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Determinants of Inter- regional Financial Inclusion Heterogeneities in the Philippines

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Determinants of Inter-regional Financial Inclusion Heterogeneities in the Philippines

Je-Al Burguillos¹ and Danny Cassimon²

Abstract

This study explores the key factors that affected the deepening of financial inclusion across the 17 regions of the Philippines from 2013-2017. Using the regional multidimensional financial inclusion index (FII) developed by the BSP, the study finds out that significant heterogeneities exist among regions, and that they persist over time, suggesting most importantly that the least financially inclusive regions do not show significant progress. Moreover, using different panel estimation techniques, we try to determine the possible factors that affect this inter-regional financial inclusion heterogeneities. Overall, we show that regional GDP per capita, population, a proxy for the availability of physical infrastructure, and the degree of mobile penetration are among the robust factors explaining the financial inclusion variations across regions.

Keywords: financial inclusion, financial development, inter-regional disparities, the Philippines

JEL codes: I30, G18, O53, R11

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1. Introduction

The advancement of financial inclusion has been at the forefront of the global policy-making agenda. The acknowledgment of its transformative role by several supranational institutions including the United Nations and the World Bank could attest to its global importance (Demirgüç-Kunt et al., 2018; UNSGSA Annual Report, 2017). Given its pivotal role in promoting development, several countries have implemented a series of initiatives to foster a more inclusive financial system. For instance, Jahan et al. (2019) mentioned that national financial strategies have been established in various countries, including the Asia-Pacific region.

Focusing on the Philippines, financial inclusion has been a serious concern among policy-makers. In fact, improving the country's state of financial inclusion has been embraced as one of the main strategies in its quest for inclusive growth (NEDA, 2017). In 2015, the country established the National Strategy for Financial Inclusion (NSFI) which serves as the primary platform for coordination of various initiatives geared towards the advancement of financial inclusion (BSP, 2015a). Under the Philippines' NSFI, financial inclusion refers to "a state wherein there is effective access to a wide range of financial services for all (BSP, 2015a, p.2)." The said definition does not only entail the provision of appropriate financial products and services that cater to the needs of all population segments but also captures the improvement in consumers and households' welfare (Llanto, 2015; BSP, 2015a; Fujimoto & Rillo, 2014). In achieving a more inclusive financial system, the country's NSFI has identified four main areas of concern, namely: (a) policy and regulation; (b) financial education and consumer protection; (c) advocacy programs; and (d) data and measurement (BSP, 2015a).

In execution of this last focus on data and measurement, the NSFI strategy has also established a monitoring framework, that allows to track progress on financial inclusion in the Philippines, not only at national but also, importantly, at regional level, using a self-defined concept of financial inclusion, operationalised through a composite Financial Inclusion Index (FII), and track its inter-regional evolution using annual survey data. We will exploit these data to describe the evolution of financial inclusion over time, including its inter-regional disparities, as a basis to embark on an analysis that looks at the key factors that drive this evolution, and its inter-regional disparities.

The remainder of the paper is structured as follows: Section 2 summarizes the literature review on financial inclusion; Section 3 provides a snapshot of the state of financial inclusion in the Philippines, including including its performance relative to other members of the Association of Southeast Asian Nations (ASEAN) economies; Section 4 discusses data description and details of the research methodology, and the drivers of inter-regional disparities; Section 5 presents the empirical results, showing the evolution over time of these inter-regional disparities in the Philippines, followed by an analysis of the key drivers of this disparity. Section 6 concludes the paper.

2. Literature Review

As financial inclusion gains limelight in the policy-making agenda, it is not surprising that various studies empirically estimated the potential benefits of improving financial inclusion. At the individual and/or household level, improving financial inclusion resulted to higher welfare (Brune et al., 2011), increased savings (Ashraf et al., 2006), poverty reduction (Burgess and Pande, 2005) and income growth for both men and women (Swamy, 2014).

At the enterprise level, studies of Ayyagari et al. (2006), Beck et al. (2005), Carpenter and Petersen (2002) showed that while there could be several obstacles that could affect enterprises' growth, constraints relating to access to finance was shown to be a significant factor on firms' decision for expansion, particularly for small firms. At the macroeconomic level, Park and Mercado (2018) showed that economies with more inclusive financial system are significantly associated with lower poverty rates. Honohan (2008) and Tchamyu et al (2019) found out that improving financial access was strongly associated with lower income inequality. Controlling a country's economic growth and fiscal policy, Garcia-Herrero and Martinez-Turegano (2015) revealed that financial inclusion contributes to income inequality reduction.

As there could be vast amounts of data relating to financial inclusion, there is no straight forward approach in measuring the said concept due to the lack of single definition of what really constitutes financial inclusion (Camara & Tuesta, 2014). However, most of studies (Jahan et al., 2019; GPF, 2017; Camara & Tuesta, 2014; Hannig & Jansen, 2010) noted that the dimensions of financial inclusion are primarily classified into three (3) types, namely: (a) usage of financial services; (b) access to financial services; and (c) quality of financial services. Using these dimensions of financial inclusion, some empirical works also explored the possibility of constructing a multidimensional FII. Some of these studies include Park and Mercado (2018); Camara and Tuesta (2014); Sarma (2012); Arora (2010); and Sarma (2008).

In understanding the dynamics of financial inclusion, it is also of equal importance to unravel the possible factors affecting the deepening of financial inclusion, particularly in areas where a significant portion of individuals and/or households remains to be unserved or underserved. Using a panel data analysis, Mejia and Gil (2018) found out that financial inclusion, as represented by four indicators such as number of ATMs, ATMs per 1,000 km², number of deposit accounts and number of commercial banks, is positively significant with the country's GDP per capita while bears a negatively significant relationship with public debt.

By utilizing the general method of moments (GMM) estimation technique, Ajide (2017) showed that the country's GDP per capita, inflation, bank's concentration, and z-score are positively significant with financial inclusion. Olaniyi and Adeoye (2016), likewise, revealed that the country's per capita income, broad money as a percent of GDP, literacy rates, internet access, and the presence of Islamic banking bear important influence on financial inclusion. Gebregziabher and Makina (2015), who also used GMM technique, found out that financial inclusion is positively significant with GDP per capita and mobile penetration (a proxy for the availability of mobile infrastructure).

Employing GMM estimation and the quantile regression approach, Uddin, Chowdhury, and Islam (2017) revealed that if total bank deposit was used as the indicator of financial inclusion,

the bank's size and literacy rate bear a positive impact while gross national income (GNI), inflation and age dependency ratio showed a significant negative relationship. On other hand, if loans and advances were used to represent financial inclusion, bank's efficiency (as proxied by the cost to income ratio), loans' interest rate charges and inflation have a significant negative relationship.

Using the FII developed by Sarma (2008), Sarma and Pais (2011) showed that financial inclusion is significantly associated with GDP per capita, adult literacy rate, and infrastructure facilities (as represented by indicators like paved roads, internet, and mobile users). In another study, Zins and Weill (2016) showed that financial inclusion is largely influenced by individual characteristics such as income, educational level, gender, and age.

Concerning the Philippines, there are limited studies that empirically estimated the possible factors affecting financial inclusion. Using the National Baseline Survey on Financial Inclusion (NBSFI) and employing probit model estimation, Llanto and Rosellon (2017) explored factors that are correlated with access to various financial products and services. It was found out that individual's socio-demographic characteristics like income, employment, age, sex, and educational attainment are significantly correlated with access to financial services. After constructing an FII at the sub-national level for the years 2011 and 2014, Tan (2014) found out using correlational analysis that the regional FII values are positively associated with GDP per capita, urbanization level, and household's average income

3. Philippines: Status of Financial Inclusion at the National Level

Fostering a conducive regulatory environment is often regarded as the first step in addressing impediments to the growth of financial inclusion (Jahan et al., 2019). In the Philippine context, several agencies promote financial inclusiveness. The BSP supervises the banking institutions and NBFIs, whereas the Cooperative Development Agency (CDA) and the Insurance Commission (IC) are responsible for providing licensing permits, among others, to cooperatives and insurance entities, respectively (BSP, 2016a; Fujimoto & Rillo, 2014).

In the 2018 report of the Business Environment for Microfinance, the country ranked 4th globally for having an appropriate environment for financial inclusion (EIU, 2018). While this reflects significant improvements, the country's overall state of financial inclusion appears to be lagging behind when compared to other ASEAN economies (see Table 1).

In the report of Alliance of Financial Inclusion (AFI) and BSP (2014), and Tayag (2014), it is stated that addressing financial inclusion gaps remains a challenge given the archipelagic nature of the country. Apart from this, the disproportionate distribution of financial activities within the country further magnifies this challenge, with banking services largely concentrated in urbanized and populous regions (AFI & BSP, 2014). For instance, the geographic breakdown of some financial inclusion indicators such as the account ownership penetration, the number of banks and ATMs is showing highly skewed characteristic in favor of the NCR, with the ARMM being significantly underserved (BSP, 2017a; Fujimoto & Rillo, 2014).

Table 1. Selected Indicators of Financial Inclusion Across ASEAN Economies, 2017

Dimension of financial inclusion	PHP	KHR	IDN	MYS	SGP	THD	VNM
Usage							
Account at a formal financial institution (% age 15+)	34%	22%	49%	85%	98%	82%	31%
Number of deposit accounts with commercial banks per 1,000 adults	592	317	1,564	2,227	***	1,610	955
Savings at a formal financial institution (% of age 15+)	12%	5%	22%	38%	67%	39%	14%
Access							
Commercial bank branches per 100,000 adults	9	8	17	10	8	12	3
ATMs per 100,000 adults	28	17	56	47	65	117	24
Quality							
Disclosure index	5	1	4	5	***	5	0
Getting credit: Distance to frontier (0-100)	5	80	60	75	75	50	70

Notes: (a) PHP – Philippines; KHR – Cambodia; IDN – Indonesia; MYS – Malaysia; SGP – Singapore; THD – Thailand; VNM – Vietnam

(b) *** (Not available)

Source: WB Global Findex (2017); GPFII Financial Inclusion Indicators (2017)

4. Methodology

4.1. Data Collection and Measurement of Variables

Data were collected from various sources covering the 17 regions of the Philippines for the years 2013-2017³. Table 2 presents the definition and short descriptions of the variables included in the study.

The dependent variable (FII) refers to the multidimensional FII constructed by the BSP. The said index follows the methodology in computing the human development index and the human poverty index (BSP, 2014). Regional FII values are constructed based on the available data on the indicators of usage and access dimensions of financial inclusion. Before aggregation, the indicators are standardized first since these are expressed in different units (BSP, 2014). Higher weight is assigned to indicators relating to banking activities as these formal financial institutions offer a wider range of financial services as opposed to other financial service access points (BSP, 2014).

³ So far we could not include the data from the 2018 survey in the analysis as they were not yet publicly available at the time of publishing this Working Paper.

Table 2. Details of Variables Used

Notation	Variable	Description
FII	Financial inclusion index (FII)	Natural log of the FII
GDPPC	GDP per capita	Natural log of the regional GDP at 2000 prices/total population
INFL	Inflation rate	Annual change in consumer price index per region
POPEN	Population	Natural log of the total number of people in a region relative to the total population in the country
ROADS	Road quality*	Natural log of paved national roads (captures only those with surface type of concrete and asphalt, in kms)
MOBILE	Mobile penetration**	Natural log of the number of families in a region who reported to have ownership of mobile/cellular phones

Notes: * No available data for ARMM

** Considering that the data on mobile users are only published every three (3) years, interpolation was employed to compute the data for the years 2013, 2014, 2016 and 2017 using the data from 2009, 2012 and 2015, respectively.

4.2. Convergence Test

To analyze whether regions, particularly the laggards, are showing significant improvements in financial inclusion over the years, and thus financial inclusion gaps have narrowed, a convergence test was also employed. Following the studies of Kumar (2011) and Boyle and McCarthy (1997), Kendall’s index (KI) of rank concordance was used and calculated as follows:

$$RC_t = \frac{\text{Variance} \sum_{t=0}^T AR(Y)_{it}}{\text{Variance} ((T + 1) * AR(Y)_{i0})}$$

Source: Adopted from Boyle & McCarthy (1997)

where RC_t denotes Kendall’s index of rank concordance at time t , $AR(Y)_{it}$ refers to the actual rank of financial inclusion of region i at time t ; $AR(Y)_{i0}$ refers to the actual rank of financial inclusion of region i at the initial year; and T denotes the number of years.

4.3. Empirical Models

a. Pooled Ordinary Least Squares (OLS) Estimation, and Panel Fixed-effects (FE) or Random-effects (RE) Model

The pooled OLS estimation, with robust standard error (SE) that is effective against heteroscedasticity and autocorrelations, serves as the baseline model of the study. However, given the inherent nature of panel dataset which usually includes cross-sectional and time-invariant characteristics (Bevan & Danbolt, 2004), the pooled OLS may not be an appropriate estimation method, and thus a panel data approach (FE or RE model) was also performed. Both the FE and RE models were tested using the F-test, and Breusch and Pagan's Lagrange Multiplier (LM) test, respectively (Baltagi, 2005). In selecting between the FE or RE model, Hausman specification test was employed to determine the appropriate model (Baltagi, 2005).

Based on the above discussion, the panel data estimation was given as follows:

$$\ln Y_{it} = \alpha_1 + \alpha_2 X_{it} + \varepsilon_{it}$$

Where Y_{it} refers to financial inclusion index (FII) in a region i at time t ; α_1 a constant term; X_{it} a vector of explanatory variables (GDP per capita, inflation, population, road quality, and mobile users) in a region i at time t ; and ε_{it} is the disturbance term.

b. A Dynamic Panel Data Estimation (GMM estimation)

In recent years, several studies including Uddin, Chowdhury, and Islam (2017), Ajide (2017), Olaniyi and Adeoye (2016), and Gebregziabher and Makina (2015) used dynamic panel estimation approach in unraveling the determinants of financial inclusion.

The use of GMM estimation in this study is supported by Roodman (2006) who noted that the said estimation is appropriate for panel studies which have smaller T (periods) compared to N (number of groups), explanatory variables that are not strictly exogenous in nature, and where serial correlation and heteroscedasticity may exist among individual observations.

Given the time period covered, and the available number of observations included in this study, the first-difference GMM, as introduced by Arellano and Bond (1991), cannot be employed. Moreover, some studies pointed out some shortcomings associated with the use of difference GMM such as: (a) losing the pure cross-sectional element of the data; (b) differencing the variables may intensify measurement biases; and (c) lagged levels of variables could be weak instruments for difference GMM (Gebregziabher & Makina, 2015; Blundell and Bond, 1997). Proposed by Arellano and Bover (1995), the system GMM serves as an alternative method to eliminate the possible biasedness arising from the use of difference GMM. Against this backdrop, this study adopted a the two-step system GMM estimation, which incorporates the finite sample corrected standard errors introduced by Windmeijer (2005).

The empirical GMM model was given as follows:

$$\ln Y_{it} = C + \alpha_1 \ln Y_{t-1} + \alpha_2 X_{it} + D_t + \varepsilon_{it}$$

where Y_{it} refers to the financial inclusion index (FII) in a region i at time t , C is the constant term, Y_{t-1} is the lag of FII in a region i at time t , X_{it} denotes a vector of explanatory variables (GDP per capita, inflation, population, road quality, and mobile users) in a region i at time t , D refers to the time dummy variable, and ε_{it} is the disturbance term.

As recommended by Roodman (2006, p.42), the inclusion of time dummies makes the following assumption more valid - “the autocorrelation test and the robust estimates of the coefficient standard errors assume no correlation across individuals in the idiosyncratic disturbances.” The robustness of the estimation results was evaluated using the specification test for the presence of second-order (AR2) serial correlation in the first difference residuals developed by Arellano & Bond (1991) and the Sargan-Hansen test of overidentifying restrictions (Roodman, 2009; Roodman, 2006; Baum et al., 2003).

5. Results and Discussions

a. Descriptive Statistics

The computed FII values for the 17 regions of the Philippines for years 2013-2017 is presented in Table 3. The National Capital Region (NCR), Cavite, Laguna, Batangas, Rizal and Quezon (CALABARZON), and the Central Visayas as the most financially inclusive regions, while the Autonomous Region of Muslim Mindanao (ARMM), and the Eastern Visayas are the laggards.

These regions are further classified using Sarma’s (2011) FII categorization (i.e., below 0.3 index point as low FII; 0.3-0.6 index point as a medium FII, and above 0.6 index point as high FII). A cross-sectional comparison reveals some meaningful observations. First, only four regions (NCR, CALABARZON, Central Visayas, and Central Luzon) are included in the high FII category. The ARMM stands out in the group as it consistently registered the lowest value, even falling under low FII category. On the other hand, the remaining 12 regions have a medium level of financial inclusion. Over the timeframe covered in this study, there is no change in the empirical distribution of regions.

Table 3. Financial Inclusion Index (FII) Across the 17 Regions of the Philippines, 2013-2017

Region	2013	2014	2015	2016	2017	Average FII (2013-2017)
<i>Philippines</i>	0.66	0.68	0.7	0.71	0.71	0.69
NCR	0.98	0.99	1.00	1.00	1.00	0.99
CAR	0.48	0.49	0.52	0.56	0.59	0.53
Ilocos Region	0.51	0.53	0.56	0.57	0.59	0.55
Cagayan Valley	0.46	0.49	0.52	0.53	0.55	0.51
Central Luzon	0.62	0.64	0.67	0.67	0.66	0.65
CALABARZON	0.7	0.71	0.73	0.75	0.75	0.73
MIMAROPA	0.36	0.38	0.42	0.45	0.47	0.41
Bicol Region	0.4	0.42	0.45	0.46	0.47	0.44
Western Visayas	0.49	0.51	0.53	0.47	0.56	0.51
Central Visayas	0.68	0.69	0.71	0.7	0.73	0.70
Eastern Visayas	0.31	0.32	0.34	0.34	0.37	0.34
Zamboanga Peninsula	0.37	0.38	0.39	0.42	0.42	0.39
Northern Mindanao	0.47	0.49	0.46	0.47	0.48	0.47
Davao Region	0.45	0.48	0.52	0.57	0.56	0.52
SOCCSKSARGEN	0.4	0.42	0.4	0.42	0.44	0.42
Caraga	0.41	0.43	0.45	0.49	0.52	0.46
ARMM	0.07	0.08	0.09	0.08	0.08	0.08

Source: BSP except for the average FII which was computed by the authors

b. Convergence Test

The results of the convergence test using Kendall's index (KI) of rank is presented in Table 4. The null hypothesis of no association on the rankings of the 17 regions across the five-year period is strongly rejected. This implies that the financial inclusion gaps among regions have not changed over time, with the laggard regions not showing marked improvements. The computed KI values for the access and usage dimensions are likewise presented. The KI values are essentially depicting the same observation, albeit there are more changes in regional rankings in the usage dimension as opposed to the access dimension.

Table 4. Kendall's Index (KI) of Rank Concordance, 2013-2017

Year	FII		Access dimension		Usage dimension	
	KI	Chi-square stat	KI	Chi-square stat	KI	Chi-square stat
2013	1.000	16	1.000	16	1.000	16
2014	0.991**	31.72	0.998**	31.92	0.990**	31.69
2015	0.989***	47.48	0.995***	47.74	0.979***	47.01
2016	0.979***	62.65	0.993***	63.53	0.936***	59.9
2017	0.979***	78.35	0.989***	79.14	0.943***	75.44

Note: ***, **, and * imply statistical significance at 1%, 5% and 10% levels, respectively.

Source: Authors' calculations based on regional FII values

c. Empirical Estimations

Before proceeding to the presentation of econometric results, a formal diagnostic test using the variance inflation factor (VIF) showed that the variables mobile penetration and population were suffering from multicollinearity problem, suggesting the possibility of not including these variables in the same estimation model.

The results of the pooled OLS estimations indicated that the variables regional GDP per capita income, population, and mobile penetration are showing a positive and significant relationship with financial inclusion (Table 5, Models 1 and 2). Considering the peculiarities inherent to pooled dataset, the OLS estimation may be biased since it does not consider the presence of cross-sectional and time-invariant heterogeneities inherent in panel dataset (Bevan & Danbolt, 2004). As such, panel data estimation was also employed.

The result of the Hausman test favored the use of FE model. Table 5 (Models 3 and 4) revealed that variables like regional GDP per capita, population, road quality and mobile penetration exert a significant impact on deepening financial inclusion.

Table 5. Estimation Results of the Pooled OLS and FE Model

Independent variable	Model 1	Model 2	Model 3	Model 4
lnGDPPC	0.390*** (-0.024)	0.342*** (-0.0282)	0.335*** (-0.0727)	-0.172 (-0.154)
INFL	-0.0219 (-0.0137)	-0.0186 (-0.0132)	0.00166 (-0.00401)	0.00153 (-0.003)
lnPOP	0.128*** (-0.0209)		2.269*** (-0.685)	
lnROADS	0.0922 (-0.0576)	0.0572 (-0.0615)	0.374*** (-0.122)	0.231 (-0.172)
lnMOBILE		0.150*** (-0.024)		0.697** (-0.27)
Constant	-5.748*** (-0.594)	-5.796*** (-0.602)	-10.82*** (-1.038)	-5.340*** (-0.962)
F-stat	140.93***	148.84***	45.50***	17.25***
Number of observations	80	80	80	80
R-squared	0.799	0.813	0.761	0.761

Notes: (a) Robust standard errors are in parentheses;

(b) ***, **, and * imply statistical significance at 1%, 5% and 10% levels, respectively.

Source: Authors' calculations using various data sources.

We extended the empirical analysis using the GMM technique. The Arellano-Bond test for zero autocorrelation of AR(2) produced acceptable results, indicating that the null hypothesis of no serial correlation is not rejected. This implies that the original error terms are not serially correlated, and thus, moment conditions are correctly specified in the model (Arellano & Bond, 1991). The Hansen and Sargan tests, likewise, confirmed the overall validity of instruments used in the study.

Table 6 presents the results of the two-step system GMM. Both Models 7 and 8 showed that the lagged FII bears a significant and positive impact on contemporaneous financial inclusion, indicating a possible “catch-up effect.” Moreover, FII is found to be significant and positively related to regional GDP per capita, population, and mobile penetration indicator while inflation rate is negatively significant with the dependent variable.

Table 6. Estimation Results of the Dynamic Panel Data Approach (Two-Step System GMM)

Independent variable	Model 5	Model 6
Lag of dependent variable	0.440** (-0.176)	0.444** (-0.18)
lnGDPPC	0.204*** (-0.0621)	0.181*** (-0.0543)
INFL	-0.0359*** (-0.0112)	-0.0330*** (-0.0108)
lnPOP	0.0620* (-0.0315)	
lnROADS	0.0295 (-0.0388)	0.016 (-0.041)
lnMOBILE		0.0714* (-0.0351)
Sargan test	0.85 (-0.654)	0.89 (-0.6422)
Hansen test	2.6 (-0.272)	2.54 (-0.281)
AR(2) Test	-0.84 (-0.399)	-0.81 (-0.42)
F-stat/Wald- χ^2	351.06**	451.70 ***
Number of observations	64	64

Notes: (a) Year dummies are included in the two (2) models.

(b) Robust standard errors are in parentheses.

(c) ***, **, and * imply statistical significance at 1%, 5% and 10% levels, respectively.

Source: Author’s calculations using various data sources.

d. Robustness Checking

To ascertain how empirical results would look like, the computed access and usage dimensions of financial inclusion are also used separately as the dependent variable. In general, the results are largely in line with the empirical findings with those of the multidimensional FII. The summary of results using the three (3) estimation techniques are presented in Annexes 1 and 2.

6. Conclusion

This study explores the pertinent indicators that affected the deepening of financial inclusion across the 17 regions of the Philippines from 2013-2017. Using the regional multidimensional financial inclusion index (FII) developed by the BSP, the study finds out that significant heterogeneities persist among regions, with the National Capital Region (NCR), and the Cavite, Laguna, Batangas, Rizal and Quezon (CALABARZON) as the most financially inclusive regions, while the Autonomous Region of Muslim Mindanao (ARMM), and the Eastern Visayas are the laggards.

Using Kendall's index (KI) of rank concordance, the study showed that the financial inclusion gaps among regions have not decreased over time, suggesting that the least financially inclusive regions are not making significant improvements. Three (3) estimation techniques are used to determine the possible factors that affect inter-regional financial inclusion heterogeneities. The pooled OLS estimation, which serves as the baseline model, revealed that regional GDP per capita (a proxy for regional income), population, and mobile penetration indicator bear a significant and positive influence on financial inclusion. The fixed-effects (FE) model indicated that regional GDP per capita, road quality (a proxy for the availability of physical infrastructure), population and mobile penetration are significant and positively associated with FII values. The results of GMM estimation revealed that lagged FII, GDP per capita, inflation rate, population, and mobile penetration indicator are significant factors in explaining the financial inclusion variations across regions.

Overall, the empirical results of this study confirm the role of mobile infrastructure and the selected regional macroeconomic and socio-economic factors in shaping the state of financial inclusion across the 17 regions of the Philippines.

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**Annex 1. Estimation Results Using the Usage Dimension of Financial Inclusion
as the Dependent Variable**

Independent variable	Pooled OLS		FE Model		Two-step System GMM	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Lag of DV					0.521* (-0.274)	0.598** (-0.24)
lnGDPPC	0.381*** (-0.0463)	0.341*** (-0.0486)	0.676*** (-0.176)	-0.201 (-0.29)	0.371* (-0.202)	0.407* (-0.211)
INFL	-0.0370** (-0.0181)	-0.0354** (-0.0178)	-0.0025 (-0.0065)	-0.00095 (-0.0052)	-0.0129 (-0.029)	-0.0113 (-0.0273)
lnPOPNI	0.0443 (-0.0349)		3.300*** (-1.096)		-0.212 (-0.149)	
lnROADS	0.111 (-0.0777)	0.0724 (-0.081)	0.505** (-0.194)	0.124 (-0.159)	0.926*** (-0.217)	0.968*** (-0.231)
lnMOBILE		0.0776** (-0.0361)		1.328*** (-0.4)		-0.226 (-0.156)
Sargan test					0.53 (-0.766)	0.45 (-0.799)
Hansen test					0.52 (-0.773)	0.57 (-0.752)
AR(2) Test					-0.05 (-0.963)	-0.13 (-0.895)
F-stat/Wald- χ^2	25.88***	26.02***	18.16***	20.73***	96.05***	43.98***
R-squared	0.573	0.581	0.705	0.747		
Number of observations	80	80	80	80	64	64

Notes: (a) Year dummies are included in Models 5 and 6.

(b) Robust standard errors are in parentheses.

(c) ***, **, and * imply statistical significance at 1%, 5% and 10% levels, respectively.

Source: Authors' calculations using various data sources.

**Annex 2. Estimation Results Using the Access Dimension of Financial Inclusion
as the Dependent Variable**

Independent variable	Pooled OLS		FE Model		Two-step System GMM	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Lag of DV					0.784*** (-0.134)	0.816*** (-0.129)
lnGDPPC	0.392*** (-0.0305)	0.338*** (-0.0344)	0.0369 (-0.145)	-0.0701 (-0.127)	0.0924* (-0.0481)	0.0770* (-0.0383)
INFL	-0.00912 (-0.015)	-0.00456 (-0.0146)	0.00371 (-0.0036)	0.00237 (-0.0041)	-0.0203 (-0.0129)	-0.0181 (-0.0119)
lnPOPn	0.191*** (-0.026)		0.948 (-0.825)		0.00611 (-0.0259)	
lnROADS	0.0542 (-0.064)	0.0243 (-0.0675)	0.229 (-0.232)	0.300** (-0.138)	0.0355 (-0.0207)	0.0327* (-0.0179)
lnMOBILE		0.202*** (-0.0283)		0.0534 (-0.187)		0.00433 (-0.0278)
Sargan test					1.69 (-0.429)	1.48 (-0.477)
Hansen test					2.47 (-0.291)	2.29 (-0.318)
AR(2) Test					-0.43 (-0.669)	-0.45 (-0.656)
F-stat/Wald- χ^2	78.04***	77.48***	4.34***	4.91***	491.66***	2683.59***
R-squared	0.808	0.817	0.276	0.246		
Number of observations	80	80	80	80	64	64

Notes: (a) Year dummies are included in Models 5 and 6.

(b) Robust standard errors are in parentheses.

(c) ***, **, and * imply statistical significance at 1%, 5% and 10% levels, respectively.

Source: Authors' calculations using various data sources.