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ABSTRACT

Financial inclusion has become a policy priority in many developing countries, including the Philippines. However, the issue of its robust measurement is still outstanding. The challenge comes from the fact that financial inclusion is a multidimensional phenomenon. A comprehensive measure is therefore needed to adequately gauge the inclusiveness of a financial system. This paper constructed a Financial Inclusion Index (FII) to measure access to and usage of financial services in the Philippines using provincial data. Results show that while there are marked disparities based on the FII, there is geographical clustering wherein nearby provinces tend to exhibit similar levels of financial inclusion. The paper also showed the relationship between the FII and some variables that are often linked to financial inclusion such as income, poverty, literacy and employment as well the province's level of human development and competitiveness. On the methodological side, possible improvement and technical innovations in constructing the FII are laid out to maximize its potential as an analytical tool for surveillance and policy-making.

Key words: inclusive finance, composite indicator, financial inclusion index

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1. Introduction

Globally, it is estimated that 2 billion people do not have a formal account in a financial institution, while in the Philippines only 31% of adults have a formal account (World Bank, 2014). The extent of financial exclusion is remarkable that building inclusive financial systems has become an important development agenda both at the national and global level. The heightened interest also stems from a better understanding of the potential benefits of financial inclusion. Many studies have shown that the poor benefit enormously from access to basic financial services such as savings, credit, and insurance. For firms, particularly the micro, small and medium enterprises (MSMEs) that are subject to greater constraints, access to finance is associated with innovation, productivity, and job creation. A growing body of literature also suggests that financial inclusion can help alleviate poverty, reduce income inequality, and promote inclusive growth (Consultative Group to Assist the Poor, 2012; 2014).

While there has been a consensus on the importance of financial inclusion, Camara and Tuesta (2014) emphasized that efforts to measure it remain incomplete, while Amidžić, Massara and Mialou (2014) noted that the issue of its robust measurement is still outstanding, and Park and Mercado (2015) highlighted that there is no standard method by which it can be measured. The challenge comes from the fact that financial inclusion is a multidimensional phenomenon. While supply-side indicators such as the number of banks per 10,000 adults as well as demand-side indicators such as the percentage of households with a formal account[3] provide useful description of how inclusive a financial system is, these indicators only provide partial information when used individually. A comprehensive measure is therefore important to adequately gauge the inclusiveness of a financial system.

The objective for constructing a Financial Inclusion Index (FII) is to come up with a composite indicator that incorporates information on the different dimensions of financial inclusion. The potential benefits of developing an index are promising. For instance, it can serve as an analytical tool which can be used for surveillance and policy purposes on a regular basis. As an example, the Bangko Sentral ng Pilipinas (BSP) being the country's regulator of banks and other financial institutions, can use the FII in monitoring progress and assessing financial inclusion levels at the different parts of the country which can guide the formulation of informed policies and targeted interventions.[4]

This paper is organized as follows: Section 2 provides a brief background on financial inclusion in the Philippines. Section 3 reviews existing literature in index construction, with focus on indexing strategies for financial inclusion. Section 4 describes the data

[3] Following World Bank's definition, formal account often refers to an account at a bank or other formal financial institutions which can be used to save money. It may also include transactional accounts to send or receive money or make payments, and may include mobile money accounts as well.

[4] Other government agencies are already using composite indices for statistical and policy purposes. For instance, the Philippine Statistics Authority - National Statistical Coordination Board (PSA - NSCB) has institutionalized the computation of the Human Development Index (HDI) and the Good Governance Index (GDI) at the national and subnational level.

sources and empirical methodology. Section 5 presents the results, and finally Section 6 provides some concluding notes.

2. Financial inclusion in the Philippines

In the country's National Strategy for Financial Inclusion (NSFI)[5], Financial Inclusion is defined as a state wherein there is an effective access to a wide range of financial products and services for all Filipinos. Since the domestic financial system is predominantly bank-based with the banking sector accounting for more than 80% of its resources, promoting financial inclusion in the Philippines is almost synonymous to increasing access to banks which offer a wide range of financial services such as savings, investment, credit, insurance, and payments and remittance.

However, the archipelagic nature of the Philippines imposes serious physical barriers to access banking services. Nearly 600 of the country's 1,634 cities and municipalities remain unbanked. There are marked regional disparities as bank branches are concentrated in highly urbanized and populous areas of the National Capital Region (NCR), CALABARZON and Central Luzon, while other regions such as Eastern Visayas and Autonomous Region in Muslim Mindanao (ARMM) are significantly left underserved. NCR alone already accounts for 42% and 70% of the total number of deposit accounts and amount of deposits in banks, respectively. Fortunately, other non-bank financial services providers (FSPs) such as cooperatives, microfinance NGOs, financing/lending companies, pawnshops, remittance agents, money changers, and electronic money agents[6] are present in unbanked areas. It is estimated that only 12% of municipalities remain unserved if other FSPs are taken into account (BSP, 2014).

Usage of formal financial services is another challenge. Based on the National Baseline Survey on Financial Inclusion (NBSFI), 43% of Filipino adults have savings but 68% of them keep their savings at home and only 33% are saving in banks. Forty-seven percent (47%) of adults have outstanding loans of which around 72% borrow from informal sources such as family, friends and relatives as well as informal lenders and loan sharks.

In comparison with other countries, formal account penetration in the Philippines is comparable with Vietnam, higher than Lao PDR, Myanmar and Cambodia, but lagging behind Singapore, Malaysia, Thailand and Indonesia.

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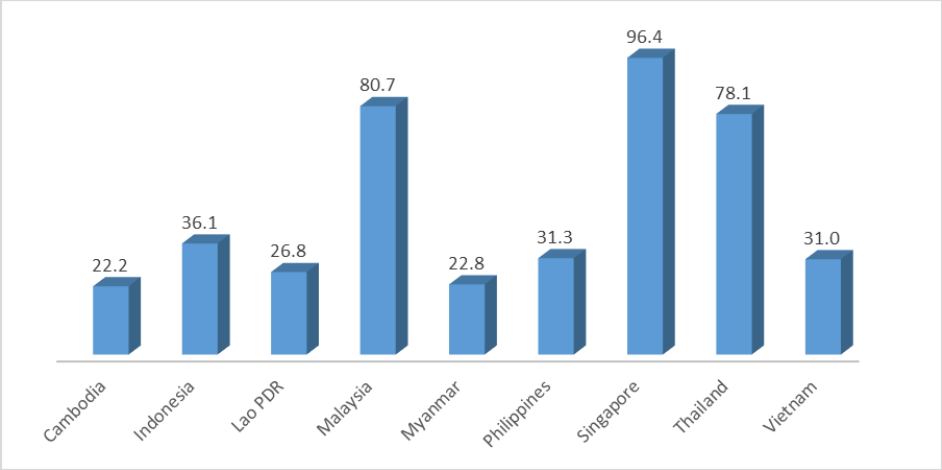
[5] The NSFI is a comprehensive document developed thru a broad-based consultative process with private and public sector stakeholders involved in financial sector development, to systematically accelerate the level of financial inclusion in the Philippines. It was initially crafted by the BSP and twelve other government agencies, including the PSA.

[6] E-money agents are cash-in/cash-out points where cash can be converted into e-money (e.g., GCash, SMART Money) and vice versa. E-money allows users to make payments and money transfers using a mobile phone or prepaid card. Examples of e-money agents include grocery stores, computer cafes, drugstores, bakeshops, among others. This make e-money agents viable access points of financial services especially in remote areas currently not being reached by banks.

Figure 1. Percentage of adults with a formal account: ASEAN



Source: World Bank Global Financial Inclusion Database (2014)

Recent studies on financial inclusion highlight the importance of data in measuring impact, identifying existing gaps and opportunities, and crafting evidence-based policies. At present, however, analysis of financial inclusion in the Philippines has been focused on unidimensional indicators. A multidimensional index providing a comprehensive measure financial inclusion is therefore needed.

3. Existing indexing strategies

A composite index (or simply an index) is constructed with an objective to obtain a synoptic or comprehensive single number, representing a wide array of measurements on the multiple aspects of a conceptual entity (Mishra, 2007). Simply put, an index measures multidimensional concepts which cannot be captured by a single indicator.

The general objective of most indices is to allow comparisons across time or space. For instance, when various indicators are used to evaluate two different provinces, some of these variables may be in favor of province *A* while other variables may be in favor of province *B*. An index is needed to compare these two provinces in terms of their overall performance.

On the methodological side, indexing strategies can be grouped into two main types: parametric and nonparametric.

Parametric approach

Parametric methods of index construction are based on multivariate techniques such as Principal Components Analysis (PCA) and Factor Analysis (FA). It is assumed that there is a latent structure behind the variation of a set of correlated indicators so that the importance of these indicators in the overall index can be determined endogenously. The usual procedure involves calculating the PC/factor loadings, multiplying the

standardized indicator values by the loadings and then summing up to produce the index.

It should be noted that when the dataset contains outlying observations, an index that is based purely on a parametric approach is not robust since outliers adversely affect the computation of the PCs/factors. These outliers cannot be removed from the analysis, otherwise there will be no computed index for them. In addition, different extraction methods supply different values for the PCs/factors and thus influencing the resulting indices and rankings. These are the major disadvantages of a parametric approach where the index is constructed endogenously. According to Mishra (2008), the more robust composite indices are ones that are exogenously determined.

Nonparametric approach

Exogenous construction of an index can be done through a nonparametric approach. Nonparametric methods involve standardization of variables based on some normalization rules and subsequently combining the indicators using an aggregation formula and weighting scheme.

The general formulation for a nonparametric index involves the following procedures: A dimension index d_i will be created for each dimension. Since the indicators have different units and thus cannot be aggregated directly, they need to be normalized. A common standardization technique is the Min-Max rule. Min-Max normalizes the indicators to have an identical range [0, 1] by subtracting the minimum value and dividing by the range:

$$d_i = \frac{x - m}{M - m} \quad (1)$$

where

x = actual value of the indicator
m = minimum
M = maximum

Another related standardization method is Distance to Reference (hereby denoted as DTR). This approach measures the relative position of an indicator with respect to a reference point. The reference could be a target to be reached or the maximum value (i.e., group leader). With R as the reference point, DTR is expressed as

$$d_i = \frac{x}{R} \quad (2)$$

The dimension indices will be combined into a composite measure by using an aggregation formula which is usually either linear or geometric. Let ω_i be the weight assigned to d_i and I be the final index. The formulas for linear and geometric aggregation, respectively are given by:

$$I_{Linear} = \frac{1}{n}(\sum_{i=1}^{n} \omega_i d_i) \quad (3)$$

$$I_{Geometric} = \prod_{i=1}^{n} {d_i}^{\omega_i} \quad (4)$$

If a dimension contains several indicators, say $x_1, x_2, \ldots, x_p$, normalization will be applied to each indicator and the standardized indicators will be aggregated to form the dimension index. In both linear and geometric aggregations, a deficit in one dimension can be offset or compensated by a surplus in another. This property is called substitutability, wherein an increase in one dimension can be compensated for by a decrease of equal (in case of arithmetic average) or proportional (in case of geometric average) magnitude in another dimension (Sarma, 2012).

Financial Inclusion Index (FII)

Several indexing strategies can be found in literature to measure financial inclusion across different countries using a multidimensional index. The country-level FII developed by Camara and Tuesta (2014) is PCA-based and thus purely parametric, while that of Sarma (2008, 2012), Chakravarty and Pal (2010) and Amidžić, Massara and Mialou (2014) are nonparametric.

Chakravarty and Pal (2010) used the Min-Max rule, and followed an axiomatic approach in index construction. Amidžić, Massara and Mialou (2014) utilized DTR in standardization and weighted geometric mean in aggregation wherein weights were derived using factor analysis.

Sarma (2012) adopted the methodology in the construction of the Human Development Index (HDI) to produce an index that will compare financial inclusion levels of different countries. The nonparametric FII is constructed as follows. A dimension index is computed based on the Min-Max rule where the weight is already incorporated:

$$d_i = \omega_i \frac{x - m}{M - m} \quad (5)$$

In Sarma's index, weights are arbitrary (that is, based on judgment). To address the presence of outliers which can distort the index since they will drive down the values for other areas, Sarma adopted a modified Min-Max rule wherein M is not necessarily the observed highest value in the dataset. Upper limits equivalent to the 90th percentile of the data were set in such a way that if a country has an indicator value higher than the upper bound, then it was set equal to the upper bound.

Based on the formulation in (5), $0 \leq d_i \leq \omega_i$. The higher the value of d_i, the higher the achievement in dimension *i*. If *n* dimensions of financial inclusion are considered, then the achievements in these dimensions will be represented by a point D = (d_1,d_2,…,d_n) on the *n*-dimensional space. Let O = (0, 0,…,0) represent the point indicating the worst

situation while W = (ω_1, ω_2, … ,ω_n) represent an ideal situation indicating the highest achievement in all dimensions. Sarma's formula for computing the FII is based on the notion of distance from a worst point and from an ideal point[7]:

$$FII = \frac{1}{2}\left[\frac{\sqrt{{d_1}^2+{d_2}^2+\cdots+{d_n}^2}}{\sqrt{{\omega_1}^2+{\omega_2}^2+\cdots+{\omega_n}^2}} + \left(1 - \frac{\sqrt{((\omega_1-d_1)^2+(\omega_2-d_2)^2+\cdots+(\omega_n-d_n)^2}}{\sqrt{{\omega_1}^2+{\omega_2}^2+\cdots+{\omega_n}^2}}\right)\right] \quad (6)$$

The location of point D vis-à-vis the worst point O and the ideal point W is the crucial factor in measuring an area's level of financial inclusion. Larger distance between D and O would indicate higher financial inclusion while smaller distance between D and W would indicate higher financial inclusion. The FII uses the average of the Euclidian distance between D and O and the inverse Euclidian distance between D and W. Both these distances are normalized by the distance between O and W, to make them lie between 0 and 1.

4. Methodology

Data

Existing country-level FIIs are constructed mostly using supply-side data, that is, data coming from financial institutions which are required to submit regular reports to the financial regulator. We included demand-side indicators to capture information coming from actual and potential users of financial services. With provinces as units of analysis, the data used in index construction were sourced from the following:

Table 1. Data used in the construction of FII

Data	Source
Number of banks and other financial service access points	Bangko Sentral ng Pilipinas (BSP)
Percentage of households with deposit, credit and insurance	Family Income and Expenditure Survey (FIES)
Adult population projection	Philippine Statistics Authority (PSA)
Habitable land area	National Mapping and Resource Information Authority (NAMRIA)

Index construction

Given the disadvantages of an index that is based purely on a parametric approach, the proposed FII was constructed using a nonparametric methodology. Following the result of a study which explored different scenarios in FII construction, and assessed the performance of the proposed FII against a set of tests for index numbers, this paper

[7] In Sarma (2008), only the distance from the ideal point was considered. This was based from the method of displaced ideal by Zeleny (1982) who first formulated the concept that a better system should have less distance from ideal.

followed a distance-based approach wherein indicators were normalized using modified DTR. For simplicity, equal weighting scheme was used.[8, 9]

The constructed FII covers two key dimensions of financial inclusion – access and usage.[10] Access refers to the availability of financial services and was measured using indicators that take into account the presence of banks and other FSPs[11] in relation to population and land area. Usage, on the other hand, refers to the adoption and uptake of financial services and was measured using the percentage of households with deposit, credit and insurance. Access indicators used supply-side data as of 2014, while usage indicators were sourced from the 2012 Family Income and Expenditure Survey (FIES).

Table 2. Dimensions and indicators in the FII[12]

Dimension	Indicator	Notation
Access d_1	Number of banks per 10,000 adults	x_{11}
	Number of other financial service access points per 10,000 adults	x_{12}
	Number of banks per 100 sq. km.	x_{13}
	Number of other financial service access points per 100 sq. km.	x_{14}
Usage d_2	Percentage with deposits and/or investments	x_{21}
	Percentage with outstanding loans	x_{22}
	Percentage with insurance	x_{23}

Since the indicators have different units and thus cannot be aggregated directly, they were first normalized. A modified version of DTR was employed to address the presence of outliers. In modified DTR, we set $R = M^*$ where M^* is the highest value less than $Q_3 + 1.5(Q_3 - Q_1)$.[13] If the actual value is higher than M^*, we set it to M^*. Let x_{ij} be the value of indicator *j* under dimension *i* and $x_{ij}{}^*$ be its normalized value multiplied

[8] In the said study, the behavior of the FII was investigated using different scenarios and tests. Results show that weighting scheme does not appear to have a substantial impact on the resulting FIIs, compared to the effect of the chosen normalization and aggregation method. The presence of outlying observations should be considered in the normalization rule because pure Min-Max or DTR will produce moderately different FIIs and rankings compared when a modified version of these standardization techniques will be used. The choice of the aggregation method is perhaps one of the most important considerations. In comparison with linear and geometric aggregation, the distance-based approach possesses desirable mathematical properties that make it suitable for an index of financial inclusion.

[9] Alternatively, weights can be derived using PCA or FA. While this approach allows objective assignment of weights, the tendency is to assign heavier weights to indicators or dimensions where there is greater variability. The advantage of an exogenous weighting scheme is that users will be able to assign heavier weights to indicators or dimensions deemed more important.

[10] There are two other dimensions of financial inclusion namely, quality and welfare. Quality refers to consumer experience and measures the relevance of financial products and services, while welfare refers to the impact that financial inclusion brings to the people. However, these dimensions are more qualitative in nature and data availability is a limitation.

[11] In this paper, other FSPs include non-bank financial institutions with and without quasi-banking functions that are under BSP supervision (e.g., financing companies, lending investors, pawnshops, remittance agents, credit-granting entities, e-money issuers)

[12] One may raise the issue that access indicators are based on individual adults while usage indicators are based on households. This is because of limitations in available data. Currently, there are three demand-side surveys related to financial inclusion (NBSFI, Consumer Finance Survey, and FIES). The NBSFI is the only survey based on adults, but it can only generate estimates at the national level and by major island groups (NCR, Balance Luzon, Visayas, Mindanao). Only FIES can produce provincial estimates.

[13] Following Tukey's method of outliers, $Q_3 + 1.5(Q_3 - Q_1)$ is the upper fence in boxplot construction.

by w_{ij} which is the corresponding weight, $\sum_{j=1}^{p} w_{ij}$ = 1 and 0 ≤ w_{ij} ≤ 1. Mathematically, the standardization procedure used in this study can be expressed as

$$x_{ij}{}^{*} = \begin{cases} w_{ij}\frac{x_{ij}}{R}, & if\ x_{ij} < R \\ w_{ij}, & if\ x_{ij} \geq R \end{cases} \tag{7}$$

Using distance-based aggregation which is based on the notion of distance from the worst point and the ideal point, the dimension indices are given by

$$d_1 = \frac{1}{2}\left[\frac{\sqrt{x_{11}{}^{*2}+x_{12}{}^{*2}+x_{13}{}^{*2}+x_{14}{}^{*2}}}{\sqrt{w_{11}{}^{2}+w_{12}{}^{2}+w_{13}{}^{2}+w_{14}{}^{*2}}} + \left(1 - \frac{\sqrt{(w_{11}-x_{11}{}^{*})^2+(w_{12}-x_{12}{}^{*})^2+(w_{13}-x_{13}{}^{*})^2+(w_{14}-x_{14}{}^{*})^2}}{\sqrt{w_{11}{}^{2}+w_{12}{}^{2}+w_{13}{}^{2}+w_{14}{}^{*2}}}\right)\right] \tag{8}$$

$$d_2 = \frac{1}{2}\left[\frac{\sqrt{x_{21}{}^{*2}+x_{22}{}^{*2}+x_{23}{}^{*2}}}{\sqrt{w_{21}{}^{2}+w_{22}{}^{2}+w_{23}{}^{2}}} + \left(1 - \frac{\sqrt{(w_{21}-x_{21}{}^{*})^2+(w_{22}-x_{22}{}^{*})^2+(w_{23}-x_{23}{}^{*})^2}}{\sqrt{w_{21}{}^{2}+w_{22}{}^{2}+w_{23}{}^{2}}}\right)\right] \tag{9}$$

Let $d_i{}^{*}$ = $\omega_i d_i$ where the weight ω_i is such that $\sum_{i=1}^{n} \omega_i$ = 1 and 0 ≤ ω_i ≤ 1. By using another round of distance-based aggregation, the FII is given by

$$FII = \frac{1}{2}\left[\frac{\sqrt{d_1{}^{*2}+d_2{}^{*2}}}{\sqrt{\omega_1{}^{2}+\omega_2{}^{2}}} + \left(1 - \frac{\sqrt{(\omega_1-d_1{}^{*})^2+(\omega_2-d_2{}^{*})^2}}{\sqrt{\omega_1{}^{2}+\omega_2{}^{2}}}\right)\right] \tag{10}$$

5. Results and Discussion

Table 3 shows the key indicators of financial inclusion at the national level, in NCR, and in select provinces. In the Philippines, there are approximately 2 banks and 5 other FSPs per 10,000 adults. On a per 100 sq. km basis, there are 7 banks and 10 other FSPs. However, the national indicator is being pulled up by NCR which is an outlier especially in terms of the number of banks and other FSPs per 100 sq. km.

With regard to usage, only 2 out of 10 households have a deposit or investment account, and the same estimate applies for households with outstanding loan[14]. Four (4) out of 10 households are covered by insurance. While it appears that more Filipinos have insurance than deposit and credit, it should be noted that the FIES question on insurance include government health insurance and pension system (i.e., PhilHealth, GSIS, SSS) and not just private insurance plan.

Table 3. Indicators of financial inclusion for selected areas

[14] Due to lack of a specific question in the FIES asking if the household has an outstanding loan from a formal financial institution, the estimate on the percentage of households with credit is based on the question asking the household if it has cash loan payments during the period specified.

	No. of banks per 10,000 adults	No. of other FSPs per 10,000 adults	No. of banks per 100 km^2	No. of other FSPs per 100 km^2	% with deposit/ investment	% with credit	% with insurance
Philippines	1.50	4.86	7.27	9.89	0.23	0.23	0.41
Metro Manila	3.76	12.38	679.01	1,738.39	0.44	0.14	0.61
Select Provinces							
Laguna	2.32	6.80	32.14	66.12	0.49	0.27	0.66
Davao del Sur	1.60	6.23	11.55	15.83	0.04	0.24	0.54
Pangasinan	1.11	3.70	5.94	147.50	0.18	0.19	0.28
Occidental Mindoro	1.29	1.84	2.82	1.07	0.47	0.46	0.47
Batanes	1.96	3.91	4.04	2.74	0.18	0.18	0.27
Mountain Province	0.73	0.49	1.87	0.28	0.37	0.19	0.38
Sulu	0.11	0.99	1.26	1.54	0.00	0.03	0.00

Note: Blue – included in the top 10 provinces
Red – included in the bottom 10 provinces

From Table 3, it can be observed that Laguna is always included in the top 10 across all indicators, except on the percentage of households with credit. On the other hand, Sulu is always at the bottom 10 in most indicators. The number of banks and other FSPs per 10,000 adults in Sulu has not even reached the minimum value of 1. There is roughly 1 bank and 2 other FSPs per 100 sq. km in Sulu, which is extremely low compared to NCR where there are 679 banks and 1,738 other FSPs per 100 sq. km. For provinces like Laguna and Sulu, it is easy to describe the level of financial inclusion as high and low, respectively.

However, this “dashboard approach” in looking at financial inclusion at the subnational level is not always straightforward. For instance, Davao del Sur always tops in access indicators, but it belongs to the bottom 10 in terms of percentage of households with deposit account. Mountain Province has a relatively high percentage of households with deposit, even if it is included in the provinces with the least number of other FSPs. Pangasinan has most number of other FSPs per 100 sq. km, but was never part of the top 10 in all other indicators. Occidental Mindoro’s access indicators are not among the highest, but it has a relatively high percentage of households with deposit and credit. Batanes stood out in terms of number of banks vis-à-vis adult population, but not in other indicators.

As evident from these examples, any one single indicator fails to adequately capture the extent of financial inclusion. Thus there is a need for a single measure that will summarize the information being provided by the different indicators. This will facilitate comparison of financial inclusion at the subnational level.

The resulting FIIs are presented in Table 4. The provinces were grouped into three categories. The grouping was based on quartiles where Q_1 = 0.40, Q_2 = 0.50 and Q_3 = 0.60 so that FIIs below 0.40 are considered "low", FIIs greater than 0.60 are considered "high" and FIIs in between are considered "average". Many provinces (41%) belong to the average category, while provinces with high FII make up the smallest group (26%). One third of the provinces fall under the group with low FII. Initiatives to build a more inclusive domestic financial system may consider these provinces with low FII as focus geographical areas.

Table 4. Resulting FII of provinces

High		Average		Low	
Laguna	**0.961**	Marinduque	**0.583**	Aurora	**0.400**
Cavite	**0.852**	Iloilo	**0.571**	Negros Oriental	**0.384**
Batangas	**0.835**	Nueva Ecija	**0.565**	Ifugao	**0.379**
Benguet	**0.832**	Quezon	**0.561**	Catanduanes	**0.377**
Rizal	**0.816**	Tarlac	**0.541**	Sarangani	**0.370**
Cebu	**0.765**	Surigao del Sur	**0.538**	Sorsogon	**0.367**
Davao del Sur	**0.740**	Camarines Sur	**0.533**	Ilocos Norte	**0.359**
Pampanga	**0.735**	Negros Occidental	**0.523**	Cagayan	**0.357**
Misamis Oriental	**0.716**	Capiz	**0.516**	Palawan	**0.353**
South Cotabato	**0.705**	Camiguin	**0.508**	Kalinga	**0.352**
La Union	**0.700**	Masbate	**0.501**	Davao Oriental	**0.352**
Aklan	**0.690**	Misamis Occidental	**0.492**	Guimaras	**0.347**
Bulacan	**0.681**	Albay	**0.490**	Western Samar	**0.343**
Davao del Norte	**0.669**	Batanes	**0.484**	Dinagat Islands	**0.336**
Bataan	**0.652**	Surigao del Norte	**0.480**	Lanao del Norte	**0.310**
Zambales	**0.649**	Ilocos Sur	**0.475**	Romblon	**0.298**
Agusan del Norte	**0.646**	Leyte	**0.467**	Sultan Kudarat	**0.283**
Camarines Norte	**0.640**	Bohol	**0.454**	Quirino	**0.263**
Oriental Mindoro	**0.625**	Nueva Vizcaya	**0.452**	Eastern Samar	**0.251**
Pangasinan	**0.608**	Southern Leyte	**0.449**	Northern Samar	**0.246**
Occidental Mindoro	**0.605**	Compostela Valley Province	**0.446**	Abra	**0.146**
		Zamboanga del Sur	**0.442**	Apayao	**0.144**
		Biliran	**0.441**	Basilan	**0.143**
		Zamboanga Sibugay	**0.439**	Maguindanao	**0.142**
		Siquijor	**0.437**	Tawi-Tawi	**0.127**
		Mountain Province	**0.436**	Sulu	**0.078**
		Isabela	**0.430**		
		Bukidnon	**0.416**		
		North Cotabato	**0.415**		
		Antique	**0.415**		
		Zamboanga del Norte	**0.414**		
		Lanao del Sur	**0.413**		
		Agusan del Sur	**0.408**		

Laguna emerged as the province with the highest level of financial inclusion (FII = 0.961). Three other provinces in CALABARZON are in the top 5 namely, Cavite, Batangas and Rizal while Benguet was in 4th spot. The provinces where Cebu City and Davao City are located are in the 6th and 7th place, respectively.

On the other hand, Sulu obtained the lowest FII value (0.078), followed by three other provinces in ARMM (Tawi-tawi, Maguindanao, and Basilan). Next are two provinces from the Cordillera Administrative Region (Abra and Apayao) and two provinces from Eastern Visayas (Eastern and Northern Samar). Looking at these provinces, some possible reasons may already be deduced as to why they have the lowest levels of financial inclusion: 1) continuing conflicts and problems on peace and order; 2) mountainous terrain; 3) high poverty incidence and; 4) being prone to typhoons.

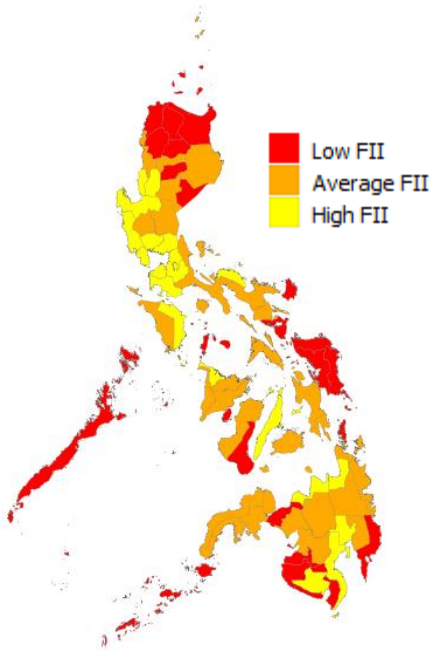


Figure 2. Choropleth map of the Philippines based on provincial FIIs

Figure 3 shows the spatial map of the provinces based on their FII. The map shows sign of geographical clustering wherein the magnitude of the FII in one province is similar with that of its neighboring provinces. The existence of spatial autocorrelation was formally tested and the results are given in Table 5. The estimated Moran's index[15] suggests that there is positive spatial autocorrelation. This means that nearby provinces tend to exhibit similar levels of financial inclusion.

Table 5. Test for spatial autocorrelation

Moran's Index	Standard Deviation	z-stat	p-value
0.128	0.021	6.595	0.000

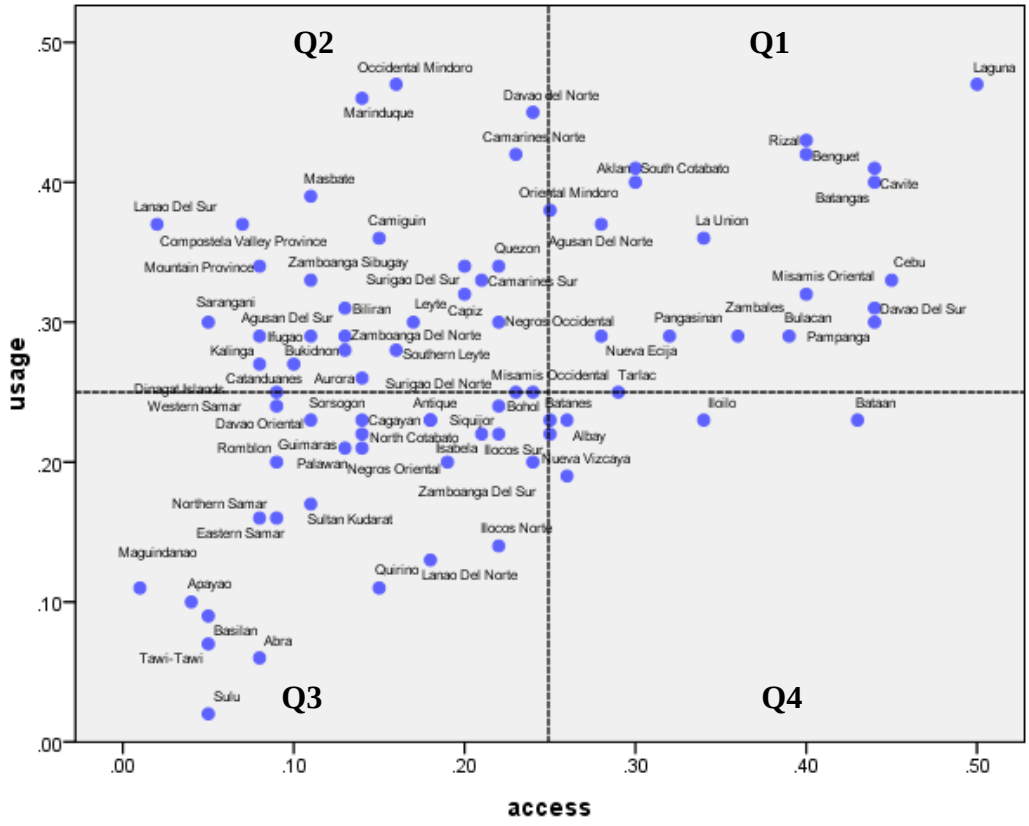
Figures 4 decomposes the FII based on the two dimensions - access and usage. The ideal point is W = (ω_1, ω_2) = (0.5, 0.5) while the worst point is the origin O = (0, 0). If a province's point is represented by D = (d_1^*, d_2^*), its FII will be high if there is a larger distance between D and O, and smaller distance between D and W.

Note that the points are more concentrated on the left half of the horizontal axis, indicating that most provinces still have low level of access. The upper right quadrant (**Q1**), which contains the provinces with high FII, is the group with high access and high usage. The lower left quadrant (**Q3**), which contains the provinces with low FII, is the group with low access and low usage. Note that very few provinces are in the lower right quadrant (**Q4**), suggesting that it is less likely for usage to be low if access is high.

[15] Moran's I is a well-known measure of spatial dependence. Its range of possible values is from -1 to 1, where a positive value indicates that similar values are more likely than dissimilar values between neighbors. Higher values of Moran's I indicate stronger geographical clustering**,** that is, values for neighboring units are similar to one another. A zero value indicates a random spatial pattern.

This may indicate that access reinforces usage. Note also that if a trend line will be fitted on the scatter plot, it will have a positive slope providing further indication that access and usage are positively correlated.

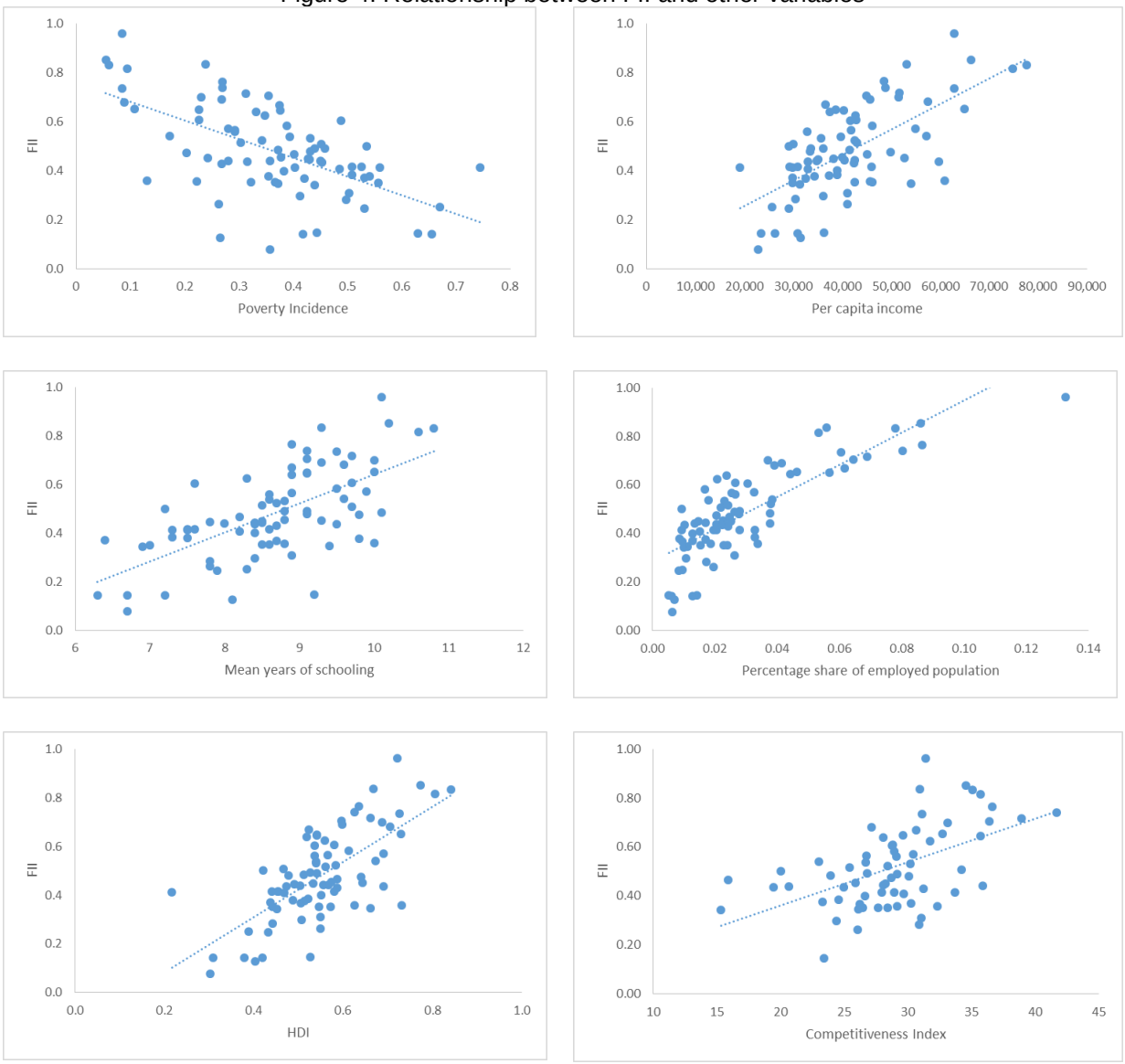
Figure 3. Access and usage dimensions of the FII



It may be interesting to look at the relationship between the FII and some variables that are often linked to financial inclusion. These include income, poverty and other factors such as literacy and employment. The study also looked at the correlation between the FII and other popular indices such as the Human Development Index (HDI) and the Provincial Competitiveness Index.

The plots show that financial inclusion, as measured by the FII, is inversely related with poverty. Financial inclusion has significant negative correlation (r = -0.61) with poverty which means that higher level of financial inclusion is associated with lower poverty incidence, and vice versa. This supports the theoretical literature linking financial inclusion with improved welfare.

Figure 4. Relationship between FII and other variables



Financial inclusion is also very much related to income, literacy and employment so we correlated the FII with these variables. There is positive correlation wherein higher income, more years of schooling and a larger percentage of working population are associated with higher levels of financial inclusion. The same is true with the HDI and the Provincial Competiveness Index since the FII moves in the same direction with these indices. As the level of a province's human development and competitiveness increases, financial inclusion tends to increase as well.

6. Concluding Notes

This study is only a first step in the direction of appropriately measuring financial inclusion in the Philippines. Improvements and technical innovations in constructing the FII are possible, and it is hoped that this paper could further stimulate interest to

conduct more studies related to financial inclusion. For instance, the FII can be used in econometric models requiring a measure of financial inclusion. It can serve as a response variable in regression models to identify the key drivers of financial inclusion. Alternatively, the FII can be used as a regressor to test whether financial inclusion significantly contributes to the reduction of poverty and income inequality.

The FII can be recalculated using updated supply-side data for the access indicators and the latest FIES dataset for the usage indicators. In this way, we can track progress and identify provinces with the least and greatest improvement.

With respect to the data requirements, the study highlighted the need to have a survey that will be able to generate provincial statistics on the percentage of households with access to formal savings, credit and insurance. The inclusion of rider questions in the FIES may merit consideration, since it is the only relevant survey which can produce provincial estimates. Ownership of transactional accounts for payments and remittance can be also added as another usage indicator. Improving the data elements of the FII can be explored in the Data and Measurement Working Group of the Financial Inclusion Steering Committee, where both the BSP and the PSA are members.

On the empirical front, the study demonstrated that there are marked disparities among provinces in terms of financial inclusion. Greater disparities are expected if city- and municipal-level FIIs will be generated. This may be explored in the future as more granular data on financial inclusion becomes available. The existence of geographical clustering should be taken into account because as seen in this study, financial inclusion is also a spatial phenomenon.

The potential of financial inclusion to improve welfare is already a compelling reason for policymakers and private providers to formulate deliberate measures aimed at increasing access to and usage of formal financial services. The provinces identified to have low level of financial inclusion based on the FII deserve attention if an inclusive financial system that supports broad-based, inclusive growth is the ultimate goal.

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