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Understanding and Measuring Financial Inclusion in the Philippines

Margarita Debuque-Gonzales and John Paul Corpus



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Abstract

Financial inclusion can help curb poverty, reduce inequality, and potentially enhance productivity and long-term growth. However, empirical research on financial inclusion remains limited, particularly at the country level. To fill this gap, this paper conducts an empirical exploration of financial inclusion in the Philippines. Its specific objectives are to: (1) benchmark financial inclusion in the Philippines versus other countries in developing Asia; (2) capture stylized facts about financial inclusion in the country based on analysis of demand-side data; and (3) construct a subnational financial inclusion index that can be used, moving forward, to estimate the links of financial inclusion with economic growth, development, and financial stability. The Philippines leads comparator countries in terms of the enabling environment, has mixed performance in financial outreach, and lags in financial account ownership and usage. Less than 15 percent of adults in the country save money using a formal account, while less than a tenth use formal credit, among the lowest proportions in the region. In terms of stylized facts, we find that greater education, higher income, being female, being employed, and being older (up to a certain point) make financial inclusion, particularly formal account ownership and credit use, more likely. Fintech in the form of mobile money appears promising with seemingly the most equitable access among the different forms of financial inclusion, although account ownership remains scant and limited to more urbanized areas. Individuals with less education and those coming from lower-income households are more likely to be “involuntarily” excluded from the formal financial sector. To construct a subnational financial inclusion index, this paper makes use of supply-side data on outreach and usage of financial services in Philippine regions, with weights derived via principal component analysis. The computed regional index is positively associated with GDP per capita, literacy, and electricity access, and negatively associated with poverty incidence, in line with the demand-side analysis and reasonable expectations about the relationship between financial inclusion and development indicators.

Keywords: Financial inclusion, financial inclusion index

Table of contents

1. Introduction.....	1
2. Regional perspective on financial inclusion.....	2
3. Understanding financial inclusion in the Philippines	6
3.1. Brief literature review.....	6
3.2. Pushing the research envelope on financial inclusion.....	8
3.3. Methodology	8
3.4. Results and discussion.....	12
4. Measuring financial inclusion in the Philippines.....	19
4.1. Brief literature review.....	19
4.2. Methodology	20
4.3. Data.....	21
4.4. Results and discussion.....	29
5. Concluding remarks	42
References.....	44

List of tables

Table 2.1. Financial access indicators – geographic and demographic penetration	3
Table 2.2. Financial access indicators – bank deposits and loans.....	4
Table 2.3. Financial access indicators – other accounts.....	4
Table 2.4. Financial inclusion indicators – account ownership	4
Table 2.5. Financial inclusion indicators – account usage.....	5
Table 2.6. Alternative forms of saving and borrowing	5
Table 2.7. Reasons for not having a formal account.....	6
Table 3.1. Description of the main variables and their summary statistics.....	11
Table 3.2. Determinants of account ownership.....	14
Table 3.3. Determinants of account usage	15
Table 3.4. Determinants of alternative borrowing sources	17
Table 3.5. Perceived barriers to account ownership and individual characteristics.....	18
Table 4.1. Dimensions and indicators of financial inclusion	20
Table 4.2. Summary of financial inclusion indicators	24
Table 4.3. Pairwise correlation of standardized indicators	28
Table 4.4. Principal component estimates and PCA loadings for baseline specification	30
Table 4.5. Principal component estimates and PCA loadings for alternative specification.....	31

List of figures

Figure 2.1. Financial inclusion in the Philippines vs. developing Asia	3
Figure 4.1. Mean demographic outreach by region, 2013-2019	25
Figure 4.2. Mean geographic outreach by region, 2013-2019	26
Figure 4.3. Mean financial usage by region, 2013-2019.....	27
Figure 4.4. Average financial inclusion index scores, baseline specification (2013-2019).....	33
Figure 4.5. Average financial inclusion index, alternative specification (2013-2017)	34
Figure 4.6. Financial inclusion index, 2013-2019.....	35
Figure 4.7. Baseline vs. alternative financial inclusion index.....	36
Figure 4.8. Baseline financial inclusion index vs. demographic outreach indicators	37
Figure 4.9. Baseline financial inclusion index vs. geographic outreach indicators	38
Figure 4.10. Baseline financial inclusion index vs. usage indicators.....	39
Figure 4.11. Financial inclusion index vs. socio-economic indicators	40

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*Margarita Debuque-Gonzales and John Paul Corpus**

1. Introduction

Conceptually, financial inclusion can help reduce poverty and inequality by helping individuals invest for the future, smooth consumption, and manage financial risk (Demirgüç-Kunt, Klapper and Singer [DKKS] 2017). Financial inclusion can also potentially facilitate investment in education and businesses, which can enhance productivity and long-term economic growth (DKKS 2017). But unlike financial depth, there is still limited empirical research on financial inclusion. There is a need to further understand individual behavior in relation to financial inclusion, and to study the latter's impact on economic growth and development.

According to new research (Gutierrez-Romero and Ahamed 2021), financial inclusion can help curb the rise in poverty, albeit indirectly, by mitigating the detrimental effect of inequality on poverty. Based on their forecasts, extreme poverty will rise due to the COVID-19 pandemic, but urgent improvements in financial inclusion can substantially lessen this harsh effect.

Although financial inclusion is widely considered to be important, there is still no formal consensus on measurement (Tram, Lai and Nguyen 2021; Park and Mercado 2018). In the Philippines, meaningful analysis requires building a (dynamic) panel dataset at a regional level if one wishes to examine and confirm systematic relationships of financial inclusion with output growth and development variables. Measurement is also important for examining the impact of financial inclusion on financial stability and the link with remittances and monetary policy.

Given the need for further research in the area, this paper conducts an empirical exploration of financial inclusion in the Philippines, using available data and updated methods, as part of a research program that investigates the link between the financial sector and economic growth and development. It aims to address the following research questions:

1. How does the Philippines compare with other countries in developing Asia in terms of financial inclusion?
2. What are the stylized facts of financial inclusion in the Philippines when it comes to individual behavior?
3. Since financial inclusion is multidimensional, how do we construct a measure at the subnational level that can help us answer important empirical/policy questions?

This paper is structured as follows. Section 2 benchmarks the Philippines' performance in financial inclusion against comparable developing countries in Asia using the most recent data available. Section 3 draws out the stylized facts about the relationship between individual characteristics and financial inclusion in the Philippines via probit regressions. Section 4 constructs a regional financial inclusion index using principal component analysis. Section 5 provides concluding remarks.

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2. Regional perspective on financial inclusion

In this section, we benchmark financial inclusion in the Philippines against comparable developing countries in ASEAN (namely, Indonesia, Malaysia, Thailand, and Vietnam) plus China and India. Figure 2.1 shows the Philippines leading the region in terms of strength of the enabling environment, as evaluated by the Economist Intelligence Unit (EIU) in the *Global Microscope 2020*. The latest rankings of the publication were based on expert interviews and desk analysis conducted between June and September 2020.

The Philippines has the second highest overall score for financial inclusion next to India and is at the forefront in the areas of “stability and integrity” and “products and outlets.” The former refers to the regulation, supervision, and monitoring of financial service providers serving low- and middle-income populations, while the latter refers to the regulation of financial products and outlets focusing on and/or reaching these populations (EIU 2020). The country scores highly as well in terms of “government and policy,” particularly relating to the degree of coordination and incentives established to create a favorable environment for financial inclusion.

The country’s performance in terms of supply-side indicators of access to and use of financial services, however, is mixed. Based on the International Monetary Fund’s 2019 Financial Access Survey (FAS), the Philippines leads developing ASEAN and most of its neighbors in geographic outreach of commercial banks (second only to India) and ATMs (behind Thailand and China) but has relatively weak performance in the corresponding indicators for demographic outreach, which fall below the ASEAN average (Table 2.1). The country ranks last and second-to-last, respectively, in terms of the value of commercial bank loans and deposits relative to GDP (Table 2.2). Yet, it leads all or most of its neighbors in geographic and demographic outreach of other deposit takers, while the value of deposits and loans from these institutions as a percentage of GDP are both close to the developing ASEAN average (Table 2.1 and 2.2).

In terms of access to other financial services, the Philippines ranks last among comparable neighbors in the demographic penetration of debit cards, and middling in access to credit cards (Table 2.3). The country also ranks last in terms of registered mobile money accounts, and second-to-last in terms of the number of mobile money transactions per 1,000 adults. Nevertheless, it surpasses the three other countries with available data (Indonesia, India, and Thailand) in terms of outstanding balances on active mobile accounts, as well as the value of mobile money transactions, as a percentage of GDP.

In contrast, the Philippines generally lags comparator countries in many key areas based on demand-side indicators on financial services access and usage. In the World Bank’s 2017 Global Findex database, it places second-to-last in share of adults with a formal financial account (34.1 percent) and last both in the ownership of debit cards (23.4 percent) and credit cards (2.1 percent), although the country does better in terms of mobile money account ownership (4.5 percent), falling third behind Malaysia and Thailand (Table 2.4).¹

The country generally lags its neighbors in terms of usage of formal financial services. Although over half (59.5 percent) of Filipino adults saved in 2017, only 13 percent reported having a formal savings account, putting it dead last among its neighbors (Table 2.5 and 2.6). Similarly, although 59.2 percent of adults reported borrowing in 2017, a mere 9.5 percent used formal sources of credit—the third lowest rate among neighbors. In contrast, 42 percent of Filipino adults reported borrowing from family or friends—the highest rate among comparator countries. Furthermore, the country is second-to-last in both the share of adults that use domestic remittances through financial institutions (9.8 percent) and in the share of adults that make online payments or purchases (8.8 percent); and middling in terms of engagement in mobile phone transactions (6.2 percent).

¹ Global Findex data are compiled using nationally representative surveys of adults, with the 2017 round covering over 150,000 respondents in 140 countries.

The Findex also collects data on the reasons for the lack of a financial account among adults that do not have one (or in short, the financially excluded). The reasons for financial exclusion include voluntary reasons (i.e., religious reasons, lack of money, family member already having an account, or respondent seeing no need for one) and involuntary reasons (i.e., distance, high cost, lack of documentation, or lack of trust).

Table 2.4 shows the proportion of financially excluded adults in each country that cited a particular reason for not having an account. In the Philippines, 69.7 percent cited lack of money as a reason. This is the most common response among financially excluded Filipino adults, and the proportion is the second highest among comparator countries (behind Indonesia). The country tops its neighbors in the share of financially excluded adults that cite distance (“too far away”, 41.4 percent), cost (“too expensive”, 54.1 percent), lack of documentation (44.9 percent), and religion (13.9 percent) as reasons for not owning an account. In essence, involuntary reasons for financial exclusion appear to be prevalent in the Philippines relative to comparator countries.

Figure 2.1. Financial inclusion in the Philippines vs. developing Asia

The Philippines leads Southeast Asia in the Overall Financial Inclusion Index Score. Of the five components, it leads in two in developing Asia.

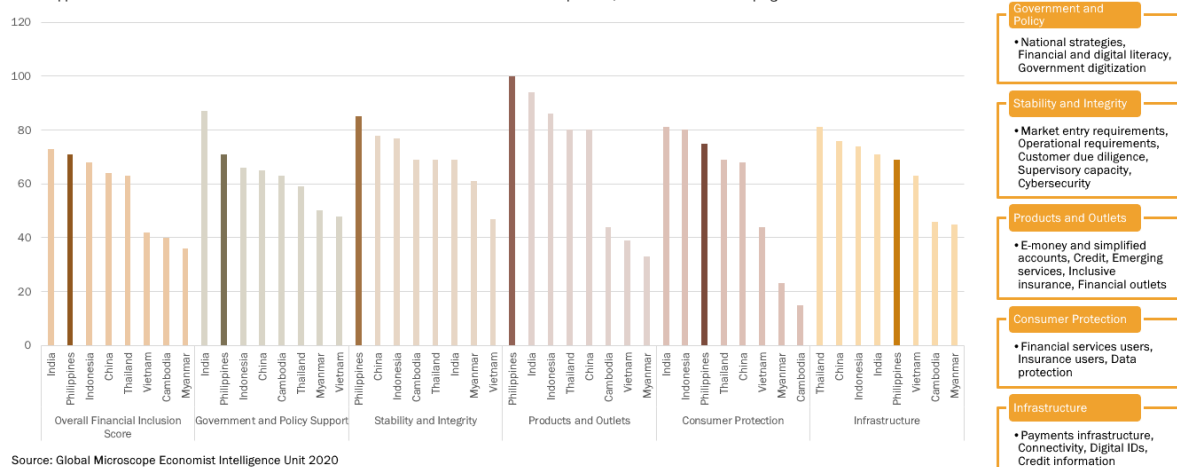


Table 2.1. Financial access indicators – geographic and demographic penetration

	Number of commercial bank branches per 1,000 km ²	Branches of other deposit takers per 1,000 km ²	Number of ATMs per 1,000 km ²	Number of commercial bank branches per 100,000 adults	Branches of other deposit takers per 100,000 adults	Number of ATMs per 100,000 adults
China	10.844	11.000	116.923	8.861	8.990	95.547
India	49.170	n.d.	70.655	14.580	n.d.	20.950
Indonesia	17.243	3.620	58.871	15.643	3.280	53.410
Malaysia	7.478	0.390	33.173	10.078	0.530	44.706
Philippines	23.191	14.970	73.046	9.200	5.940	28.975
Thailand	12.739	4.840	130.463	11.238	4.270	115.092
Vietnam	9.514	0.050	61.880	3.983	0.020	25.904
ASEAN (developing)	8.874	2.690	42.084	14.216	1.622	49.669

Source: IMF Financial Access Survey 2019.

Table 2.2. Financial access indicators – bank deposits and loans

	Outstanding deposits with commercial banks (% of GDP)	Outstanding deposits with other deposit takers (% of GDP)	Outstanding loans from commercial banks (% of GDP)	Outstanding loans with other deposit takers (% of GDP)
China	145.723	45.404	108.401	44.562
India	63.267	0.197	48.554	1.863
Indonesia	37.885	0.703	35.474	0.750
Malaysia	94.400	0.454	109.446	0.443
Philippines	49.412	4.912	33.995	3.891
Thailand	73.450	25.873	70.802	26.127
Vietnam	152.413	1.038	132.981	2.981
ASEAN (developing)	66.562	3.672	60.522	3.974

Source: IMF Financial Access Survey 2019.

Table 2.3. Financial access indicators – other accounts

	Number of credit cards per 1,000 adults	Number of debit cards per 1,000 adults	Number of registered mobile money accounts per 1,000 adults	Number of mobile money transactions (during the reference year) per 1,000 adults	Outstanding balances on active mobile money accounts (% of GDP)	Value of mobile money transactions (during the reference year) (% of GDP)
China	649.340	6,678.800	n.d.	n.d.	n.d.	n.d.
India	46.960	903.370	1,264.795	4,130.131	0.016	0.899
Indonesia	87.580	873.620	1,463.833	26,175.282	0.039	0.917
Malaysia	414.780	1,857.090	n.d.	n.d.	n.d.	n.d.
Philippines	141.130	571.470	563.375	8,349.707	0.115	7.611
Thailand	414.400	1,118.470	749.690	21,099.822	0.012	0.969
Vietnam	69.730	1,095.700	n.d.	n.d.	n.d.	n.d.
ASEAN (developing)	137.461	830.951	925.633	18,541.604	0.055	3.165

Source: IMF Financial Access Survey 2019.

Table 2.4. Financial inclusion indicators – account ownership

	Formal financial account			Debit card		Mobile money account		Credit card	
	Obs.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
China	3,627	0.735	0.441	0.585	0.493	n.d.	n.d.	0.152	0.360
India	3,000	0.793	0.405	0.314	0.464	0.022	0.146	0.029	0.169
Indonesia	1,000	0.529	0.499	0.360	0.480	0.039	0.194	0.029	0.168
Malaysia	1,004	0.863	0.344	0.754	0.431	0.129	0.336	0.221	0.415
Philippines	1,000	0.341	0.474	0.234	0.424	0.045	0.207	0.021	0.143
Thailand	1,000	0.809	0.393	0.561	0.497	0.060	0.238	0.085	0.279
Vietnam	1,002	0.327	0.469	0.286	0.452	0.034	0.181	0.040	0.196

Source: World Bank Findex 2017.

Table 2.5. Financial inclusion indicators – account usage

	Formal saving		Formal credit		Domestic remittance through financial institution		Mobile phone transaction		Online payment or purchase	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
China	0.290	0.454	0.071	0.257	0.108	0.310	0.208	0.406	0.328	0.470
India	0.190	0.392	0.066	0.248	0.068	0.252	0.027	0.162	0.040	0.197
Indonesia	0.251	0.434	0.187	0.390	0.174	0.379	0.052	0.222	0.114	0.318
Malaysia	0.407	0.492	0.136	0.343	0.301	0.459	0.183	0.387	0.420	0.494
Philippines	0.130	0.336	0.095	0.293	0.098	0.297	0.062	0.241	0.088	0.283
Thailand	0.366	0.482	0.170	0.376	0.354	0.478	0.087	0.282	0.132	0.339
Vietnam	0.162	0.368	0.200	0.400	0.106	0.308	0.045	0.207	0.204	0.403

Source: World Bank Findex 2017.

Table 2.6. Alternative forms of saving and borrowing

	Saved through an informal savings club		Borrowed from family or friends		Borrowed from an informal savings club		Saved in the past year		Borrowed in the past year	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
China	0.034	0.181	0.281	0.449	0.003	0.052	0.450	0.498	0.406	0.491
India	0.092	0.290	0.334	0.472	0.047	0.212	0.335	0.472	0.437	0.496
Indonesia	0.325	0.469	0.353	0.478	0.161	0.368	0.632	0.483	0.558	0.497
Malaysia	0.105	0.306	0.180	0.385	0.024	0.153	0.658	0.474	0.425	0.495
Philippines	0.089	0.285	0.420	0.494	0.044	0.205	0.595	0.491	0.592	0.492
Thailand	0.148	0.355	0.249	0.433	0.072	0.259	0.579	0.494	0.444	0.497
Vietnam	0.144	0.351	0.290	0.454	0.047	0.212	0.587	0.493	0.476	0.500

Source: World Bank Findex 2017.

Table 2.7. Reasons for not having a formal account

	Too far away			Too expensive		Lack documentation		Lack trust	
	Obs.	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev
China	1,286	0.184	0.387	0.121	0.326	0.088	0.283	0.071	0.257
India	646	0.218	0.413	0.260	0.439	0.215	0.411	0.214	0.410
Indonesia	538	0.333	0.472	0.316	0.465	0.238	0.426	0.086	0.280
Malaysia	178	0.331	0.472	0.404	0.492	0.247	0.433	0.270	0.445
Philippines	684	0.414	0.493	0.541	0.499	0.449	0.498	0.213	0.410
Thailand	199	0.307	0.462	0.161	0.368	0.126	0.332	0.065	0.248
Vietnam	692	0.127	0.333	0.108	0.311	0.117	0.322	0.081	0.273

	Religious reasons			Lack of money		Family member already has one		No need for financial services	
	Obs.	Mean	St. dev	Mean	St. dev	Mean	St. dev	Mean	St. dev
China	1,286	0.023	0.151	0.610	0.488	0.297	0.457	0.239	0.426
India	646	0.056	0.230	0.536	0.499	0.486	0.500	0.286	0.452
Indonesia	538	0.059	0.237	0.717	0.451	0.309	0.462	0.270	0.444
Malaysia	178	0.129	0.336	0.466	0.500	0.522	0.501	0.478	0.501
Philippines	684	0.139	0.346	0.697	0.460	0.257	0.437	0.404	0.491
Thailand	199	0.020	0.141	0.583	0.494	0.503	0.501	0.638	0.482
Vietnam	692	0.004	0.066	0.454	0.498	0.214	0.410	0.465	0.499

Source: World Bank Findex 2017.

3. Understanding financial inclusion in the Philippines

Inability to raise important dimensions of financial inclusion in the Philippines to the level of its Asian peers despite vast improvement in the enabling environment deserves closer study. A step in this direction would be to leverage information from the available data, by identifying determinants of financial inclusion at the individual level and possible obstacles to account ownership using the best available framework and method. This section aims to conduct that empirical exercise.

3.1. Brief literature review

In the literature, one finds several cross-country and country studies framed to uncover the factors driving or deterring financial inclusion. Using data on 148 economies from the World Bank's Global Financial Inclusion Index (Findex) for 2011, Demirgüç-Kunt and Klapper (2013) show that development level leads to variations in account penetration across countries, while income level tends to drive differences across individuals within these countries. The dimensions of financial inclusion they looked at were account ownership at a formal financial institution, saving using such an account (formal saving), and borrowing from a financial institution (formal credit). They noted that half of all adults across the world remained unbanked during the time. Reported barriers to account use include cost, distance, and documentation requirements, indicating possible market failures that could be addressed by financial inclusion policies.

Allen et al. (2016) examines the "foundations of financial inclusion," observing how very little was known about the factors underpinning related economic behavior. They investigated how individual and country characteristics in 123 economies, also using the 2011 Global Findex, were associated with

financial inclusion, which was defined as the use of formal accounts and reflected by the likelihood of bank account ownership, saving using the account, and frequency of account use (based on the number of bank withdrawals). They find a positive link between individual characteristics, particularly income and education, and financial inclusion. They also provide evidence on the positive effects of lower banking costs, proximity of financial institutions, stronger legal rights, and greater political stability. According to their results, the efficacy of policies to promote financial inclusion differs depending on the characteristics of the individuals involved.

A useful concept introduced by Allen et al. (2016) relates to individuals being “involuntarily excluded” from using formal financial services. This may happen due to certain hindrances (e.g., distance of banks and high cost) that may arise because of market failures, such as asymmetric information or a weak contracting environment. They deem it the role of policy to widen financial inclusion to reach those shut out from the formal financial sector because of market failures and preventable barriers.

Similar econometric approaches have been applied to user-side microdata on individual countries to gain a better understanding of financial inclusion. Prompted by the need to explore how financial inclusion may foster economic growth in developing countries, Fungáčová and Weill (2015) also use 2011 data from Global Findex but focus their research on China, the largest economy in the set. They were additionally motivated by China’s high savings rate and the expansion of shadow banking in the country, where financial reforms and liberalization were underway, especially as the availability of bank credit for small and medium-sized enterprises (SMEs) became increasingly constrained.

Fungáčová and Weill (2015) find a relatively high level of financial inclusion in China in terms of formal account ownership and formal saving (versus other BRICS economies), with financial exclusion being largely voluntary, but relatively lower use of formal credit.² The authors note that the latter may present a challenge to China’s further development. However, they also found income and education to be positively associated with greater use of formal accounts and formal credit in the country, as well as with the use of alternative sources of borrowing.

3.1.1. Philippine studies on financial access and use

In the Philippines, a smaller developing country in Asia, comparable studies that look at the determinants of financial inclusion include Llanto (2015) and Llanto and Rosellon (2017). Using 2013 data from the Annual Poverty Indicators Survey (APIS), Llanto (2015) gleans robust and significantly positive relationships between household use of financial services (as proxied by access to formal credit) and household characteristics such as age, marital status (being married), and education of the household head; and family size. In contrast, poorer households with a greater number of dependents (those below 15 years old) are less likely to borrow from the formal financial sector.

Llanto and Rosellon (2017) meanwhile use the BSP’s 2015 National Baseline Survey on Financial Inclusion to identify important determinants of financial participation at the individual level. Motivated by weak access to and/or low uptake of financial services despite national efforts to boost financial inclusion, their study aimed to provide empirical evidence on financial access in the Philippines by examining the factors behind individual decisions to transact with formal financial institutions.³

They investigated different aspects of financial inclusion: namely, transactions with formal financial institutions, ownership of savings accounts, and access to credit and insurance. Their estimations reveal

² Other BRICS economies include Brazil, Russia, India, and South Africa.

³ Apart from central bank initiatives, government-wide efforts mentioned by the authors include those specified in the Philippine Development Plan 2017-2022, which provides a strategic macroeconomic framework with an inclusive monetary and financial sector and which targets improving financial inclusion indicator levels; and the National Strategy for Financial Inclusion (NSFI) issued by the government to map out and coordinate efforts toward inclusive finance.

significant positive associations between the various types of financial access and socio-demographic characteristics such as age, sex, civil status (married), education, employment, and income.

3.2. *Pushing the research envelope on financial inclusion*

Motivated by the observed challenges to further expansion of financial outreach and usage in the Philippines despite this being on top of the policy agenda for several years, as similarly noted by Llanto and Rosellon (2017), we expand their work by additionally estimating the determinants of barriers to financial inclusion in the country. We build on the above-mentioned research by providing a wide-angle view on financial inclusion in the country, mainly by considering a broad range of financial accounts (i.e., including debit and credit cards and those driven by even newer technology, such as mobile money accounts) and financial services (including bank-based remittance and mobile phone and internet transactions).

Following previous studies, we use Global Findex data to explore the correlates of financial inclusion, which we similarly define as the ownership and use of formal accounts. As far as we know, this is the first paper to tap Global Findex microdata on the Philippines. In any case, it provides a useful update, as we make use of the 2017 round of the global survey, which has incorporated additional data on the use of financial technology (or fintech) such as the use of mobile phones and the internet to conduct financial transactions.

The other advantage of using this dataset is the insight gained on the barriers to financial inclusion in the Philippines, as existing studies have mostly explored the issue using a cross-country dataset. Following Allen et al. (2016) and the interpretation by Fungáčová and Weill (2015), we differentiate between “voluntary” and “involuntary” financial exclusion, with the latter identified as hurdles resulting from potential market failures or those that can be lowered by suitable policy. These include impediments relating to distance, cost, and documentary requirements of and trust in financial institutions.

3.3. *Methodology*

We initially focus on the determinants of two basic dimensions of financial inclusion. These are: (1) account ownership, in terms of having an account in a formal financial institution, a debit card associated with a financial account, a mobile money account, and a credit card; and (2) account usage, namely formal saving, formal borrowing, transactions on remittances through a financial institution, financial transactions through a mobile phone, and online financial transactions using the internet. We then investigate the factors driving alternative sources of borrowing and the perceived barriers to holding a formal financial account.

3.3.1. Econometric specification and data

Our main specification for account ownership takes the following form:

$$y_{1i}^* = x_i' \beta_1 + e_{1i} \quad (1)$$

$$y_{1i} = \begin{cases} 1 & \text{if } y_{1i}^* > 0 \\ 0 & \text{if } y_{1i}^* \leq 0 \end{cases}$$

where i is the index for individuals; the dependent variable y_{1i} is a binary variable for account ownership; y_{1i}^* is a latent variable; x_{1i} is a vector of individual characteristics (see next subsection on explanatory variables); β_1 is the corresponding vector of parameters; and e_{1i} is a normally distributed error term with mean 0 and variance 1. We estimate equation (1) as a probit model using maximum likelihood.

For y_{1i} , we alternately consider account ownership linked to the following: (1) formal account, equal to 1 if the individual reports having an account at a financial institution, and 0 otherwise; (2) debit card,

equal to 1 if the individual reports having a debit card (assumed to be attached to a financial account), 0 otherwise; (3) mobile money, equal to 1 if the individual reports having a mobile money account, 0 otherwise; and (4) credit card, equal to 1 if the individual reports having a credit card, 0 otherwise. The vector x_{1i} is discussed in the next subsection.

For account usage, we estimate a similar equation written as:

$$y_{2i}^* = x_{2i}'\beta_2 + e_{2i} \quad (2)$$

$$y_{2i} = \begin{cases} 1 & \text{if } y_{2i}^* > 0 \\ 0 & \text{if } y_{2i}^* \leq 0 \end{cases}$$

where the dependent variable y_{2i} is a binary variable for account usage of individual i ; y_{2i}^* is a latent variable; x_{2i} is the same vector of individual characteristics; β_2 is the corresponding vector of parameters; and e_{2i} is a standard normal error term.

For y_{2i} , we alternately consider account usage as follows: (1) formal saving, equal to 1 if the individual saved in the past year using a formal account, and 0 otherwise; (2) formal credit, equal to 1 if the individual borrowed in the past year using a formal account, 0 otherwise; (3) domestic remittance through a financial institution, equal to 1 if the individual sent or received remittances in the past year using a formal account, 0 otherwise; (4) mobile phone transactions, equal to 1 if the individual sent or received payments (including domestic remittances) through a mobile phone, 0 otherwise; and (5) online transactions, equal to 1 if the individual made bill payments or bought something using the internet, 0 otherwise.

However, since usage of a formal financial or mobile money account requires ownership of the account, proper estimation would entail a Heckman-type model where equation (1) serves as the selection equation and equation (2) as the decision equation. As Allen et al. (2016) notes, however, Heckman's two-step estimation procedure cannot be applied here since equation (2) also refers to a binary variable, and so the appropriate method would be joint estimation of the probit selection procedure and probit model for account usage by maximum likelihood.⁴ Since data related to ownership of internet accounts are not available, the specification for online transactions is estimated using a basic probit model.

Like Fungáčová and Weill (2015) who focus on China, we also perform probit estimations to further investigate the low uptake of formal credit in the Philippines. These are meant to identify possible differences in individual characteristics associated with alternative sources of borrowing. We use the same econometric approach as applied to estimating determinants of formal and mobile account usage, but with the binary decision to borrow replacing y_{1i} in equation (1), the binary variable for alternative sources of borrowing replacing y_{2i} in equation (2), and the two probit equations jointly estimated.

Finally, we estimate how different individual characteristics are associated with subjective barriers to financial inclusion. This entails probit estimation of equation (1), where reasons cited by individuals for not having a formal account alternately serve as dependent variables. These include the following categories of responses: "too far away," "too expensive," "lack documentation," "lack trust," "religious reasons," "lack of money," "family member already has one (a financial account)," and "no need for financial services."

Data used in the estimations were obtained from the World Bank Global Findex survey conducted in 2017, which included 1,000 observations for the Philippines, from a population of individuals ages 15 years old and above. The database and survey methodology are detailed in Demirgüç-Kunt et al. (2017).

⁴ Note that $x_{1i} = x_{2i}$. Hence, there is no exclusion restriction to identify the estimation of equations (1) and (2).

3.3.2. Explanatory variables

As stated above, we make use of a uniform set of explanatory variables for all regressions. Table 3.1 provides definitions and summary statistics of these variables.

We include *age*, defined in number of years, and *age squared* in the specifications to capture possible nonlinearity in its relationship with financial inclusion (positive and negative coefficients correspondingly in equations (1) and (2) above). Both account ownership and usage can be expected to initially rise then decline over time, especially as one approaches retirement when the stream of income weakens, and one is in many instances barred from credit (and insurance, though this financial product is not covered in the current paper) as one ages. In a cross-sectional sample, this can reflect as differences across generations. Nonlinearity in the sample may also capture a “generational effect” where older individuals exhibit reluctance to use formal financial services because of unfamiliarity with such services, as noted in Fungáčová and Weill (2015), or other limits that are related to age.

We also include a dummy variable for females in the regressions (*female*), with the male subgroup as the omitted variable (base category). In cross-country studies (e.g., Allen et al. 2016), the parameter associated with this dummy variable is expected to be positive, as women may be less likely to work or make financial decisions on their own and are therefore less likely to own a bank account. This held true in their research, for holding of accounts, saving using these accounts, and the frequency of use by women. Fungáčová and Weill (2015) also came up with this finding, but only for account ownership and formal credit, as Chinese women were more likely to save in a bank than Chinese men. However, based on the results of Llanto (2015) and Llanto and Rosellon (2017) using government surveys, we consider it more likely that the parameters for financial inclusion will be mostly positive for females in the Philippine setting.

To estimate the impact of education on financial inclusion, we construct dummy variables for subgroups of individuals who have primary education or less (*primary level*) or who completed high school or some post-secondary education (*secondary level*). The base category in this case refers to individuals with higher education than the others (*tertiary level*). With the dummy variable for the most highly educated subgroup removed from the regressions, we expect the parameters on the remaining dummy variables for education (representing the less educated) to be progressively more negative as in past empirical studies, especially for account ownership. We also expect involuntary financial exclusion to be more likely for less educated individuals.

In capturing the effect of employment in the probit estimations, we presume the base group to comprise unemployed individuals, though no such category is specified in the dataset. Rather, this is implicit from inclusion in the regressions of subgroups consisting of employed individuals (both *self-employed* and *employed by employer* and thus receiving wages) as well as those who are not part of the labor force (*out of the workforce*). Among these subgroups, one can expect wage-employed workers, especially those regularly employed, to have a higher likelihood of owning and using an account in a financial institution, given institutional arrangements where such accounts may be needed to efficiently dispense salaries.

To determine how the income level of an individual influences account ownership and usage, we introduce income quintiles in the specifications, ranging from the *poorest 20 percent* (quintile 1) to the second-richest 20 percent (quintile 4). The *richest 20 percent* (quintile 5) is omitted from the regressions, and functions as the base category. We therefore expect the parameters on poorer quintiles to be increasingly negative for account ownership and usage. As with the less educated, we anticipate that subjective barriers to financial inclusion will be higher, and involuntary exclusion more likely, for less wealthy individuals.

Lastly, to capture location effects, including urbanization effects, we incorporate dummy variables for three geographical areas in the Philippines: Luzon, Visayas, and Mindanao. We drop the dummy

variable for NCR (or Metro Manila), the most urbanized region in the country. We expect the parameters to be negative for the different dimensions of financial inclusion, as similarly observed in previous studies, and especially for mobile- and internet-based (or fintech) transactions, given still limited digital connectivity and underdeveloped digital technology across the country. Perceived obstacles to account ownership will also likely be greater outside of the country's capital.

Table 3.1. Description of the main variables and their summary statistics

	Definition	Mean	Std. dev.	Min.	Max.
Age	Number of years	40.474	17.510	15	95
Age squared	Number of years, squared	1,944.426	1,625.919	225	9025
Sex	Female = 1 if respondent is female, 0 otherwise	0.562	0.496	0	1
Education	Primary level = 1 if respondent has primary education or less, 0 otherwise	0.292	0.455	0	1
	Secondary level = 1 if respondent completed high school or post-secondary education, 0 otherwise	0.594	0.491	0	1
	Tertiary level (base category), with higher education	0.114	0.318	0	1
Employment	Out of workforce = 1 if respondent is not part of the labor force, 0 otherwise	0.354	0.478	0	1
	Employed by employer (or wage employed) = 1 if respondent received wage payments in past 12 months, 0 otherwise	0.363	0.481	0	1
	Self-employed = 1 if respondent received self-employment payments in past 12 months, 0 otherwise	0.156	0.363	0	1
	Unemployed (base category, implicit), in labor force but not employed				
Income	Poorest 20% = 1 if respondent is in the first quintile based on income level, 0 otherwise	0.192	0.394	0	1
	Second 20% = 1 if respondent is in the second quintile based on income level, 0 otherwise	0.168	0.374	0	1
	Middle 20% = 1 if respondent is in the third quintile based on income level, 0 otherwise	0.203	0.402	0	1
	Third 20% = 1 if respondent is in the fourth quintile based on income level, 0 otherwise	0.209	0.407	0	1
	Richest 20% (base category), in fifth quintile based on income level	0.228	0.420	0	1
Location	Luzon = 1 if respondent is from Luzon, 0 otherwise	0.251	0.434	0	1
	Visayas = 1 if respondent is from Visayas, 0 otherwise	0.249	0.433	0	1
	Mindanao = 1 if respondent is from Mindanao, 0 otherwise	0.250	0.433	0	1
	NCR (base category), from National Capital Region (Metro Manila)	0.250	0.433	0	1

Source: World Bank Findex 2017; authors' definitions and calculations.

3.4. Results and discussion

This subsection presents the results of the estimations described earlier. We first consider the individual characteristics that are significantly associated with financial inclusion, specifically the basic dimensions of account ownership and usage. We then examine the determinants of informal credit, to further understand the results for formal credit, and the barriers to account ownership.

3.4.1. Determinants of account ownership

Table 3.2 summarizes the results of the regressions for the different types of account ownership based on equation (1). Each column displays the marginal effects for the corresponding probit estimation, with standard errors in parentheses. The first two columns refer to more traditional financial accounts such as bank accounts and associated debit cards, the third column represents more innovative fintech accounts such as mobile money accounts, while the fourth column represents credit cards.

As expected, the relationship between age and account ownership tends to be nonlinear, though this is statistically significant only for formal accounts (see Column (1)).⁵ Also as anticipated, estimations show the probability of having a bank account to be higher for females than males, by about 10 percentage points.

Education and income clearly matter for holding bank-based accounts and debit and credit cards, with the probability of account ownership being increasingly negative with lesser years of schooling or lesser income (Columns (1), (2), and (4)). In the case of formal accounts, for example, the likelihood of individuals with primary-level education having such an account is significantly lower than that of individuals with more education (tertiary level) by 31.6 percentage points, while the likelihood of the poorest 20 percent is lower than that of the richest 20 percent by about the same amount (29.4 percentage points).

As hypothesized, employed individuals are more likely than the unemployed to have a formal account and debit card (by 6.6 and 13 percentage points, respectively). The estimations however reveal the self-employed to be less likely than the unemployed to have a formal account, by 11.5 percentage points. Meanwhile, the probability of holding a debit card is significantly higher for individuals in Metro Manila than in Luzon or Visayas.

There is seemingly less disparity in the ownership of fintech accounts in the form of mobile money (Column (3)), although only less than a tenth of adults (about 5% to 8%) have such accounts (based on the BSP Financial Inclusion Survey, 2019; World Bank Global Findex 2017). Only those among the poorest segments of society (quintile 2) are less likely than in the richest segment (quintile 5) to have a mobile money account.⁶ Also less likely to have fintech accounts are individuals who have not joined the country's workforce and those located in Mindanao.

3.4.2. Determinants of account usage

Table 3.3 displays the regressions for usage of accounts in financial transactions. Columns (1) to (4) contain the results from probit estimations of the specifications for formal saving and credit and remittance transactions through banks (equations (1) and (2)) where we apply a Heckman-style approach and jointly estimate the selection and decision problems through maximum likelihood. Column (5) presents the results of a simple probit model for online internet transactions.

⁵ A simple calculation would in fact show that the positive relationship wears off at around 67 years old, or shortly after the usual age of retirement.

⁶ Due to limited observation points, there is no estimate of the coefficients for quintile 1.

We again observe a nonlinear relationship between age and financial usage, but this time specifically for formal credit.⁷ Females are also more likely to use their financial accounts for saving, borrowing, and remitting or receiving money than males.

An individual's education and income continue to figure greatly in estimating the likelihood of using accounts in a financial institution. Those with less schooling or income are less likely to transact using formal accounts than the more educated or richer set. The least educated (primary level) are 14.7 percentage points less likely to save in a financial institution than the most educated (tertiary level), 5.6 percentage points less likely to borrow from a financial institution, and 11.2 percentage points less likely to send or receive domestic remittances through a formal account.

The poorest 20 percent meanwhile are around 15 to 16 percentage points less likely to save or send/receive remittances using a formal account, and 10.9 percentage points less likely to borrow formally. Individuals from Visayas and Mindanao were more likely to borrow formally than individuals from Metro Manila, a result that was also observed in Llanto and Rosellon (2017) for Mindanao and Luzon (but not the Visayas).

As expected, those employed by an employer (receiving wages) have a higher probability of borrowing from a financial institution like a bank than the unemployed. The self-employed however are less likely to save formally than the unemployed, while those outside the labor force are less likely to channel domestic remittances through a financial institution.

Income remains a critical determinant for fintech use, with poorer individuals less likely to make financial transactions through a mobile phone account or through the internet (Columns (4) and (5)). The likelihood of the poorest quintile using fintech accounts is 27.4 percentage points lower than the richest quintile for online payments or purchases, and 20 percentage points lower in the case of mobile phone transactions. Schooling remains a significant determinant only for online transactions, with those having primary-level education being 14.9 percentage points less likely than those with tertiary-level education to use the internet for finance purposes.

We observe a clear urbanization effect for mobile money account use, though not for online internet transactions. Among the geographic areas, Mindanao appears to be the most financially excluded, especially in terms of fintech usage.

⁷ For this regression, the relationship diminishes starting around 50 years of age, with the probability of getting a bank loan tending to decline as one gets older.

Table 3.2. Determinants of account ownership

	(1) Formal account	(2) Debit card	(3) Mobile money	(4) Credit card
Age	0.012*** (0.004)	0.008** (0.003)	0.005 (0.004)	0.003 (0.002)
Age squared	-0.00009* (0.00005)	-0.00005 (0.00004)	-0.00010* (0.00006)	-0.00003 (0.00002)
Female	0.102*** (0.031)	-0.015 (0.025)	-0.005 (0.018)	-0.017 (0.011)
Primary level	-0.316*** (0.053)	-0.263*** (0.040)	-0.042 (0.035)	-0.040** (0.020)
Secondary level	-0.162*** (0.047)	-0.148*** (0.034)	-0.031 (0.027)	-0.029** (0.012)
Out of workforce	-0.044 (0.041)	-0.028 (0.034)	-0.046* (0.025)	-0.021 (0.018)
Employed by employer	0.066* (0.040)	0.130*** (0.033)	-0.029 (0.025)	-0.003 (0.015)
Self-employed	-0.115** (0.051)	-0.032 (0.043)	0.000 (0.026)	-0.047** (0.023)
Income: poorest 20%	-0.294*** (0.049)	-0.161*** (0.041)	— —	— —
Income: second 20%	-0.237*** (0.048)	-0.190*** (0.042)	-0.090*** (0.034)	-0.043** (0.020)
Income: middle 20%	-0.151*** (0.047)	-0.122*** (0.036)	-0.023 (0.026)	-0.048** (0.021)
Income: fourth 20%	-0.138*** (0.044)	-0.065* (0.034)	-0.021 (0.025)	-0.031** (0.014)
Luzon	(0.044)	-0.070** (0.034)	-0.031 (0.024)	-0.009 (0.013)
Visayas	0.042 (0.044)	-0.069* (0.038)	-0.027 (0.034)	0.028 (0.021)
Mindanao	0.018 (0.042)	-0.045 (0.038)	-0.059** (0.025)	-0.004 (0.016)
N	1,000	1,000	808	808

Note: The table summarizes probit estimations of the determinants of account ownership in the Philippines [from equation (1) in the main text]. See Table 3 for a description of the explanatory variables. The column heading indicates the corresponding dependent variable. Marginal effects are reported. Standard errors in parentheses. Significance levels denoted by * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3.3. Determinants of account usage

	(1) Formal saving	(2) Formal credit	(3) Domestic remittance through an FI	(4) Mobile phone transaction	(5) Online payment or purchase
Age	0.004 (0.003)	0.008*** (0.002)	0.004 (0.003)	0.002 -0.002	-0.002 (0.004)
Age squared	-0.00002 (0.00003)	-0.00008*** (0.00003)	-0.00005* (0.00003)	-3.52E-05 -2.14E-05	-0.00003 (0.00004)
Female	0.040** (0.020)	0.031** (0.015)	0.042*** (0.016)	-0.006 -0.009	0.014 (0.021)
Primary level	-0.147*** (0.033)	-0.056** (0.024)	-0.112*** (0.029)	-0.017 -0.017	-0.149*** (0.040)
Secondary level	-0.091*** (0.025)	-0.027 (0.021)	-0.072*** (0.025)	-0.015 -0.014	-0.122*** (0.027)
Out of workforce	-0.029 (0.027)	-0.024 (0.019)	-0.049** (0.024)	-0.014 -0.012	0.003 (0.026)
Employed by employer	-0.008 (0.028)	0.036** (0.017)	-0.015 (0.022)	-0.008 -0.012	-0.022 (0.028)
Self-employed	-0.077*** (0.029)	0.013 (0.021)	-0.041 (0.025)	0.009 -0.013	0.009 (0.030)
Income: poorest 20%	-0.162*** (0.031)	-0.109*** (0.025)	-0.150*** (0.032)	-0.200*** -0.039	-0.274*** (0.056)
Income: second 20%	-0.128*** (0.031)	-0.063** (0.025)	-0.106*** (0.028)	-0.037** -0.016	-0.141*** (0.035)
Income: middle 20%	-0.074*** (0.027)	-0.033* (0.019)	-0.062** (0.024)	-0.013 -0.012	-0.050* (0.029)
Income: fourth 20%	-0.084*** (0.026)	-0.032 (0.020)	-0.069*** (0.023)	-0.004 -0.011	-0.037 (0.026)
Luzon	-0.021 (0.023)	0.022 (0.015)	-0.004 (0.021)	-0.023* -0.013	-0.021 (0.025)
Visayas	0.001 (0.028)	0.038** (0.019)	-0.009 (0.024)	-0.034** -0.015	-0.013 (0.034)
Mindanao	0.003 (0.026)	0.077*** (0.020)	-0.051** (0.021)	-0.046*** -0.012	-0.049* (0.027)
N	1,000	1,000	1,000	1,000	1,000

Note: Columns (1) to (4) summarize bivariate probit estimations of determinants of account usage in the Philippines [from equations (1) and (2) in the main text]. Column (5) refers to a basic probit model [equation (1) only]. See Table 3 for a description of the explanatory variables. The column heading indicates the corresponding dependent variable. Marginal effects are reported. Standard errors in parentheses. Significance levels denoted by * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

3.4.3. Determinants of alternative borrowing sources

We have seen how formal credit is more likely in the Philippines if one is richer, more educated, employed and receiving wages, a woman, or older (up to about middle age). Moreover, less than a tenth of the relevant population has a loan from a financial institution, among the lowest in Southeast Asia and in the whole of developing East Asia (except notably for China). It would be illuminating therefore to further understand borrowing at the individual level by looking at the determinants of informal credit.

Column (1) of Table 3.4 shows the results of the probit regressions for informal loans from family or friends, which is the most common type of borrowing in the country (over 40 percent of the relevant population has such a loan). Neither income nor education appears to be significant for such borrowing, though being self-employed seems important. The likelihood of taking on such a loan is around 10.7 percentage points higher for self-employed individuals compared to the unemployed. Those located in the Visayas are again more likely to borrow from kith and kin.

Females have a higher probability of borrowing from an informal savings group than males (Column (2)). This type of informal borrowing is less common for those outside the workforce and for the poor (those in quintile 2 specifically). Individuals located in Mindanao are the least likely to avail of such a loan, while those in NCR are most likely to do so. Such transactions however are not very widespread, as only 4.4 percent of the relevant population nationwide engages in the practice.

The least educated in the country are also the least likely to participate in both formal and informal credit markets (Column (3)). Across geographical areas, individuals located in the Visayas continue to stand out, with the probability of borrowing from any source being the highest nationwide, at 12.7 percentage points higher than for individuals in the country's capital.

3.4.4. Determinants of barriers to financial inclusion

Finally, we look at the barriers to account ownership to further understand the disincentives to financial inclusion in the Philippines. Table 3.5 summarizes the probit regressions that were estimated to investigate how individual characteristics influence the likelihood of the reasons put forward by the unbanked for not having a formal financial account. We also aim to identify drivers of both voluntary and involuntary exclusion, which are crucial information in designing financial inclusion policies.

Distance from and lack of trust in financial institutions have a nonlinear association with age, with the abovementioned reasons more likely to be cited by older respondents.⁸ Older individuals are also more apt to mention cost and religious reasons as deterrents to opening an account. Meanwhile, males are more likely than females to cite distance and lack of trust in financial institutions as obstacles to financial inclusion, and to deny the need for financial services. This suggests greater determination by women in the country to be financially included. Allen et al. (2016) had a similar finding based on cross-country regressions, with male and wealthier adults more likely to report not having an account because of lack of trust in banks.

Those employed by an employer are more sensitive to the different barriers to financial inclusion than the other types of workers or those outside of the work force. Poorer individuals (quintiles 1 and 2) are more likely than richer individuals (quintiles 3 to 5) to mention both physical distance and banking costs as explanations for not having a formal account. Oddly, they are not more likely to cite lack of money as a reason. Individuals with lesser education on the other hand are more likely to cite cost (primary level) and lack of documentation (primary and secondary levels). The results further indicate the apparent involuntary financial exclusion of these two disadvantaged segments of society.

In terms of geographic area, those residing in Metro Manila are less likely to mention financial institutions being "too far away" as reason for not having a formal account, which reflects the higher

⁸ This holds true until close to middle age, at around 47 years old based on a rough calculation.

density of bank branches in the country's capital (see next section). The probability of individuals citing bank costs or lack of documents as disincentives is significantly higher in Visayas and Mindanao than the NCR. Individuals residing in these areas are also more responsive to other constraints such as those related to religion and lack of money. Those in the Visayas, particularly, are more likely to cite lack of trust as an explanation for not opening an account. Overall, financial exclusion in the country appears to be widely involuntary in nature, with barriers apparently greater in areas outside of the National Capital Region (NCR), especially in Visayas and Mindanao. This being the case, there is evidently still room to address the issues through appropriate financial inclusion policy.

Table 3.4. Determinants of alternative borrowing sources

	(1) Borrowed from family or friends	(2) Borrowed from informal savings group	(3) Borrowed in past year (all sources)
Age	0.008 (0.006)	0.003 (0.002)	0.011** (0.005)
Age squared	-0.00015** (0.00006)	-0.00004 (0.00003)	-0.00017*** (0.00006)
Female	0.034 (0.034)	0.029** (0.014)	0.041 (0.037)
Primary level	-0.078 (0.069)	0.012 (0.026)	-0.156** (0.069)
Secondary level	0.012 (0.062)	0.013 (0.021)	-0.074 (0.062)
Out of workforce	0.019 (0.049)	-0.033* (0.017)	-0.068 (0.047)
Employed by employer	0.068 (0.047)	-0.007 (0.017)	0.063 (0.047)
Self-employed	0.107* (0.058)	0.006 (0.020)	0.084 (0.057)
Income: poorest 20%	0.062 (0.062)	-0.014 (0.024)	-0.04 (0.061)
Income: second 20%	-0.04 (0.061)	-0.041* (0.023)	-0.021 (0.061)
Income: middle 20%	0.076 (0.057)	0.000 (0.019)	0.067 (0.058)
Income: fourth 20%	0.066 (0.056)	0.006 (0.019)	0.042 (0.057)
Luzon	-0.053 (0.045)	-0.016 (0.019)	-0.035 (0.047)
Visayas	0.131*** (0.051)	-0.014 (0.020)	0.127** (0.050)
Mindanao	-0.002 (0.048)	-0.038** (0.019)	0.035 (0.049)
N	1,000	1,000	1,000

Note: Columns (1) and (2) summarize bivariate probit estimations of determinants of alternative borrowing sources in the Philippines [from equations (1) and (2) in the main text]. Column (3) refers to a basic probit model [equation (1) only]. See Table 3 for a description of the explanatory variables. The column heading indicates the corresponding dependent variable. Marginal effects are reported. Standard errors in parentheses. Significance levels denoted by * p<0.1; **p<0.05; *** p<0.01.

Table 3.5. Perceived barriers to account ownership and individual characteristics

	(1) Too far away	(2) Too expensive	(3) Lack documents	(4) Lack trust	(5) Religious reasons	(6) Lack of money	(7) Family member already has one	(8) No need for financial services
Age	0.014** (0.006)	0.011* (0.006)	0.007 (0.006)	0.013** (0.005)	0.007* (0.004)	0.005 (0.006)	-0.004 (0.005)	0.002 (0.006)
Age squared	-0.00015** (0.00007)	-0.00011 (0.00007)	-0.00009 (0.00007)	-0.00013** (0.00006)	-0.00006 (0.00005)	-0.00006 (0.00006)	0.00003 (0.00006)	-0.00005 (0.00007)
Female	-0.084** (0.043)	0.031 (0.044)	-0.044 (0.046)	-0.064* (0.036)	0.012 (0.029)	-0.007 (0.042)	-0.012 (0.042)	-0.108** (0.045)
Primary level	0.088 (0.090)	0.163* (0.098)	0.301*** (0.102)	0.091 (0.080)	0.09 (0.075)	-0.046 (0.097)	-0.018 (0.097)	-0.005 (0.106)
Secondary level	-0.01 (0.085)	0.026 (0.094)	0.200** (0.098)	0.119 (0.076)	0.041 (0.076)	0.019 (0.093)	-0.06 (0.093)	-0.058 (0.101)
Out of workforce	-0.014 (0.054)	0.062 (0.056)	0.019 (0.058)	0.009 (0.047)	0.003 (0.041)	-0.058 (0.053)	0.037 (0.051)	0.032 (0.058)
Wage-employed	0.049 (0.057)	0.195*** (0.055)	0.104* (0.058)	-0.046 (0.044)	0.082** (0.038)	0.05 (0.054)	-0.055 (0.056)	0.097* (0.058)
Self-employed	0.06 (0.067)	0.09 (0.069)	0.048 (0.072)	-0.021 (0.058)	-0.006 (0.048)	-0.01 (0.065)	0.027 (0.064)	0.021 (0.071)
Poorest 20%	0.158** (0.073)	0.148* (0.077)	-0.039 (0.081)	-0.024 (0.060)	-0.014 (0.049)	-0.004 (0.075)	-0.113 (0.073)	-0.024 (0.080)
Second 20%	0.159** (0.072)	0.162** (0.075)	-0.074 (0.078)	-0.046 (0.062)	-0.031 (0.052)	-0.063 (0.072)	-0.084 (0.070)	-0.102 (0.079)
Middle 20%	0.082 (0.072)	0.026 (0.074)	-0.025 (0.076)	-0.097 (0.062)	-0.090* (0.050)	-0.041 (0.072)	-0.092 (0.068)	-0.104 (0.077)
Fourth 20%	0.078 (0.074)	0.053 (0.074)	0.000 (0.077)	-0.115* (0.059)	-0.078 (0.048)	-0.015 (0.070)	-0.088 (0.068)	-0.098 (0.078)
Luzon	0.115** (0.053)	0.002 (0.058)	0.045 (0.057)	-0.031 (0.043)	0.027 (0.031)	0.044 (0.057)	0.017 (0.056)	0.035 (0.059)
Visayas	0.234*** (0.061)	0.136** (0.064)	0.134** (0.065)	0.148*** (0.056)	0.111*** (0.040)	0.07 (0.064)	-0.108* (0.058)	0.035 (0.065)
Mindanao	0.265*** (0.057)	0.107* (0.061)	0.131** (0.061)	0.078 (0.049)	0.150*** (0.040)	0.193*** (0.057)	-0.038 (0.058)	0.023 (0.062)
N	684	684	684	684	684	684	684	684

Note: The table summarizes probit estimations of the determinants of barriers to account ownership in the Philippines [refers to equation (1) in the main text]. See Table 3 for a description of the explanatory variables. The column heading indicates the corresponding dependent variable. Marginal effects are reported. Standard errors in parentheses. Significance levels denoted by * p<0.1; **p<0.05; *** p<0.01.

4. Measuring financial inclusion in the Philippines

In this section, the goal is to construct a subnational financial inclusion index based on the available time series data, comprising mainly bank supply indicators though with some representations serving as demand proxies. We take the position of Beck, Demirgüç-Kunt and Peria (2007) that the aggregate data provided by regulators reflect equilibrium outcomes, affected by both supply and demand factors. The dimensions we consider are financial access/outreach and usage. Such a measure is needed, moving forward, to build panel data for estimating the important links between financial inclusion and economic growth and development, and between financial inclusion and financial stability.

4.1. *Brief literature review*

Some of the first measures of financial access were by Beck, Demirgüç-Kunt and Peria (2007), who presented simple indicators of bank sector outreach based on aggregate data provided by bank regulators worldwide (e.g., geographic and demographic bank penetration and geographic and demographic ATM penetration), and Honohan (2008) who attempted to combine different indicators (e.g., number of bank accounts and number of microfinance accounts per 100 adults, and survey-based household access) using simple OLS regressions to form a composite indicator.

Several other composite indexes patterned after the Human Development Index were subsequently created, led by papers of Sarma (2008, 2015, 2016) and followed by similar studies (e.g., Yorulmaz 2013, Park and Mercado 2018b). However, these non-parametric methods entailed arbitrarily choosing weights based on researchers' intuition, which was broadly criticized (Tram, Lai and Nguyen 2021). This led to the creation of parametric methods based on data reduction techniques. Mialou et al. (2017), for example, introduced a method that used factor analysis to assign weights to financial inclusion indicators and subindexes. Cámara and Tuesta (2018) pursued a similar approach using principal component analysis (PCA), with computed PCA loadings as bases for the assigned weights.

While there is still no consensus on how to measure financial inclusion, parametric techniques have gained popularity, as they relied on statistical properties of the dataset, rather than ad hoc beliefs, to generate the weights needed to aggregate the relevant financial variables. Some of the papers that have adopted this approach include Tram, Lai and Nguyen (2021) and Park and Mercado (2018a), to come up with a financial inclusion index at the national level, with the former focusing on developing economies; Ahamed and Mallick (2019) and Vo et al. (2021), to examine the impact of financial inclusion on financial stability; and Gutierrez-Romero and Ahamed (2021), to explore the extent to which financial inclusion, particularly financial outreach, could help curb the rise in poverty brought about by the COVID-19 pandemic.

In terms of technique, Cámara and Tuesta (2018), Ahamed and Mallick (2019), and Tram, Lai, and Nguyen (2021) construct their respective indexes via a "two-stage PCA". This involves two successive data reductions using standard the PCA: the first stage PCAs reduce multiple indicators into dimensions that are posited to comprise financial inclusion, while the second stage PCA reduces the dimensions obtained from the first stage into a single index representing overall financial inclusion. Cámara and Tuesta (2018) use the weighted sum of all principal components (PCs) obtained from each PCA to represent the dimension or index being estimated⁹, while Ahamed and Mallick (2019) and Tram, Lai, and Nguyen (2021) do so by simply taking the first PC from each PCA (i.e., the PC that accounts for the greatest proportion of the total variance in the indicators/dimensions).

We add to this stream of research by creating a subnational financial inclusion index for the Philippines for its 17 regions and spanning the years 2013 to 2019. It also covers fintech elements, as represented by the number of e-money agents in the country.

⁹ Principal components are weighted by the proportion of the total variance that they account for.

While we have not seen a similar study in the literature for other countries, there have been several attempts locally to construct such a composite index. These include the indexes of Mojica and Mapa (2017) and Tan (2014), who used non-parametric methods and created cross-section indicators for Philippine provinces and regions, respectively; and Reyes (2018) who generated a regional index using various techniques, creating panel data for the years 2005 to 2016.

4.2. Methodology

Basing on parametric methodology, we construct a financial inclusion index that combines two basic dimensions of financial inclusion: outreach and usage. The outreach dimension captures the pervasiveness of financial services providers' (FSPs) physical presence. This dimension consists of demographic outreach and geographic outreach, which, respectively, are measured by the number of financial service providers relative to a region's population (i.e., per 100,000 people) and land area (i.e., per 100 square kilometers). We measure the physical presence of bank offices,¹⁰ ATMs, non-stock savings and loan associations (NSSLAs), credit cooperatives, e-money agents, pawnshops, and money service businesses (or MSBs, consisting of remittance agents and currency exchange businesses).¹¹

Meanwhile, the usage dimension captures the extent to which people in a region use financial services. This dimension consists of uptake, which is measured by the number of bank deposit accounts¹² per 100,000 people, and intensity, measured by the value of bank deposits and the value of bank loans relative to a region's gross regional domestic product (GRDP). Table 4.1 below lists the specific indicators used to measure each dimension.

Table 4.1. Dimensions and indicators of financial inclusion

Dimension	Sub-dimension	Indicators
Outreach	Demographic outreach (per 100,000 people)	Number of bank offices Number of ATMs Number of NSSLAs Number of credit cooperatives
	Geographic outreach (per square kilometer)	Number of e-money agents Number of pawnshops Number of money service businesses Number of NBFIs
Usage	Uptake (per 1,000 people)	Number of bank deposit accounts
	Intensity (share of GRDP)	Value of bank deposits Value of outstanding bank loans and net receivables

We combine the different financial inclusion indicators via a two-stage PCA to construct the financial inclusion index. In each PCA stage, we take the first principal component to represent the index being estimated, following Ahamed and Mallick (2019) and Tram, Lai, and Nguyen (2021). In the first stage, we construct the outreach and usage sub-indexes using the following specifications:

$$Outreach_i = \text{outreach}_i^{\text{pop}} \beta_1 + \text{outreach}_i^{\text{km}} \beta_2 \quad (1)$$

$$Usage_i = \gamma_1 \text{accounts}_i + \gamma_2 \text{deposits}_i + \gamma_3 \text{loans}_i \quad (2)$$

¹⁰ An aggregation of universal and commercial banks, thrift banks, and rural and commercial banks.

¹¹ Although we managed to obtain regional data on the number of microfinance borrowers and the value of microfinance loans from BSP, we exclude them due to the data points for the now-defunct Negros Island Region in 2015 and 2016.

¹² An aggregation of bank deposit types (demand, savings, time, and other) across bank types (universal and commercial, thrift, and rural and commercial banks).

where $Outreach_i$ and $Usage_i$ are, respectively, the outreach and usage sub-index scores of region i ; $\mathbf{outreach}_i^{\text{pop}}$ and $\mathbf{outreach}_i^{\text{km}}$ are, respectively, the vectors of demographic outreach and geographic outreach indicators; $accounts$ is the number of bank deposit accounts per 1,000 people, $deposits$ is the number of bank deposit accounts as a percentage GRDP, and $loans$ is the value of outstanding bank loans and net receivables as a percentage of GRDP; and $\{\beta_1, \beta_2\}$ and $\{\gamma_1, \gamma_2, \gamma_3\}$ are, respectively, the weights of the outreach and usage indicators, corresponding to the loadings on the first PCs of the outreach and usage dimensions. The PCAs are performed using the correlation matrices of standardized outreach and usage indicators.

In the second stage, we estimate the financial inclusion (FI) index by combining the outreach and usage subindexes as follows:

$$FII_i = \delta_1 Outreach_i + \delta_2 Usage_i \quad (3)$$

where FII_i is the financial inclusion index score of region i , and δ_1 and δ_2 are the respective weights on the outreach and usage subindex scores from the second-stage PCA.

We estimate two specifications of the outreach sub-index (equation 3), which in turn yield two different estimates of the financial inclusion index. In the baseline specification, we follow the literature and measure the outreach dimension using the demographic and geographic outreach of bank offices and ATMs, which are the traditional measures of financial services penetration. However, non-bank financial service providers also play an important role in the country's financial sector. They provide bank-like services (e.g., saving or credit provision) that are more accessible to unbanked or underbanked population segments and areas, as well as services that bank branches may not necessarily offer. We incorporate them in the alternative specification of the outreach sub-index, which we construct using the demographic and geographic outreach of NSSLAs, credit cooperatives, e-money agents, pawnshops, and MSBs, in addition to the baseline outreach indicators.

4.3. Data

We use supply-side data on financial inclusion indicators from the Bangko Sentral ng Pilipinas (BSP). The data are disaggregated at the regional level and are of annual frequency. Outreach data for bank branches and ATMs, and usage data for bank accounts, bank deposits, and bank loans, span 2013 to 2019. Meanwhile, outreach data for non-bank FSPs cover 2013 to 2017. We use a shorter series for the latter due to issues with outreach data in 2018 and 2019 for four of the five non-bank FSPs we include in the index.¹³ Thus, we construct the baseline specification of the FI index using data from 2013 to 2019, and the alternative FI specification using data from 2013 to 2017.

Our data has two limitations. First, we only use supply-side indicators because of the lack of annual demand-side data at the regional level over a long enough period.¹⁴ Second, due to the lack of disaggregation, our data on the number of bank deposit accounts, value of bank deposits, and value of bank loans include those that are held by businesses or institutions as well as those held by households or individuals. Moreover, all accounts, deposits, and loans count towards the data regardless of whether they belong to the same owner or borrower. The caveat is that our usage data possibly overestimates the actual level of usage of financial services by households and individuals, especially in regions with

¹³ The issues are as follows: (1) a large but short-lived drop in the number of money service businesses in 2018; (2) a large drop in the reported number of cooperatives in 2019; (3) data on pawnshops for 2018 and 2019 being incomparable to data from previous years; and (4) a steep jump in the number of e-money agents in 2019.

¹⁴ The BSP's Financial Inclusion Survey is biennial and only generates national estimates. The Family Income and Expenditure Survey (FIES) and Annual Poverty Indicators Survey (APIS) data generate subnational estimates but do not collect data on financial account ownership, except in the 2019 round of the APIS. Regional estimates of household access to loans from formal sources can be obtained using the APIS, but the data series would be broken in off-survey (i.e., FIES) years.

financially developed areas where ownership of multiple accounts may be common, and where large firms account for a significant share of bank savings and lending.

4.3.1. Summary statistics

Table 4.2 presents summary statistics describing the data, while Figures 4.1 through 4.3 illustrate the regional mean of the indicators under each dimension over the period considered.

Among the FSPs we measure, ATMs have the widest physical presence nationally (18 per 100,000 people and 5.8 per 100 km²), followed by pawnshops, and MSBs. On the other hand, NSSLAs are the least physically widespread (0.2 per 100,000 people and 0.06 per 100 km²), followed by credit cooperatives. In terms of usage, there were an average of 572 bank accounts per 1,000 people, or about one bank account for nearly two (1.75) people, from 2013 to 2019. Meanwhile, over the same period, bank deposits and bank loans amounted to an average of 62.2 percent and 42.4 percent of GDP, respectively.¹⁵

Regionally, the demographic concentration of bank offices, ATMs, and all but one non-bank FSP (credit cooperatives) is highest in NCR, followed usually by CALABARZON or Central Visayas. Credit cooperatives have the highest demographic concentration in CAR, followed by Cagayan Valley, Northern Mindanao, and Caraga. CAR is also second to NCR in the demographic concentration of NSSLAs, followed by Zamboanga Peninsula, MIMAROPA, and Northern Mindanao. Outside of NCR and CALABARZON, Eastern Visayas has the highest demographic concentration of e-money agents, followed by Northern Mindanao and Bicol. CALABARZON notably ranks low in the demographic concentration of credit cooperatives and NSSLAs. BARMM has the lowest demographic penetration across all FSPs.

In terms of geographic outreach, NCR is an outlier as it has the largest number of FSPs while also being the smallest region physically with just 0.19 percent of the country's land area. Outside of NCR, CALABARZON has the highest geographic concentration of any FSP, followed usually by Central Luzon or Central Visayas. BARMM has the lowest geographic concentration of most FSPs and is typically joined in the bottom ranks by CAR, MIMAROPA, Caraga, Eastern Visayas, and Cagayan Valley. The latter are regions that have a higher-than-average land area but lower-than-average population (see Figure A.1 in the Appendix).

NCR also tops the usage indicators and is far ahead of the next-ranked region, while BARMM again ranks last. CAR is second to NCR in terms of the uptake of bank deposit accounts, followed by CALABARZON and Central Visayas. Outside of NCR, the value of bank deposits relative to regional output is largest in Central Visayas, Western Visayas, and Ilocos, while the value of bank loans relative to regional output is largest in Central Visayas, Cagayan Valley, and SOCCSKSARGEN. CALABARZON notably ranks at the middle and low end, respectively, in terms of bank deposits and loans as a percentage of GRDP.

4.3.2. Pairwise correlation of financial inclusion indicators

Table 4.3 shows the pairwise correlation of the standardized indicators. We find a highly positive and significant correlation between most indicators within and across sub-dimensions. However, two indicators appear to buck this overall pattern. First is the demographic outreach of credit cooperatives, which is positively correlated with only a few variables (the demographic outreach of bank offices and NSSLAs, and number of deposit accounts), and whose correlation with the latter variables tends to be

¹⁵ As noted earlier, the usage indicators used in the study likely overstate the actual level of financial usage by households. For bank account ownership, a better measure would be the percentage of the population that own a bank account. Based on the BSP's Financial Inclusion Survey, only 12.2 percent of Filipino adults owned a bank account in 2019 (Bangko Sentral ng Pilipinas 2020a, p. 10).

weak.¹⁶ Second is the demographic outreach of e-money agents. It has no significant correlation with some demographic outreach indicators (cooperatives and pawnshops), and while it is positively and significantly correlated with most other indicators, these correlations are relatively lower in magnitude compared with the pairwise correlations of other variables.

¹⁶ This result likely owes to the fact that cooperatives' institutional goals are distinct from other commercial financial service providers such as commercial banks. For instance, Article 7.e of the Philippine Cooperative Code of 2008 states that cooperatives should, as part of their objectives, "[a]llow the lower income and less privileged groups to increase their ownership in the wealth of the nation."

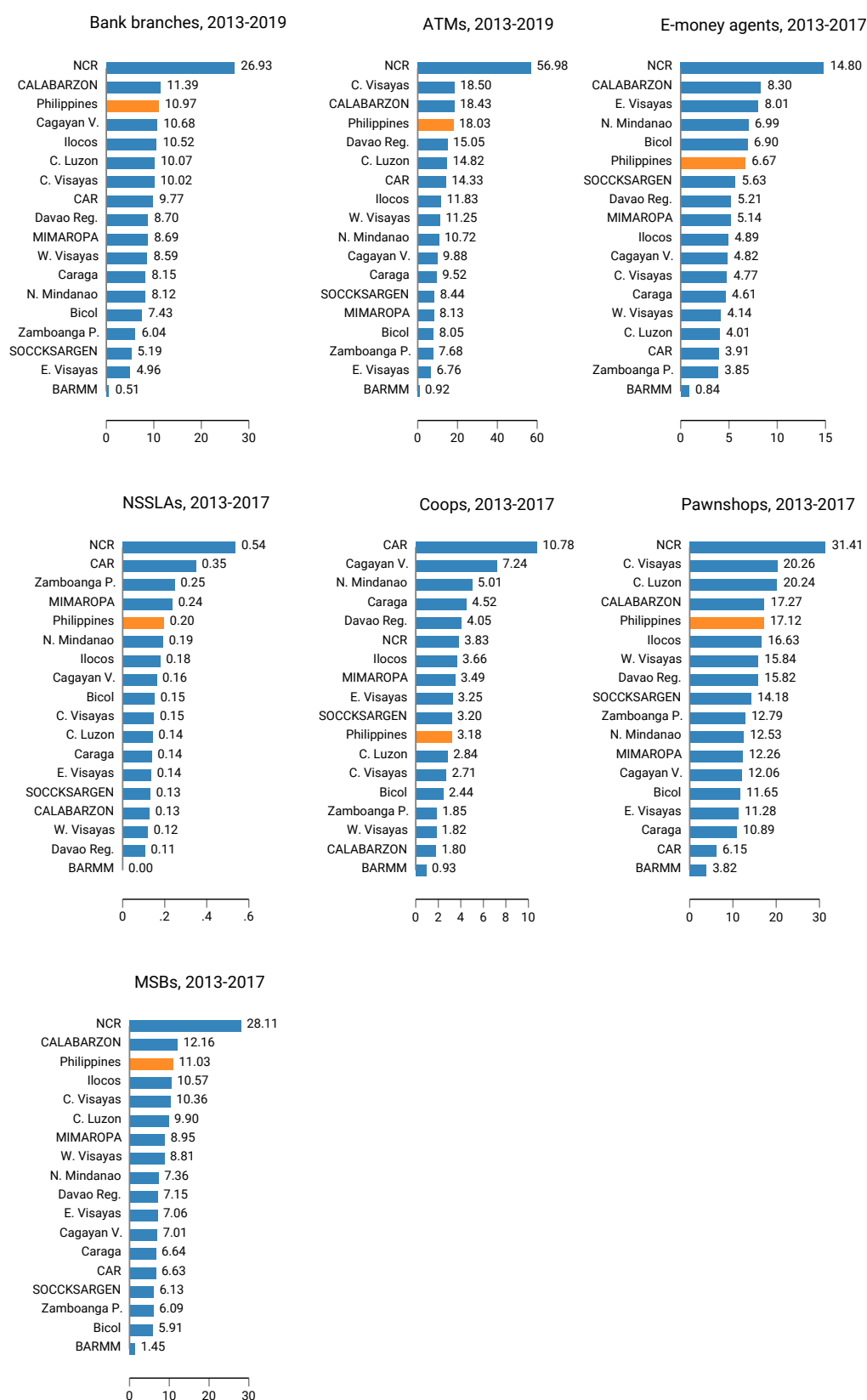
Table 4.2. Summary of financial inclusion indicators

	Years	All regions						Excluding NCR					
		N	Mean	S.D.	Min.	Med.	Max.	N	Mean	S.D.	Min.	Med.	Max.
Demographic outreach (per 100,000 people)													
Bank branches	2013-19	119	9.16	5.22	0.42	8.82	28.59	112	8.05	2.78	0.42	8.52	12.78
ATMs	2013-19	119	13.61	11.87	0.79	10.58	61.84	112	10.89	4.73	0.79	10.12	20.94
E-money agents	2013-17	85	5.70	3.11	0.65	5.20	17.92	80	5.13	2.01	0.65	5.12	9.50
NSSLAs	2013-17	85	0.18	0.11	0.00	0.15	0.55	80	0.16	0.07	0.00	0.15	0.36
Coops	2013-17	85	3.73	2.32	0.87	3.27	13.50	80	3.72	2.40	0.87	3.26	13.50
Pawnshops	2013-17	85	14.42	6.04	3.68	12.84	33.90	80	13.35	4.35	3.68	12.66	21.74
MSBs	2013-17	85	8.84	5.42	1.35	7.60	29.03	80	7.64	2.49	1.35	7.27	12.45
Geographic outreach (per 100 sq. km.)													
Bank branches	2013-19	119	35.68	133.27	0.14	1.87	617.53	112	2.59	2.45	0.14	1.67	11.09
ATMs	2013-19	119	73.94	283.57	0.22	2.12	1,331.25	112	3.75	4.11	0.22	2.00	18.86
E-money agents	2013-17	85	19.63	74.54	0.18	1.39	376.87	80	1.60	1.64	0.18	1.29	8.31
NSSLAs	2013-17	85	0.70	2.63	0.00	0.04	11.30	80	0.04	0.03	0.00	0.04	0.11
Coops	2013-17	85	5.50	18.67	0.27	0.90	87.48	80	0.87	0.41	0.27	0.82	1.96
Pawnshops	2013-17	85	42.44	153.37	0.52	3.02	684.51	80	4.42	3.92	0.52	2.84	15.27
MSBs	2013-17	85	36.69	137.63	0.39	1.56	615.10	80	2.53	2.52	0.39	1.49	10.90
Uptake (per 1,000 people)													
Bank accounts	2013-19	119	458.32	449.21	31.20	346.95	3,540.31	112	362.52	170.99	31.20	334.31	922.65
Intensity (percent of GDP)													
Value of bank deposits	2013-19	119	34.66	27.25	3.52	28.80	146.92	112	28.36	10.20	3.52	28.32	58.37
Value of outstanding bank loans	2013-19	119	15.09	24.91	0.71	8.55	133.23	112	9.09	4.86	0.71	8.35	25.36

Note: Observations are regions.

Figure 4.1. Mean demographic outreach by region, 2013-2019

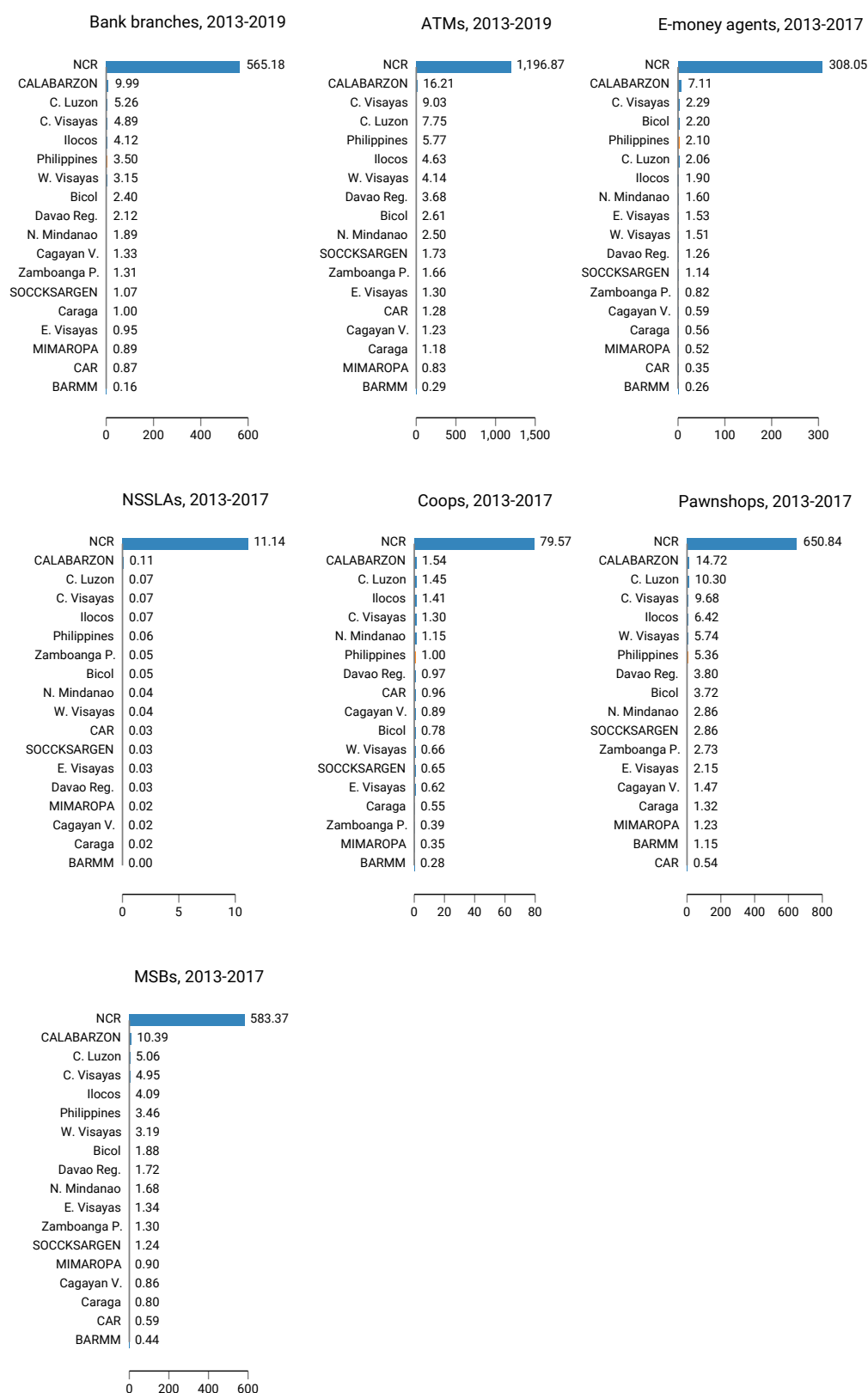
Per 100,000 people



Source: Authors' calculation using BSP data.

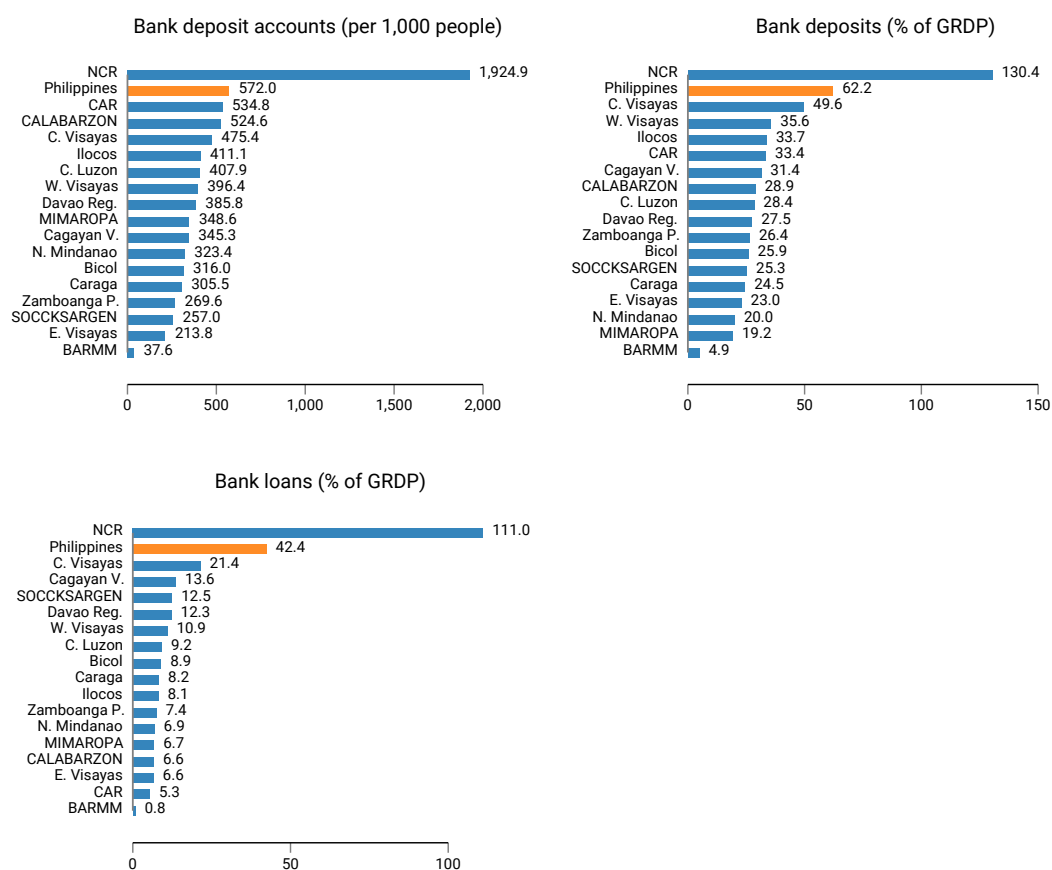
Figure 4.2. Mean geographic outreach by region, 2013-2019

Per 100 square kilometers



Source: Authors' calculation using BSP data.

Figure 4.3. Mean financial usage by region, 2013-2019



Source: Authors' calculation using BSP data.

Table 4.3. Pairwise correlation of standardized indicators

Variables	Demographic outreach							Geographic outreach							Uptake	Intensity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Demographic outreach																	
(1) Banks	1.000																
(2) ATMs	0.952***	1.000															
(3) E-money agents	0.418***	0.429***	1.000														
(4) NSSLAs	0.793***	0.752***	0.235***	1.000													
(5) Cooperatives	0.205**	0.101	-0.069	0.412***	1.000												
(6) Pawnshops	0.719***	0.714***	0.038	0.483***	-0.198**	1.000											
(7) MSBs	0.820***	0.809***	0.161*	0.693***	-0.011	0.825***	1.000										
Geographic outreach																	
(8) Banks	0.861***	0.922***	0.362***	0.769***	0.001	0.635***	0.796***	1.000									
(9) ATMs	0.858***	0.923***	0.370***	0.761***	0.003	0.619***	0.784***	0.998***	1.000								
(10) E-money agents	0.682***	0.742***	0.556***	0.568***	-0.019	0.330***	0.527***	0.793***	0.805***	1.000							
(11) NSSLAs	0.855***	0.910***	0.334***	0.778***	0.003	0.656***	0.814***	0.995***	0.988***	0.755***	1.000						
(12) Cooperatives	0.858***	0.917***	0.312***	0.770***	0.015	0.658***	0.806***	0.993***	0.990***	0.719***	0.992***	1.000					
(13) Pawnshops	0.830***	0.877***	0.245***	0.763***	0.000	0.703***	0.833***	0.961***	0.948***	0.613***	0.980***	0.977***	1.000				
(14) MSBs	0.826***	0.878***	0.284***	0.760***	0.001	0.674***	0.855***	0.960***	0.950***	0.670***	0.975***	0.965***	0.979***	1.000			
Uptake																	
(15) Deposit accounts	0.891***	0.924***	0.389***	0.731***	0.149*	0.587***	0.623***	0.875***	0.881***	0.707***	0.851***	0.874***	0.807***	0.759***	1.000		
Intensity																	
(16) Deposit liabilities	0.928***	0.970***	0.410***	0.770***	0.099	0.702***	0.787***	0.927***	0.929***	0.741***	0.917***	0.924***	0.883***	0.884***	0.911***	1.000	
(17) Loans	0.882***	0.946***	0.397***	0.739***	0.008	0.647***	0.748***	0.977***	0.980***	0.808***	0.965***	0.967***	0.918***	0.910***	0.904***	0.966***	1.000

Note: *** p<0.01, ** p<0.05, * p<0.10.

4.4. Results and discussion

We first show the PCA results for the baseline and alternative models, which serve as the bases for the weights of the regional financial inclusion index (FII) for the Philippines. We then show the subnational FIIs and compare regions using the new index to assess its plausibility and help confirm its empirical validity. We then plot the baseline FII against several indicators of economic output and development to see how well they correlate. Based on our understanding of financial inclusion at the individual level from the demand side (see Section 3), we expect a positive relationship with output/income indicators and a negative relationship with poverty (though not necessarily with inequality indicators).

4.4.1. PCA results – baseline and alternative models

Table 4.4 shows the results of the PCA for the baseline specification, while Table 4.5 does the same for the alternative specification. Panel A of each table shows the principal component estimates, while panel B shows the loadings of each indicator for the first four principal components.¹⁷ The first principal component of the outreach and usage indicators are taken as the outreach and usage sub-indexes, respectively. These sub-indexes are combined in the second-stage PCA, and the resulting first principal component is extracted as the financial inclusion index. The final index scores are normalized to take on values between 0 and 100.

In the baseline specification, the first principal component from the first-stage PCA of the outreach and usage dimensions, respectively, have an eigenvalue of 3.76 and 2.85, accounting for 94 percent and 95 percent of the total variation. The loadings of the outreach and usage indicators are roughly equal in magnitude (0.49-0.51 for the outreach indicators and 0.57-0.58 for the usage indicators), indicating that they contribute almost equally to their respective sub-indexes. In the second-stage PCA, the first principal component has an eigenvalue of 1.98 and accounts for 99 percent of the variation in the data. The outreach and usage sub-indexes meanwhile are weighted equally (by 0.71).¹⁸

In the alternative specification which includes outreach indicators of non-bank FSPs, the first principal component from the first-stage PCA of the outreach dimension has an eigenvalue of 11.39 and captures 81 percent of the total variation in the indicators. While still significant, this is lower than the share of the variation accounted for by the first principal component of the PCA for outreach that includes only bank offices and ATMs.

Turning to the loadings, we find that the loading on the first principal component of the demographic outreach of credit cooperatives (0.01) is substantially lower than those of the other outreach indicators. This result reflects the relatively weak positive relationship that the demographic outreach of credit cooperatives has with the other outreach indicators. In the second-stage PCA, the first principal component accounts for 99 percent of the variation, and the outreach and usage sub-indexes' loadings are again equal (0.71), as in the baseline specification.

In all PCAs performed, the proportion of the variation in the underlying data captured by the first principal component is over 70 percent, which is the common (albeit subjective) cutoff point used in deciding to retain PCs (Jolliffe and Cadima 2016). The fact that first PCs capture a sufficiently large proportion of the variation in the data supports our choice to use only the first PCs in constructing the sub-indexes and final index.

Because of NCR's immense influence on the distribution of geographic outreach indicators, we also check the results for an index with an outreach dimension that consists only of demographic outreach indicators. The results of this exercise for the baseline and alternative specifications are shown in Tables

¹⁷ The loadings of fifth and higher principal components of the outreach sub-index are omitted for space.

¹⁸ This suggests that a similar index would have been obtained if the subindexes and final index were constructed by aggregating the indicators via simple averaging. Tram (et al. 2021) have a similar finding in a cross-country analysis.

A.1 and A.2 in the Appendix. The resulting outreach sub-index and final index are qualitatively similar to those that include geographic outreach indicators. Notably, however, in the alternative specification, the first principal component of the outreach sub-index accounts for an even lower share of the variation (71 percent).

Table 4.4. Principal component estimates and PCA loadings for baseline specification

A. Principal component estimates				
	Eigenvalue	Difference	Proportion	Cumulative
First stage: Outreach				
Component 1	3.76	3.55	0.94	0.94
Component 2	0.21	0.17	0.05	0.99
Component 3	0.04	0.03	0.01	1.00
Component 4	0.00	.	0.00	1.00
First stage: Usage				
Component 1	2.85	2.74	0.95	0.95
Component 2	0.11	0.08	0.04	0.99
Component 3	0.03	.	0.01	1.00
Second stage: FI index				
Component 1	1.98	1.96	0.99	0.99
Component 2	0.02	.	0.01	1.00
B. PCA loadings				
	Comp. 1	Comp. 2	Comp. 3	Comp. 4
First stage: Outreach sub-index				
No. of bank offices per 100,000 people	0.49	0.68	0.55	0.04
No. of ATMs per 100,000 people	0.51	0.30	-0.81	-0.05
No. of bank offices per 100 sq. km.	0.50	-0.47	0.18	-0.70
No. of ATMs per 100 sq. km.	0.50	-0.48	0.10	0.71
First stage: Usage sub-index				
No. of bank deposit accounts per 1,000 people	0.57	0.82	0.01	-
Deposit liabilities as % of GRDP	0.58	-0.39	-0.71	-
Outstanding loans as % of GRDP	0.58	-0.41	0.70	-
Second stage: FI index				
Outreach sub-index	0.71	0.71	-	-
Usage sub-index	0.71	-0.71	-	-

Table 4.5. Principal component estimates and PCA loadings for alternative specification

A. Principal component estimates				
	Eigenvalue	Difference	Proportion	Cumulative
First stage: Outreach				
Component 1	11.39	10.10	0.81	0.81
Component 2	1.28	0.67	0.09	0.91
Component 3	0.61	0.24	0.04	0.95
Component 4	0.37	0.19	0.03	0.98
Component 5	0.18	0.11	0.01	0.99
Component 6	0.07	0.03	0.00	0.99
Component 7	0.04	0.01	0.00	1.00
Component 8	0.03	0.01	0.00	1.00
Component 9	0.02	0.01	0.00	1.00
Component 10	0.01	0.01	0.00	1.00
Component 11	0.00	0.00	0.00	1.00
Component 12	0.00	0.00	0.00	1.00
Component 13	0.00	0.00	0.00	1.00
Component 14	0.00	.	0.00	1.00
First stage: Usage				
Component 1	2.93	2.88	0.98	0.98
Component 2	0.05	0.03	0.02	0.99
Component 3	0.02	.	0.01	1.00
Second stage: FI index				
Component 1	1.99	1.97	0.99	0.99
Component 2	0.01	.	0.01	1.00
B. PCA loadings*				
	Comp. 1	Comp. 2	Comp. 3	Comp. 4
First stage: Outreach				
No. of bank offices per 100,000 people	0.28	0.12	0.35	-0.11
No. of ATMs per 100,000 people	0.29	0.02	0.19	-0.04
No. of e-money agents per 100,000 people	0.24	-0.02	0.22	0.92
No. of NSSLAs per 100,000 people	0.24	0.39	0.02	-0.15
No. of credit cooperatives per 100,000 people	0.01	0.86	0.11	0.00
No. of pawnshops per 100,000 people	0.23	-0.28	0.60	-0.29
No. of MSBs per 100,000 people	0.28	-0.06	0.31	-0.07
No. of bank offices per 100 sq. km.	0.29	-0.03	-0.22	-0.04
No. of ATMs per 100 sq. km.	0.29	-0.03	-0.22	-0.01
No. of e-money agents per 100 sq. km.	0.29	-0.03	-0.22	0.11
No. of NSSLAs per 100 sq. km.	0.29	-0.03	-0.22	-0.07
No. of credit cooperatives per 100 sq. km.	0.29	-0.02	-0.21	-0.03
No. of pawnshops per 100 sq. km.	0.29	-0.04	-0.20	-0.10
No. of MSBs per 100 sq. km.	0.29	-0.03	-0.22	-0.05
First stage: Usage				
No. of bank deposit accounts per 1,000 people	0.58	-0.69	0.43	-
Deposit liabilities as % of GRDP	0.58	-0.03	-0.81	-
Outstanding bank loans as % of GRDP	0.58	0.72	0.39	-
Second stage: FI index				
Outreach sub-index	0.71	0.71	-	-
Usage sub-index	0.71	-0.71	-	-

*Note: Loadings for components 5 through 14 are omitted for space.

4.4.2. The regional FII for the Philippines – comparing regions

We now illustrate the average financial inclusion index scores of each region under the baseline and alternative specifications of the index in Figures 4.4 and 4.5, respectively. We also show the resulting outreach sub-index and final index when geographic outreach indicators are excluded. Figure 4.6, meanwhile, illustrates the annual movement of each region's financial inclusion index scores.

NCR tops the outreach and usage sub-indexes as well as the final financial inclusion index in both the baseline and alternative specifications, as expected. A wide gulf separates NCR from the rest of the country. Among the other regions, BARMM is considerably behind. The rankings at the very top and very bottom of the indexes are notably stable between the two specifications, though slight differences in scores result in changes in rankings for regions in the middle section.

CALABARZON, Central Visayas, Central Luzon, and CAR follow NCR in the outreach sub-index, while SOCCSKARGEN, Eastern Visayas, and BARMM are at the bottom. In the usage sub-index, Central Visayas, Western Visayas, CAR, and CALABARZON trail NCR, while Northern Mindanao, Eastern Visayas, and BARMM rank the lowest. In the overall index, Central Visayas, CALABARZON, and CAR are the most financially inclusive outside of NCR, while Eastern Visayas and BARMM are the least inclusive.

Regions outside NCR score higher in outreach and in overall financial inclusion with geographic outreach excluded, although there are little changes in the final rankings. Excluding geographic outreach in effect removes the penalty of being so far behind NCR, which is an outlier in this dimension.

Figure 4.7 plots each region's financial inclusion scores in both specifications against each other. We find a high degree of positive correlation between the two. Figures 4.8 through 4.10 meanwhile plot the financial inclusion index that includes non-banks against individual financial inclusion indicators (standardized). Variables that are highly weighted in the index have a clear positive relationship with the latter, as expected. This is true for most indicators, particularly with the demographic outreach of banks and ATMs, and with all usage indicators.

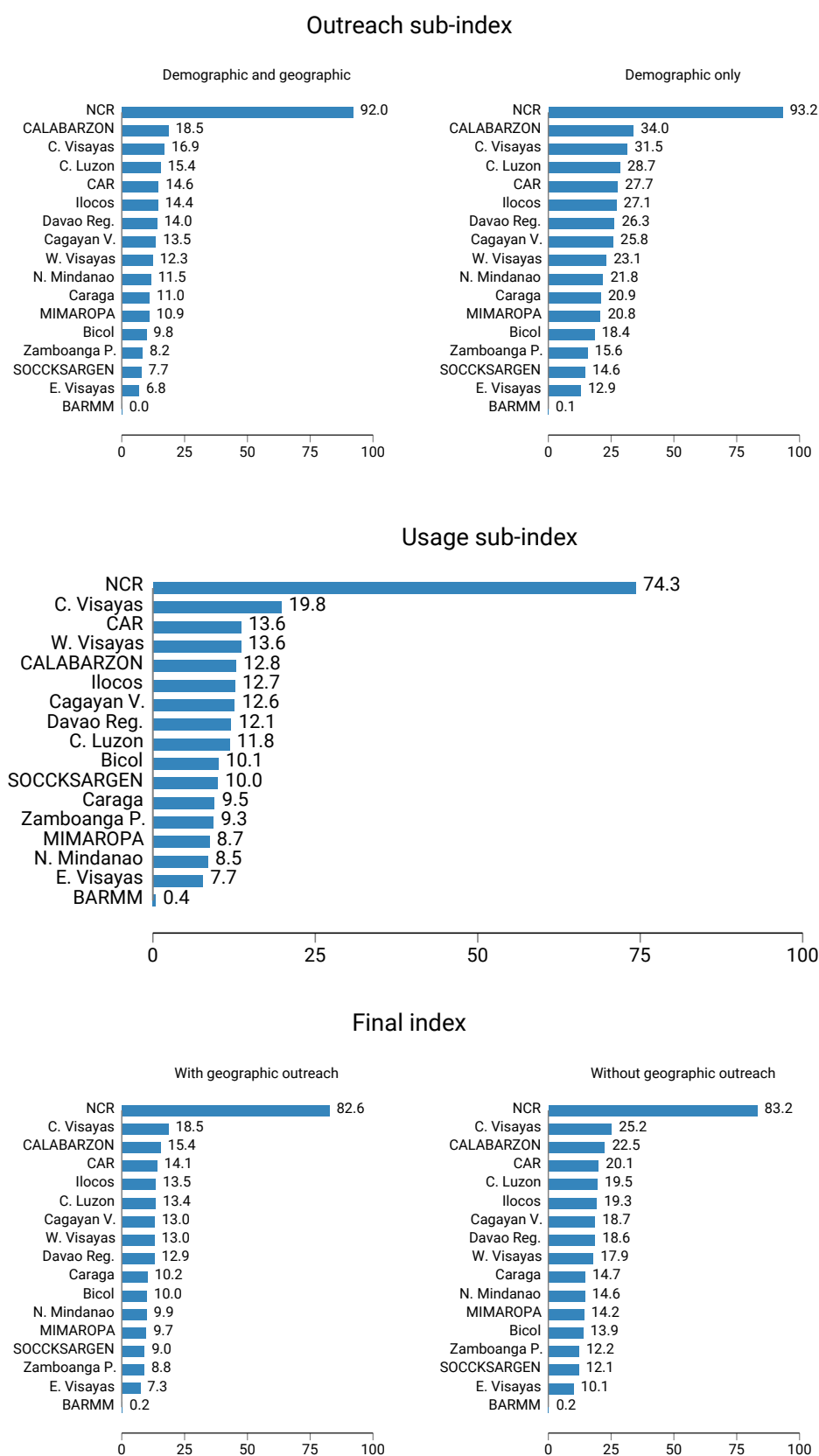
The index is also positively correlated with geographic outreach indicators, although the relationship appears to be driven principally by the large data points from NCR. Meanwhile, the positive relationship is less clear with the demographic outreach of NSSLAs, pawnshops, MSBs, and e-money agents, and does not appear to exist with the demographic outreach of credit cooperatives, which is weighted very low in the outreach sub-index due to its weak positive correlation with the rest of the outreach indicators.

4.4.3. The regional FII and Philippine development indicators

Finally, Figure 4.11 plots the baseline financial inclusion index against selected socio-economic indicators. We find a positive relationship between our index and GDP per capita, functional literacy and electricity access. There is also a positive relationship between our index and the share of households with a deposit or investment based on the Family Income and Expenditure Survey. This further confirms the plausibility of our financial inclusion index.

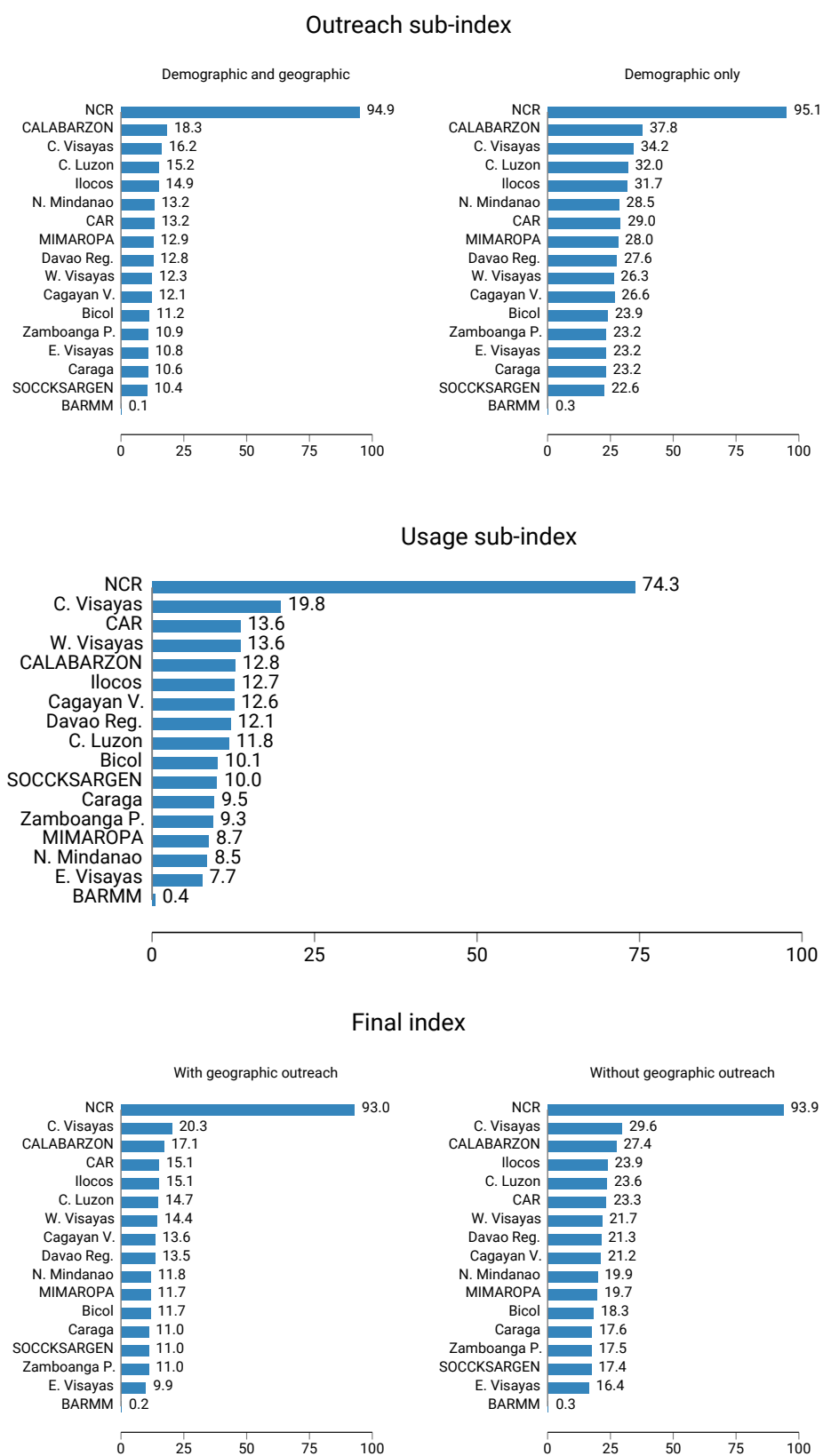
Moreover, we find that our index has a negative relationship with poverty incidence and, to some extent, income inequality (as measured by the Gini index). Overall, the results closely match our findings on financial inclusion at the individual level on the demand side, which identify income (and employment) as major determinant of both formal account ownership and use. This congruence of findings supports the validity of our financial inclusion measure.

Figure 4.4. Average financial inclusion index scores, baseline specification (2013-2019)



Source: Authors' calculation.

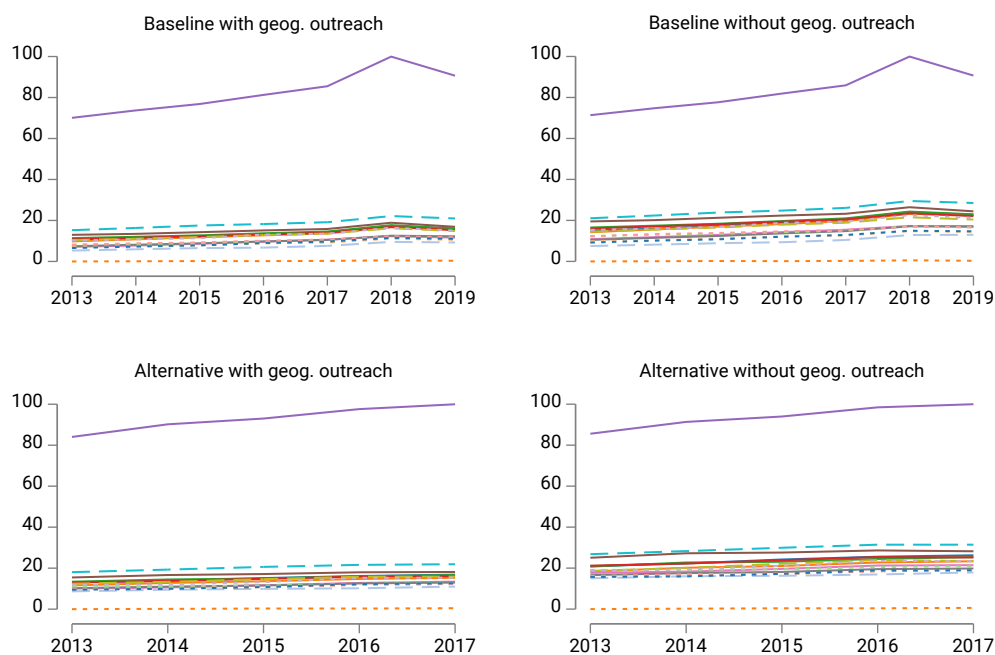
Figure 4.5. Average financial inclusion index, alternative specification (2013-2017)



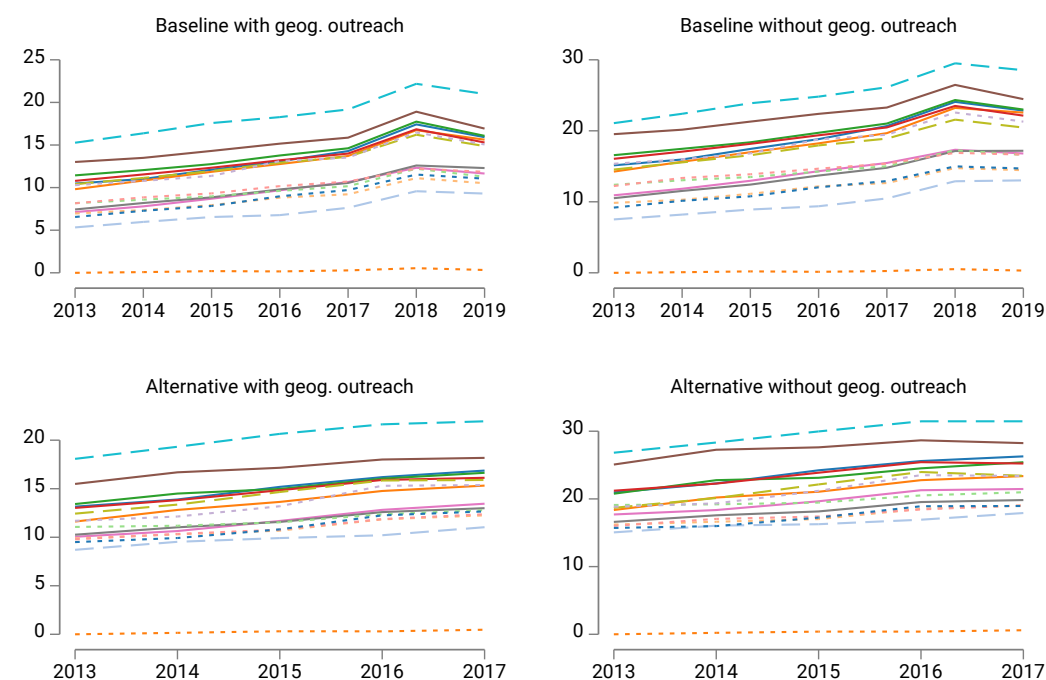
Source: Authors' calculation.

Figure 4.6. Financial inclusion index, 2013-2019

A. All regions

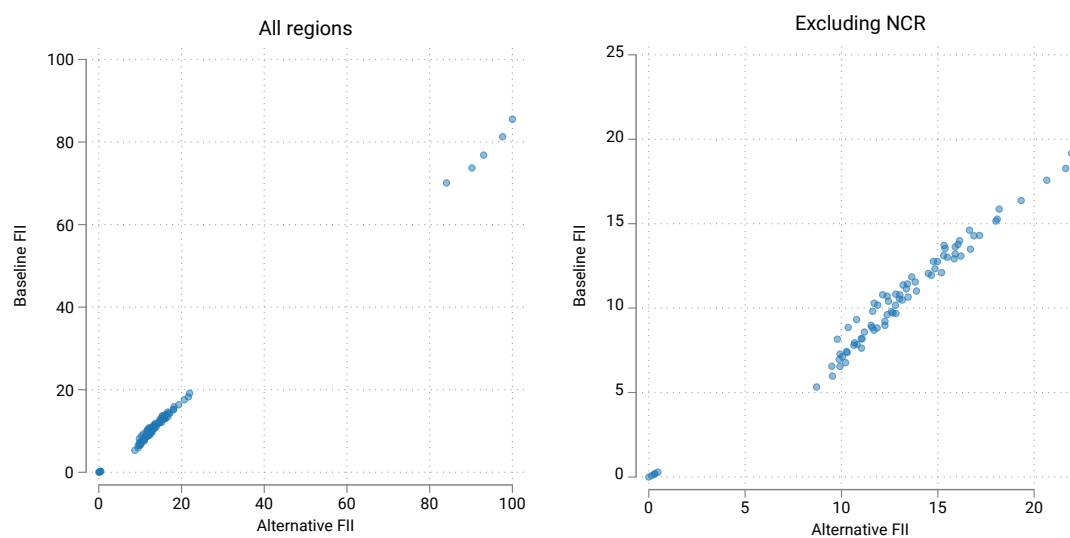


B. Excluding NCR



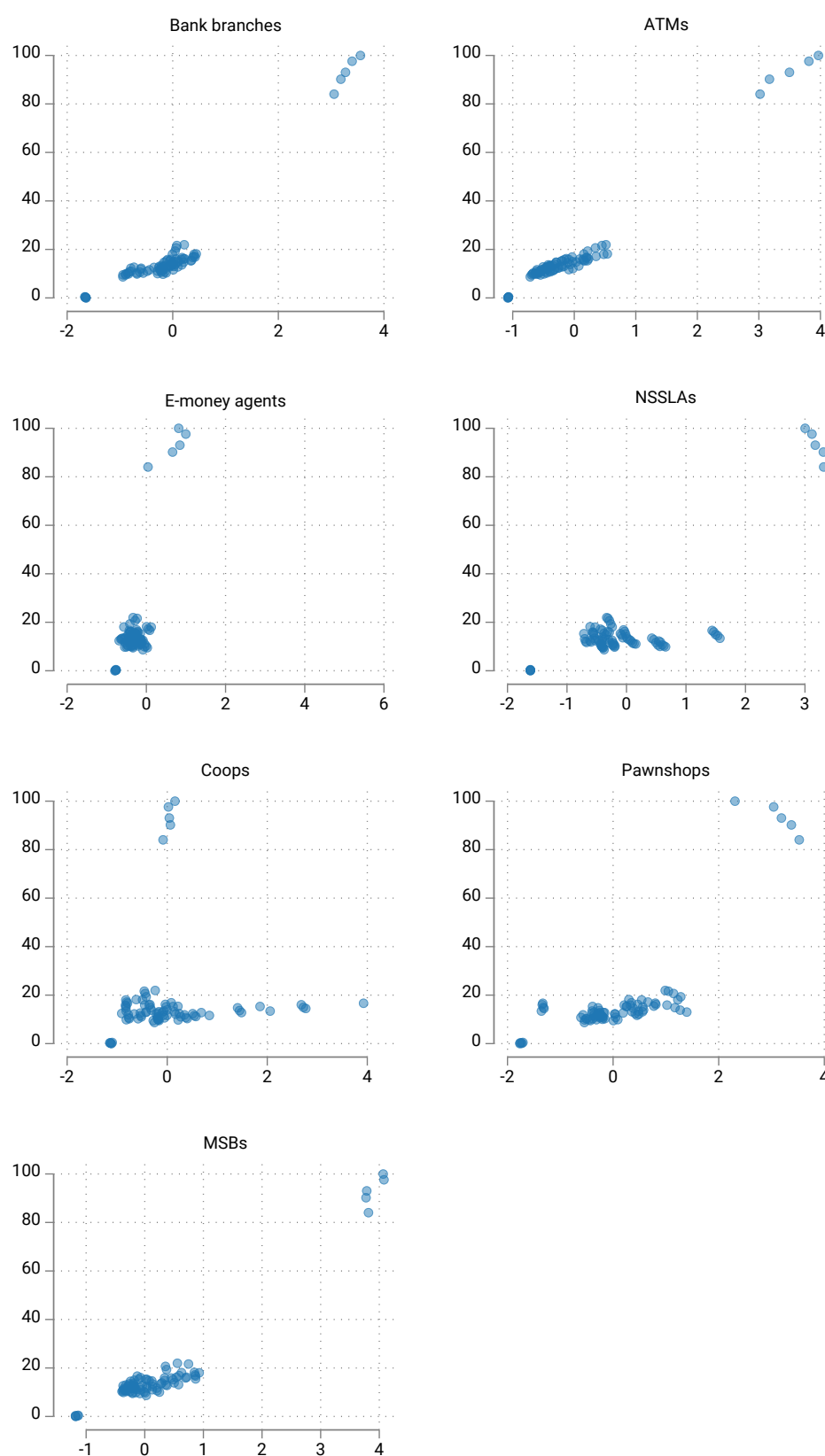
Source: Authors' calculation.

Figure 4.7. Baseline vs. alternative financial inclusion index



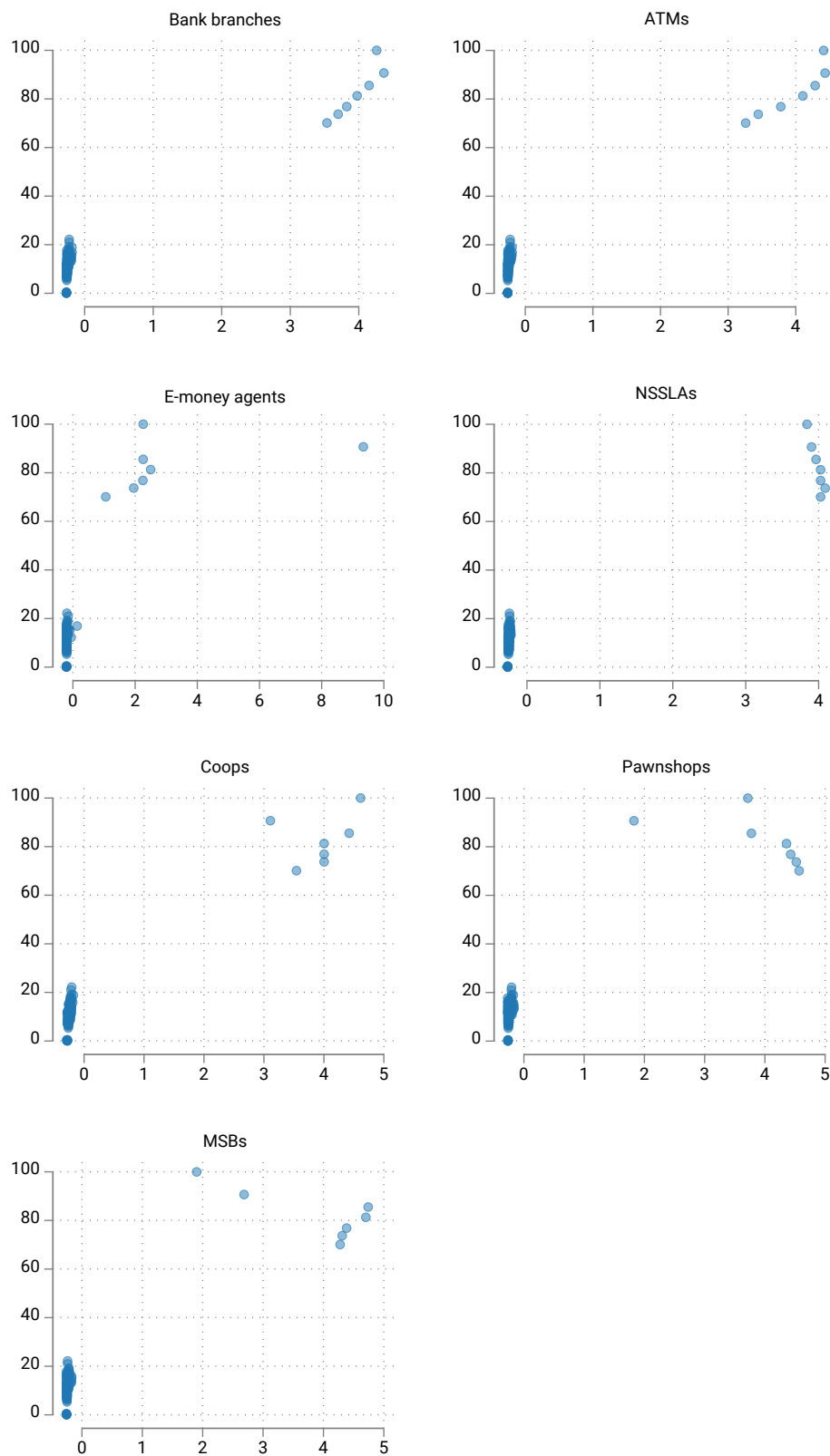
Source: Authors' calculation.

Figure 4.8. Financial inclusion index (with non-banks) vs. demographic outreach indicators



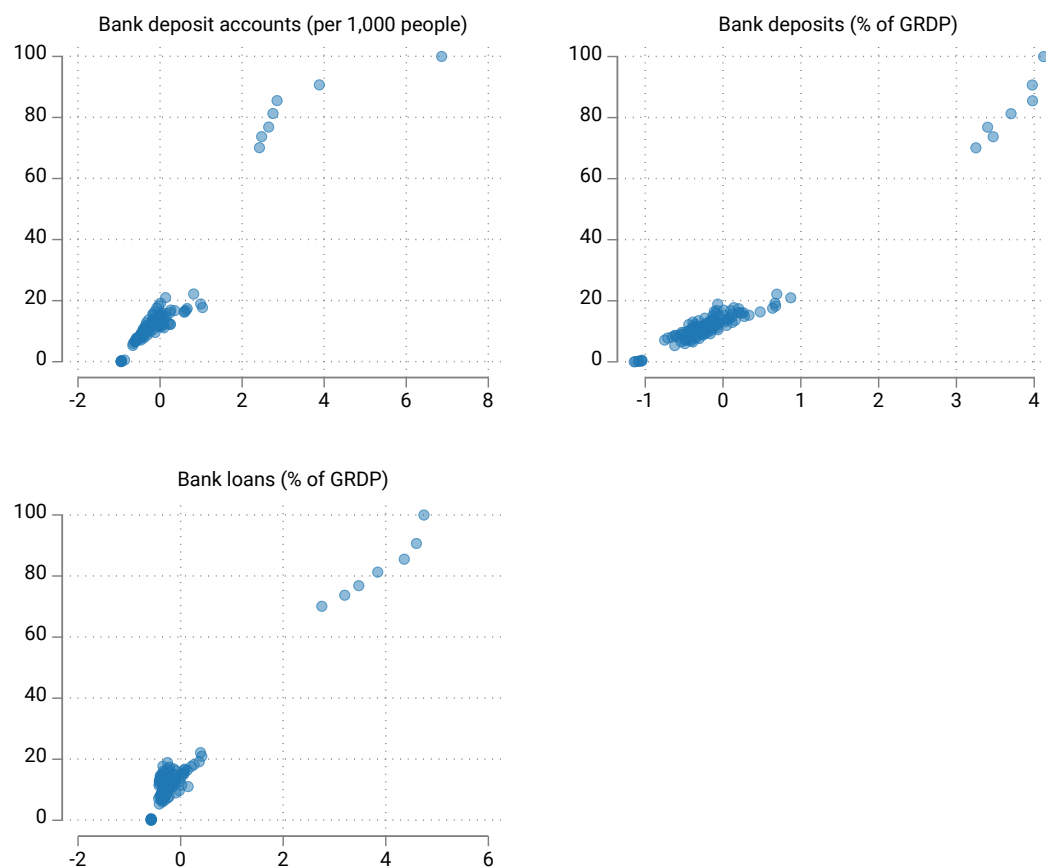
Source: Authors' calculation. Note: The financial inclusion index is measured along the y-axis, and the indicators are measured along the x-axis (in standard deviations from the mean).

Figure 4.9. Financial inclusion index (with non-banks) vs. geographic outreach indicators



Source: Authors' calculation. Note: The financial inclusion index is measured along the y-axis, and the indicators are measured along the x-axis (in standard deviations from the mean).

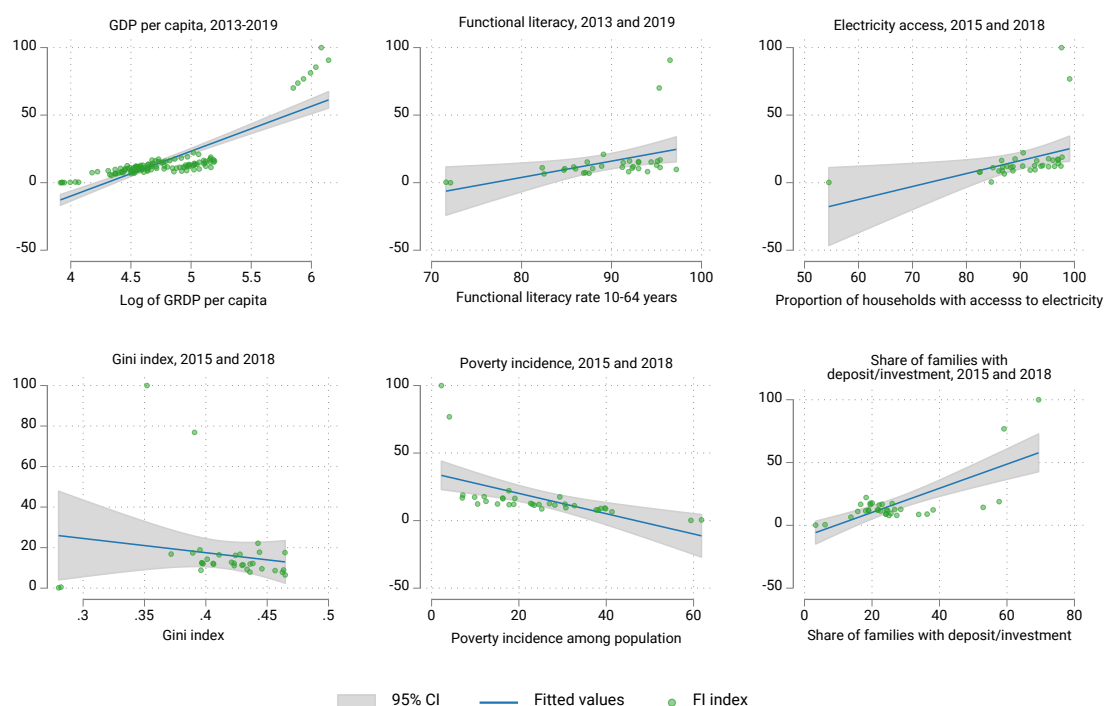
Figure 4.10. Financial inclusion index (with non-banks) vs. usage indicators



Source: Authors' calculation. Note: The financial inclusion index is measured along the y-axis, and the indicators are measured along the x-axis (in standard deviations from the mean).

Figure 4.11. Financial inclusion index vs. socio-economic indicators

A. Financial inclusion index



B. Outreach index

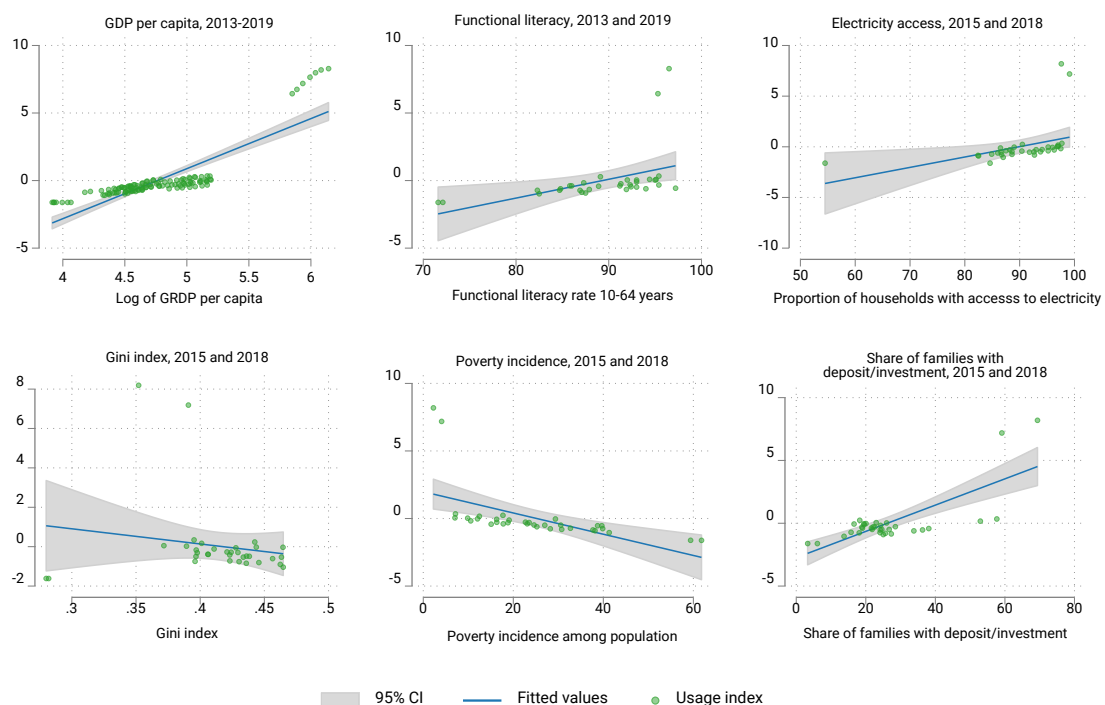
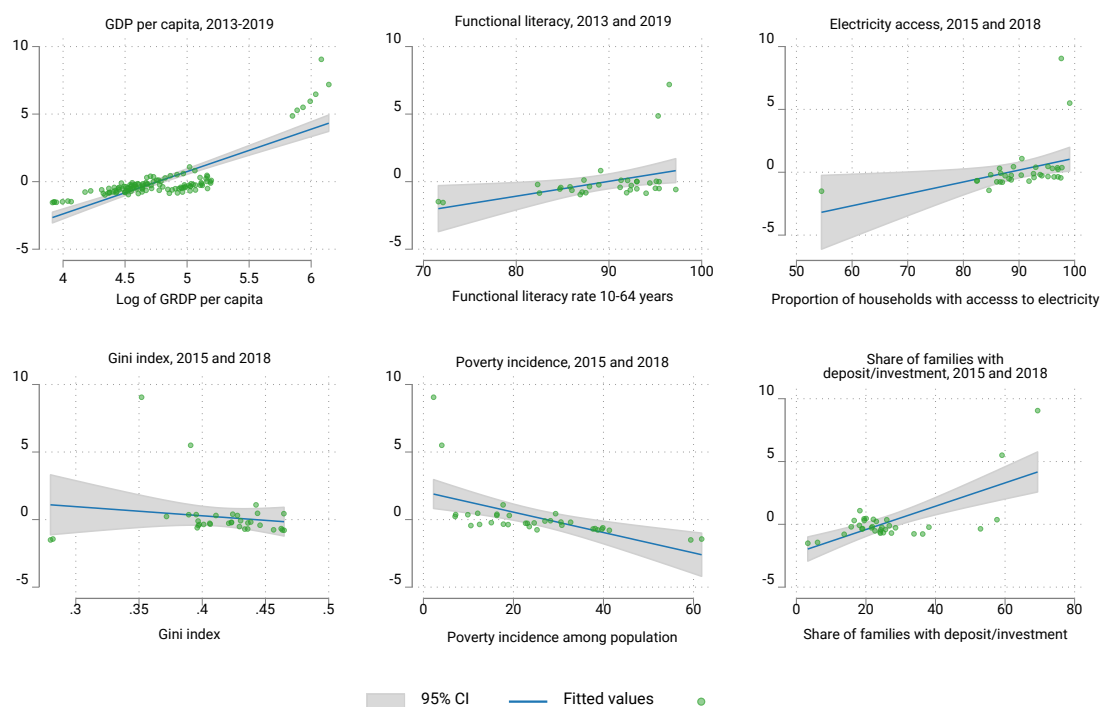


Figure 4.11. Financial inclusion index vs. socio-economic indicators (continued)

C. Usage index



Source: Authors' calculation.

5. Concluding remarks

This paper aimed to conduct an empirical exploration of financial inclusion in the Philippines using available data and methods, with the goal of providing useful information for policymaking. Although the country is well-known for its strong enabling environment for financial inclusion, we find that the country's supply-side performance has been mixed, while demand-side outcomes have lagged other developing countries in the region.

In analyzing microdata to gain a better understanding of the issue from the demand side, we confirm the results of previous studies, by similarly finding a significant positive association between formal account ownership and use, particularly for formal credit, and individual characteristics such as level of education and income, sex (being a woman), employment (having an employer), and age (being older, up to retirement and middle age, respectively). The key finding of the paper pertains to the possible “involuntary exclusion” of the lower-income and less educated segments of society because of barriers and possible market failures.

The above stylized facts offer obvious policy levers such as raising education levels in the country and creating broader programs to improve math and financial literacy, including in the adult population.¹⁹ Grohmann, Klühs and Menkhoff (2018) have shown forcefully in a cross-country study that financial literacy raises financial inclusion, hence financial education can be a potent instrument of financial development. Potential undesired generational effects where the elderly may be shut out of the formal financial sector for various reasons, including unfamiliarity with financial services, further underscore the need for some intervention.

Research has suggested that targeting the financially excluded by encouraging basic or low-fee accounts and correspondent banking, as well as consumer protection policies and the use of G2P payments by government may be effective strategies for greater financial participation (Allen et al. 2016). Such inclusive policies are already being pursued in earnest by the country's monetary and financial regulatory authorities (BSP 2021) and the national government.

A silver lining of the COVID-19 pandemic is that it has served as a catalyst for the speedy implementation of the country's national ID system for more efficient delivery of social protection, as having such a system helps eliminate documentation barriers to banking and other financial services. To date, more than 5 million low-income individuals in the country have already opened bank accounts during the registration for the Philippine Identification System or PhilSys (Diop 2021). This is a good start given sharp supply- and demand-side evidence of how areas outside of the country's capital continue to be largely underbanked.

In measuring financial inclusion at the subnational level, we have taken the first step to building a dataset that would allow us to further study other issues that may be deemed relevant by Philippine policymakers. These include not just the important link between financial inclusion and economic growth and development, but also the critical link between financial inclusion and financial stability, and even monetary policy. The next important step would be to try to uncover the existence of significant causal relationships that may exist in the data and that may be relevant to policy design.

From a cross-country perspective, for example, Ahamed and Mallick (2019) find financial inclusion contributing to bank stability, highlighting the importance of having an inclusive financial system as a development goal and as an “issue that should be prioritized by banks” as it is good for their stability. Vo, Nguyen and Van (2021) obtain similar results for Asia, likewise using bank-level data, noting how

¹⁹ According to the BSP's 2019 Financial Inclusion Survey, adults in the Philippines could answer one out of three of the financial literacy questions asked (on inflation and simple and compound interest). According to the Standard and Poor's Global Financial Literacy Survey (see Klapper, Lusardi and Oudheusden 2015), only one-fourth of adults in the country were financially literate.

financial inclusion can help Asian banks increase their revenue, lower their costs, and widen their market share. One would have to confirm however if such is true specifically for the Philippines.

Fintech seems tailor-made to address the barriers to financial inclusion, but economic history has shown that financial innovation comes with its own set of risks. The “democratization of credit” in the US beginning the 1980s, for example, led to a sharp rise in credit card debt and bankruptcies by the late 1990s (Livshits, Gee and Tertilt 2016), while similar forces alongside the creation of new financial derivatives led to the subprime crisis and contributed to the global financial crisis of 2008. With today’s economic, financial, and technological environment serving as breeding ground for risk, the country’s lawmakers and regulators will need to (continuously) strike an optimal regulatory balance to foster both financial inclusion and financial stability. This requires deeper understanding of the nature of new financial products, services, technologies, and markets that may emerge, as well as the behavior of new players, both the very big and small, and their clients. Clearly, much research will be needed on these new developments moving forward.

Findings of this paper generally support the following policy recommendations. One is the need to strengthen education at the basic level, especially to hone mathematical ability and improve numeracy of the general population. Research has shown that financial literacy sharply increases with educational attainment, which in turn is strongly associated with math skills, apart from age and income (Klapper, Lusardi and Oudheusden 2015). Moreover, general understanding of financial concepts tends to be positively associated with math proficiency, based on performance in internationally accredited tests. Integrating math and financial education, starting at the formative age, would therefore provide an efficient base for greater financial inclusion in the future.

Another is the need to continue strengthening the enabling environment for alternative forms of financial inclusion. There should continue to be a healthy balance in providing access to financial services and minimizing different types of risk that may accompany financial innovation. The country had already been particularly successful in achieving this with mobile phone-based and microfinance models (ESCAP 2014, Llanto 2017). E-money regulations enabled the entry of new providers and more active agents, which led to a sharp increase in e-money accounts and transactions, an observation complemented by this paper’s empirical findings, where mobile money appears to provide the most equitable access to financial services. With rapid development of fintech, however, regulatory gaps still exist in the country such as for virtual banking, also known as branchless or online banking. For more traditional financial services, meanwhile, there remains a need to fill the infrastructure and institutional gaps such as in payments and credit reporting.

Finally, as poor quality and expensive internet connectivity especially outside of NCR pose a barrier to wider fintech access and usage, the government must pursue policy reforms addressing the country’s inadequate internet infrastructure and high cost of internet services. The government can promote greater private investment in the country’s broadband network by easing regulatory barriers that limit competition in the sector. This includes liberalization measures such as amending the Public Service Act, which imposes foreign ownership restrictions on telecommunications and other public utilities.

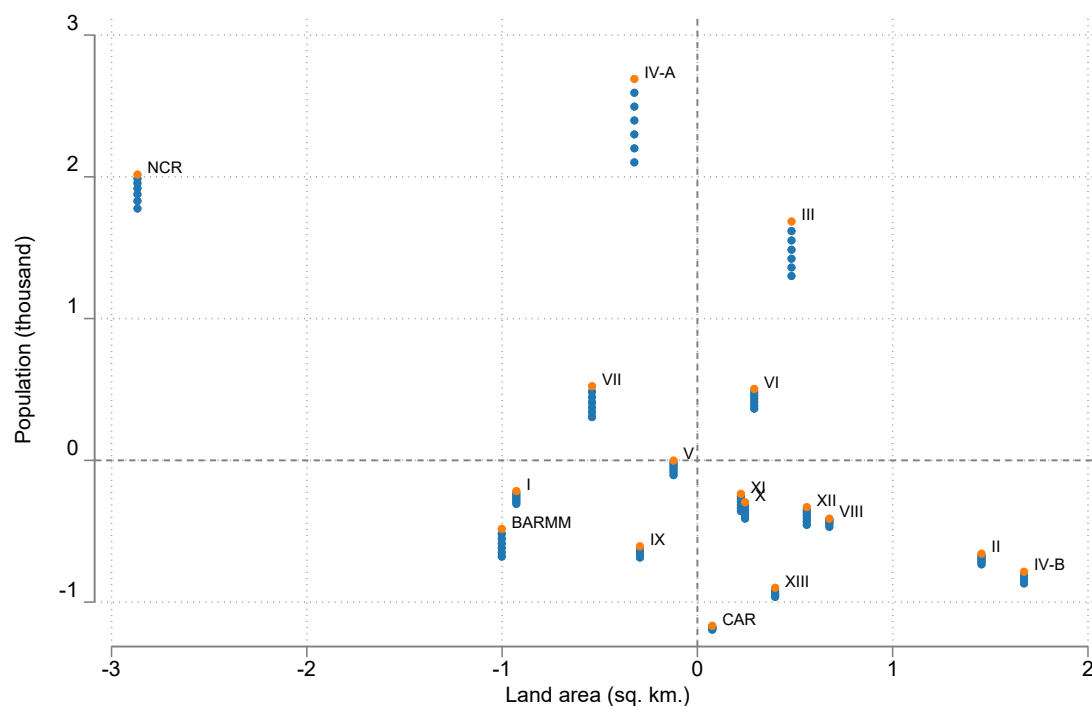
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Appendix

Figure A.1. Regional population (2013-2019) vs. land area



Note: Units are standard deviations from the mean (zero). Regions on the right (left) of the zero line along the x-axis have a higher-than-average (lower-than-average) land area. Regions above (below) the zero line along the y-axis have a higher-than average (lower-than-average) population.
Source: Authors' calculation.

Table A.1. Baseline without geographic outreach

A. PCA estimates				
	Eigenvalue	Difference	Proportion	Cumulative
Demographic outreach				
Component 1	1.95	1.90	0.98	0.98
Component 2	0.05	.	0.02	1.00
Usage				
Component 1	2.85	2.74	0.95	0.95
Component 2	0.11	0.08	0.04	0.99
Component 3	0.03	.	0.01	1.00
FI index				
Component 1	1.96	1.92	0.98	0.98
Component 2	0.04	.	0.02	1.00
B. PCA loadings				
	Comp. 1	Comp. 2	Comp. 3	
Demographic outreach				
No. of bank offices per 100,000 people	0.71	0.71	-	-
No. of ATMs per 100,000 people	0.71	-0.71	-	-
Usage				
No. of deposit accounts per 1,000 people	0.57	0.82	0.01	-
Bank deposit liabilities (% of GRDP)	0.58	-0.39	-0.71	-
Outstanding bank loans (% of GRDP)	0.58	-0.41	0.70	-
FI index				
Demographic outreach sub-index	0.71	0.71	-	-
Usage sub-index	0.71	-0.71	-	-

Table A.2. Alternative without geographic outreach

A. PCA estimates				
	Eigenvalue	Difference	Proportion	Cumulative
Demographic outreach				
Component 1	4.97	3.70	0.71	0.71
Component 2	1.27	0.90	0.18	0.89
Component 3	0.37	0.15	0.05	0.94
Component 4	0.22	0.12	0.03	0.98
Component 5	0.10	0.06	0.01	0.99
Component 6	0.04	0.02	0.01	1.00
Component 7	0.02	.	0.00	1.00
Usage				
Component 1	2.93	2.88	0.98	0.98
Component 2	0.05	0.03	0.02	0.99
Component 3	0.02	.	0.01	1.00
FI index				
Component 1	1.96	1.92	0.98	0.98
Component 2	0.04	.	0.02	1.00
B. PCA loadings				
	Comp. 1	Comp. 2	Comp. 3	Comp. 4
Demographic outreach				
No. of bank offices per 100,000 people	0.44	0.07	-0.16	0.16
No. of ATMs per 100,000 people	0.44	-0.02	-0.06	0.07
No. of e-money agents per 100,000 people	0.37	-0.07	0.89	0.13
No. of NSSLAs per 100,000 people	0.37	0.36	-0.10	-0.79
No. of credit cooperatives per 100,000 people	0.05	0.86	-0.05	0.46
No. of pawnshops per 100,000 people	0.38	-0.34	-0.40	0.35
No. of money service businesses per 100,000 people	0.44	-0.11	-0.10	-0.03
Usage				
No. of deposit accounts per 1,000 people	0.57	0.82	0.01	-
Bank deposit liabilities (% of GRDP)	0.58	-0.39	-0.71	-
Outstanding bank loans (% of GRDP)	0.58	-0.41	0.70	-
FI index				
Demographic outreach sub-index	0.71	0.71	-	-
Usage sub-index	0.71	-0.71	-	-