F-statistics of threshold estimation is significant. Besides, the value of lower, optimal, and upper levels confirms the scale of the globalization index's threshold effect. Thus, those levels do not indicate the estimated index of globalization.

### Panel Cointegration Test

We use the panel cointegration test as an alternative specification (Pedroni, 2000, 2001; Pesaran, Shin, & Smith, 1999; Pesaran & Smith, 1995) to see how the explanatory variables are associated

with financial inclusion in the short-run and the long-run. The specification for this test is to regress the following:

$$\begin{aligned}
 FI_{it} = & \beta_0 + \beta_1 FI_{it-1} + \beta_2 fdini_{it} + \beta_3 fdini_{it-1} + \beta_4 ic_{it} + \beta_5 ic_{it-1} + \beta_6 gini_{it} + \\
 & \beta_7 gini_{it-1} + \beta_8 to_{it} + \beta_9 to_{it-1} + \beta_{10} kofgi_{it} + \beta_{11} kofgi_{it-1} + \sum_{n=1}^6 \delta_{1n} Q_{n,it} + \\
 & \sum_{n=1}^6 \delta_{2n} Q_{n,it-1} + \varepsilon_{it}
 \end{aligned} \quad (4)$$

Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC) suggest an autoregressive distributed lag of order one as the best model for equation (4). The equation can also be divided into the short-run effect (error correction model) and the long-run effect. We also employ several methods in the test that concern with data heterogeneity and consistency of long-run estimation. These methods are the pooled mean group (PMG), dynamic fixed effects (DFE), fully-modified OLS (FMOLS), and dynamic OLS (DOLS).

## Results and Discussion

Table 2 presents the descriptive statistics of the variables used in this study where each variable is divided into three rows: overall (total observation), between (by country), within (by year). In total, we have a balanced panel of 760 country-years observations from 40 countries for 19 years.

**Table 2.** Descriptive Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
<i>pc1</i>	overall	-6.58E-07	1.667	-2.182	5.144	N = 760
	between		1.376	-2.050	3.075	n = 40
	Within		0.964	-4.981	2.314	T = 19
<i>pc2</i>	overall	-1.05E-06	0.840	-2.286	3.382	N = 760
	between		0.328	-0.624	0.587	n = 40
	within		0.775	-1.926	3.572	T = 19
<i>pc3</i>	overall	3.94E-07	0.719	-1.996	2.298	N = 760
	between		0.585	-1.085	1.274	n = 40
	within		0.427	-2.199	2.119	T = 19
<i>pcafi</i>	overall	-0.012	1.979	-2.192	7.3898	N = 760
	between		1.395	-2.003	3.239	n = 40
	within		1.418	-4.699	4.578	T = 19
<i>to</i>	overall	75.021	57.804	21.852	437.327	N = 760
	between		57.082	25.780	368.486	n = 40
	within		12.655	11.013	143.862	T = 19
<i>kofgi</i>	overall	62.853	18.985	0	91.3	N = 760
	between		11.223	33.037	84.442	n = 40
	within		15.410	-21.590	76.237	T = 19
<i>fdini</i>	overall	2.32E+10	5.74E+10	-6.77E+10	5.09E+11	N = 760
	between		5.10E+10	2.67E+07	2.73E+11	n = 40
	within		2.75E+10	-1.40E+11	2.59E+11	T = 19
<i>ic</i>	overall	11187.62	16385.36	250	88416	N = 760
	between		15858.52	395.842	67448.68	n = 40

Variable		Mean	Std. Dev.	Min	Max	Observations
<i>gini</i>	within		4790.78	-18393.07	33158.98	T = 19
	overall	21.911	22.135	0	64.8	N = 760
	between		13.976	0	46.463	n = 40
<i>va</i>	within		17.299	-24.552	72.859	T = 19
	overall	0.069	0.813	-1.749	1.739	N = 760
	between		0.781	-1.511	1.497	n = 40
<i>psav</i>	within		0.257	-1.428	1.580	T = 19
	overall	-0.252	0.869	-2.81	1.586	N = 760
	between		0.805	-2.111	1.194	n = 40
<i>ge</i>	within		0.352	-1.445	1.860	T = 19
	overall	0.173	0.835	-1.848	2.437	N = 760
	between		0.808	-1.467	2.050	n = 40
<i>rq</i>	within		0.245	-1.877	1.640	T = 19
	overall	0.164	0.809	-1.481	2.261	N = 760
	between		0.776	-1.175	1.846	n = 40
<i>rl</i>	within		0.260	-1.682	1.339	T = 19
	overall	0.032	0.855	-1.816	2.038	N = 760
	between		0.829	-1.425	1.827	n = 40
<i>cc</i>	within		0.245	-1.795	1.457	T = 19
	overall	0.035	0.920	-1.497	2.326	N = 760
	between		0.892	-1.090	2.095	n = 40
	within		0.263	-2.060	1.125	T = 19

### Financial Inclusion Index

Table 3 summarises the three principal components and their eigenvalues (which are the variances of these components). The first principal component (*pc1*) has a variance of 2.78 and explains 69% of the total variance, whereas the second and third components are relatively similar in explaining the residual variance with 18% and 13%. This suggests that *pc1* is the most important component in the financial inclusion index.

The PCA result is employed to categorize countries with strong and weak financial inclusion (*pc1* is positive and negative, respectively) (Table 4). Six countries have a strong financial inclusion during 2000-2018 (Table 5): China, Malaysia, Singapore, South Africa, United Kingdom, and the United States. In contrast, eight countries have a weak financial inclusion: Bangladesh, Central African Republic, Dominican Republic, Ecuador, Egypt, Ghana, Nicaragua, and Pakistan. See Table A in the appendix for the details.

**Table 3.** Principle components of financial inclusion

Component	Eigenvalue	Difference	Proportion	Cumulative
<i>pc1</i>	2.778	2.072	0.694	0.694
<i>pc2</i>	0.706	0.189	0.176	0.871
<i>pc3</i>	0.517	0.517	0.129	1.000

**Table 4.** Financial Inclusion Index

Country	PCAFI	Country	PCAFI
Algeria	-0.861	Nicaragua	-1.443
Argentina	-0.811	Pakistan	-1.642
Bangladesh	-1.181	Peru	-0.943
Bolivia	-0.749	Philippines	-1.047
Brazil	-0.052	Portugal	1.435
Bulgaria	-0.313	Romania	-0.808
Central African Republic	-2.003	Russian Federation	-0.284
Chile	0.869	Singapore	2.064
China	1.775	South Africa	1.415
Colombia	-0.746	Spain	2.018
Costa Rica	-0.323	Sweden	2.307
Dominican Republic	-1.015	Switzerland	2.800
Ecuador	-1.014	Thailand	1.183
Egypt	-1.183	Tunisia	-0.432
Ghana	-1.672	Turkey	0.118
India	-0.617	United Kingdom	2.730
Indonesia	-0.906	United States	3.239
Malaysia	1.329	Uruguay	-0.452
Mexico	-0.975	Vietnam	0.116
Morocco	-0.363	Zambia	-1.563

Note: the number of PCA is an average value during 2000-2018

**Table 5.** Strong and Weak Financial Inclusion Index

Strong financial inclusion	Weak financial inclusion
Argentina (2011-2017); Bolivia (2014-2017); Brazil (2011-2017); Bulgaria (2011-2017); Chile (2011-2018); <b>China (2000-2018)</b> ; Colombia (2011-2017); Costa Rica (2011-2017); India (2014-2017); Indonesia (2016-2017); <b>Malaysia (2000-2018)</b> ; Mexico (2013-2017); Morocco (2011-2017); Peru (2014 & 2016-2017); Portugal (2001-2003, 2006-2017); Romania (2011-2017); Russian Federation (2011-2017); <b>Singapore (2000-2018)</b> ; <b>South Africa (2000-2018)</b> ; Spain (2003, 2005-2017); Sweden (2006-2018); Switzerland (2000-2017); Thailand (2000, 2002-2003, 2007-2018); Tunisia (2011-2017); Turkey (2011-2017); <b>United Kingdom (2000-2018)</b> ; <b>United States (2000-2018)</b> ; Uruguay (2010-2017); Vietnam (2009-2017).	Algeria (2000-2018); Argentina (2000-2010 & 2018); <b>Bangladesh (2000-2018)</b> ; Bolivia (2000-2013 & 2018); Brazil (2000-2010 & 2018); Bulgaria (2000-2010 & 2018); <b>Central African Republic (2000-2018)</b> ; Chile (2000-2010); Colombia (2000-2010 & 2018); Costa Rica (2000-2010 & 2018); <b>Dominican Republic (2000-2018)</b> ; <b>Ecuador (2000-2018)</b> ; <b>Egypt (2000-2018)</b> ; <b>Ghana (2000-2018)</b> ; India (2000-2013 & 2018); Indonesia (2000-2015 & 2018); Mexico (2000-2012 & 2018); Morocco (2000-2010 & 2018); <b>Nicaragua (2000-2018)</b> ; <b>Pakistan (2000-2018)</b> ; Peru (2000-2013, 2015 & 2018); Philippines (2000-2018); Portugal (2000, 2004-2005, & 2018); Romania (2000-2010 & 2018); Russian Federation (2000-2010, & 2018); Spain (2000-2002, 2004, & 2018); Sweden (2000-2005); Switzerland (2018); Thailand (2001, 2004-2006); Tunisia (2000-2010, & 2018); Turkey (2000-2010, & 2018); Uruguay (2000-2010, & 2018); Vietnam (2000-2008, & 2018); <b>Zambia (2000-2018)</b> .

Note: A strong financial inclusion occurs when  $pcafi > 0$  while a weak financial inclusion occurs when  $pcafi < 0$ . Countries written in bold letters consistently have strong or weak financial inclusion over the 2000-2018 period. The PCA for 40 selected countries can be obtained by request to the author.

Strong financial inclusion indicates a country can promote and maintain the level of financial inclusion, especially in a certain period. Indeed, it can support the public financial transaction into an efficient and integrated financial system. In contrast, weak financial inclusion exhibits a country that cannot promote and increase financial inclusion for public transactions, especially in a certain period.



Although some previous study contributes to the construct financial inclusion index (such as Lenka & Barik, 2018; and Yorulmaz, 2018), this study contributes to classifying the index of financial inclusion into strong and weak categories. It can be used to identify the financial inclusion index level for a country in a certain period. Moreover, the country can monitor and evaluate the level of financial inclusion each year.

### The Threshold of Globalisation Index

Table 6 summarises the result of the KOF globalization index threshold for four of the dependent variables ( $pcafi$ ,  $pc1$ ,  $pc2$ ,  $pc3$ ). Specifically, there are three threshold levels (optimal, lower, and upper) where the findings show the optimal level of globalization index to be around 69.70-70.50. Indeed, this study's uniqueness is because previous empirical research mostly ignores the threshold effect of globalization on financial inclusion.

The regressions also confirm that the lower threshold and upper threshold of  $kofgi$  significantly associate with financial inclusion. It means that there is a threshold effect of the globalization index on financial inclusion in 40 selected countries.

**Table 6.** Threshold Regression Models

	PC1	PC2	PC3	PCAFI
Fdini	8.18e-14 (0.46)	-8.27e-12 (-0.36)	2.29e-11 (2.00)**	1.52e-12 (1.04)
Ic	2.06e-05 (19.33)***	2.09e-03 (15.12)***	5.76e-04 (8.33)***	1.76e-04 (20.13)***
Gini	-1.2e-03 (-4.10)***	0.07 (1.83)*	0.02 (0.96)	-0.01 (-3.73)***
To	-4.26e-04 (-1.15)	0.11 (2.22)**	0.09 (3.88)***	-0.00 (-0.10)
Va	0.03 (1.21)	4.63 (1.57)	-2.25 (-1.52)	0.11 (0.59)
Psav	0.01 (0.88)	-6.85 (-3.29)***	-0.05 (-0.05)	0.13 (0.99)
Ge	0.04 (1.07)	10.63 (2.36)**	0.08 (0.04)	0.26 (0.90)
Rq	-0.08 (-2.53)**	0.90 (0.23)	1.30 (0.67)	-0.55 (-2.24)**
Rl	0.10 (2.45)**	-3.20 (-0.63)	3.00 (1.19)	0.87 (2.71)***
Cc	-0.13 (-4.19)***	-7.29 (-1.79)*	-4.26 (-2.09)**	-1.16 (-4.48)***
Kofgi				
a. Lower Threshold	0.00 (7.41)***	-0.17 (-3.67)***	-0.02 (-0.82)	0.02 (7.05)***
b. Upper Threshold	0.00 (14.10)***	0.16 (3.56)***	0.10 (4.58)***	0.042 (14.60)***
Constant	-0.28 (-7.77)***	-8.72 (-1.84)*	26.72 (11.29)***	-3.52 (-11.70)***
Threshold (bootstrap) of globalisation index:				
a. Optimal Threshold	70.40	69.70	70.50	70.40
b. Lower Threshold	70.20	69.35	69.80	70.20
c. Upper Threshold	70.50	69.80	70.60	70.50
d. F-statistics	63.61**	86.59***	41.93	81.58**
R-square:				
a. Within	0.48	0.39	0.22	0.51
b. Between	0.81	0.32	0.55	0.70
c. Overall	0.30	0.27	0.51	0.51
F-statistics	9.48***	17.95***	47.68***	12.61***
Observation	760	760	760	760

Notes: PC1 is Banking Penetration; PC2 is Banking Services/Availability; PC3 is Banking Product Usage; PCAFI is Financial Inclusion Index; Numbers in parentheses denote the t-values; \*\*\*, \*\* and \* denote significant at 1%, 5%, and 10% levels respectively.

The index of banking penetration ( $pc1$ ) is significantly determined by per capita income ( $ic$ ), the rule of law ( $rl$ ), and globalization index ( $kofgi$ ), both lower and upper threshold. The increase in the three variables shall encourage banking penetration to be more progressive. It indicates that external shocks such as the globalization index plays an essential role in accelerating banking

penetration for 40 selected countries during the study period. Besides, the increase in per capita income supports the ability of banking penetration at a higher level. On the other hand, several institutional quality indicators tend to inhibit banking penetration, such as regulatory quality (*rq*) and control of corruption (*cc*). It illustrates that the two institutional indicators tend to be weak and risky in banking penetration.

Moreover, the Gini index (*gin*) level shows a negative effect on banking penetration. In general, the level of inequality in most developing countries is high. As a consequence, it becomes a barrier to banking penetration acceleration.

The findings on the relationship between globalization indicators and the index of banking service/availability (*pc2*) are slightly different from the empirical results on *pc1*. Several variables positively affect on financial inclusion indicator, namely: per capita income, government effectiveness (*ge*), and the upper threshold of globalization index. As per capita income increases, the level of banking service or availability will also increase. Similarly, when the government can provide good quality public services and have credible policies, the level of banking service/availability will go up. Thus, the quality of the 40 selected countries' bureaucracy tends to be able to encourage increased banking service/availability index. In contrast, two other institutional indicators indicate a risk of increasing banking service/availability index: political stability (*pst*) and corruption control. It informs that, in general, the political condition is unable to support banking service/availability. Indeed, creating political stability and controlling the level of corruption are strategic steps in supporting and encouraging the implementation of financial inclusion.

Furthermore, the banking product usage index (*pc3*) is determined by external shocks such as foreign direct investment (*fdi*) inflows, trade openness (*to*), and the upper threshold of the globalization index. An increase in FDI inflows and trade openness will increase the banking product usage index. The governments of 40 selected countries can pursue various strategies to attract foreign investment and expand the global market for commodity trading. Apart from that, per capita income also contributed significantly in driving the expansion of banking product usage. On the other hand, it is supported by the empirical findings in the *pc1* and *pc2* estimation models that control of corruption has negative implications for banking product usage. Up to this stage, these findings indicate that corruption is an acute problem in all countries and is an obstacle to implementing financial inclusion.

Generally, the composite index of financial inclusion (*pcafi*) is influenced by internal shocks such as per capita income, Gini index, and several institutional indicators (regulatory quality, the rule of law, and control of corruption). Indeed, external shocks, such as the globalization index, also have a significant impact. A positive impact is given by per capita income, the rule of law, and the globalization index, while a negative effect comes from the Gini index, regulatory quality, and corruption control. Three financial dimensions face a significant threshold effect of globalization indexes such as *pc1*, *pc2*, and *pcafi*. Generally, the impact of the lower and upper threshold of the globalization index is significant in all financial inclusion dimensions. The findings suggest that governments should concern about globalization to promote financial inclusion.

The empirical finding of the impact of income inequality on financial inclusion has been supported by Aginta, Soraya & Santoso (2018). They found that financial inclusion has negative and significant implications for income inequality at the provincial level in Indonesia's mining and manufacturing sectors. Indeed, Baiardi & Morana (2018) suggest that the financial system's function can be more focused on equal income distribution. Furthermore, on the institutional aspect, it indicates that institutional quality, such as the rule of law, has a positive impact on financial inclusion. This finding has been supported by Nasreen et al. (2020). In contrast, two other institutional indicators, namely regulation quality and control of corruption, have a negative impact on the financial inclusion index in 40 selected countries. It means that these countries are expected to improve the quality of institutions to increase financial inclusion.

### Robustness Checking

The study examines the model using a panel cointegration test to identify the short-run effect and the long-run effect. The result found that the error correction term (speed of adjustment) has a negative and significant impact on *pcafit* when the parameters are estimated using the pooled mean group model, but not when they are estimated using a dynamic fixed-effects model. The robustness check result is available upon request to the author.

Several estimation methods are used to explain the relationship between the globalization index and inequality on financial inclusion in 40 selected countries during 2000-2018, namely: pooled mean group (PMG), dynamic fixed effects (DFE), fully-modified OLS (FMOLS), and dynamic OLS (DOLS). The empirical findings of banking penetration index (*pc1*) show that in the long-run per capita income (PMG, DFE, FMOLS, and DOLS), Gini index (FMOLS and DOLS), globalization index (DFE, FMOLS, and DOLS), political stability and government effectiveness (PMG), regulatory quality and the rule of law (PMG, DFE, and FMOLS), and control of corruption (PMG, FMOLS and DOLS), have a significant impact. Meanwhile, in the short term, several independent variables have a significant impact, such as speed of adjustment or error correction term (PMG and DFE), foreign direct investment (FDI) inflows (DFE), per capita income, globalization index, and political stability (PMG), trade openness (PMG and DFE) and regulatory quality (DFE). Thus, the implications of globalization index and inequality indicators can occur both in the long- and short-run on the banking penetration index.

Moreover, the empirical findings of banking service/availability (*pc2*) confirm that in the long-run, all indicators of globalization and inequality have a significant impact (see PMG result). There are two institutional indicators had a significant impact, namely: political stability and regulatory quality. These results prove that the estimation of robustness checking can provide a proper explanation, while the interpretation of the findings should be carried out carefully and proportionally. It means that 40 selected countries' governments need to be careful in encouraging increased banking service/availability because the Gini index, trade openness, and globalization index have a negative effect. In contrast, the empirical findings under different methods express that in the long-run, per capita income (DFE, FMOLS, and DOLS), Gini index (FMOLS), trade openness (DOLS), political stability and government effectiveness (FMOLS and DOLS), and control of corruption (FMOLS), have a significant relationship on the banking service/availability index. On the other hand, in the short-run, the error correction term indicates the wrong direction. Therefore, in the short-run, the finding is inappropriate to interpret the relationship between the globalization index and the inequality on financial inclusion in the short-run.

The other findings exhibit that in the long run, most of the explanatory variables have a significant impact on the index of banking product usage (*pc3*) under PMG estimation, while in the short-run, the effect cannot be precisely explained because the error correction term is insignificant. It shows that the linkage between the globalization index and inequality is more emphasized in the long-run. Besides, in the same period, several explanatory variables also had a significant effect on banking product usage index under different methods such as FDI inflows (FMOLS), per capita income (FMOLS and DOLS), trade openness (FMOLS and DOLS), globalization index and voice of accountability (FMOLS).

The latest finding expresses that, in the long-run under DOLS estimation, there is a significant effect of globalization indices and inequality indicators on the financial inclusion index (*pcafit*). In contrast, in the short-run, the globalization index's significant impact and several institutional quality indicators on the financial inclusion index can be exhibited by the PMG estimation model. In conclusion, the linkage between the globalization index and inequality on financial inclusion in 40 selected countries during 2000-2018 has been proven under different panel cointegration tests.

In general, in the short-run, PMG found that the financial inclusion index is determined by error correction term (speed of adjustment), per capita income, trade openness, globalization index, political stability, and absence of violence. Meanwhile, DFE indicates that the financial inclusion index is determined by per capita income, trade openness, and regulatory quality.

Furthermore, in the long-run, two methods indicate the significant impact of some explanatory variables on financial inclusion. Fully-modified OLS (FMOLS) exhibits that the financial inclusion index is significantly affected by per capita income, GINI index, globalization index, the rule of law, and corruption control. Besides, dynamic OLS (DOLS) found that the financial inclusion index is determined by foreign direct investment inflows, per capita income, GINI index, and globalization index.

An interesting finding has come by Kim (2015) that income inequality can be decreased under the financial inclusion system. Indirectly, this condition will encourage economic growth. It means that governments in selected 40 countries can utilize and implement financial inclusion policies to reduce income inequality levels significantly. Thus, the government will also be able to encourage economic growth. Similarly, Park & Mercado Jr. (2015) shows that income inequality and institutions' quality have a significant relationship with financial inclusion. Furthermore, they have identified several policy recommendations, such as utilizing the demographic structure in terms of age and education to encourage increased access to the financial system, systematically and consistently improve institutional quality, and strengthen financial institution systems widely accessed by the public.

## Conclusion

The study investigates the importance of institutions, inequality, and globalization on various financial inclusion dimensions. PCA is utilized to objectively measure the degree of financial inclusion in 40 selected countries from 2000-2018 and employ a panel threshold model to investigate globalization's threshold effect on financial inclusion. The study can also categorize the countries based on financial inclusion levels, where the finding exhibits six countries with strong financial inclusion and eight with weak financial inclusion. Furthermore, the threshold effect of globalization has a significant impact on the financial inclusion index. Besides, by estimating the threshold model's parameters separately, the study can identify the explanatory variables' idiosyncratic impacts on different financial inclusion dimensions. Lastly, the cointegration test shows a short-run and long-run association between financial inclusion with the explanatory variables.

Our investigation is relevant to policymakers in the following ways. First, governments can evaluate the financial inclusion index level to boost financial deeply during the globalization regime. Secondly, some macroeconomic policies can be designed to improve the quality of financial inclusion, such as maintaining a lower level of inequality and a higher macroeconomic institutional policy level. Finally, governments should increase international economic cooperation to maintain the quality of globalization to increase financial inclusion.

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