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*Cyn-Young Park and Rogelio V. Mercado, Jr.*

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# Financial Inclusion, Poverty, and Income Inequality in Developing Asia

Cyn-Young Park and Rogelio V. Mercado, Jr.

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## ABSTRACT

Poverty and income inequality remain a stubborn challenge in Asia and the Pacific despite the region's rapid economic expansion in previous decades, which lifted millions out of poverty. Financial inclusion is often considered as a critical element that makes growth inclusive as access to finance can enable economic agents to make longer-term consumption and investment decisions, participate in productive activities, and cope with unexpected short-term shocks. Understanding the link between financial inclusion, poverty, and income inequality at the country level will help policymakers design and implement programs that will broaden access to financial services, leading to reduction of poverty incidence and income equality. This paper extends the existing literature on financial inclusion by focusing on developing Asian economies. We construct our own financial inclusion indicator to assess various macroeconomic and country-specific factors affecting the degree of financial inclusion for 37 selected developing Asian economies. We also test the impact of financial inclusion, along with other control variables, on poverty and income inequality. Our results show that per capita income, rule of law, and demographic characteristics significantly affect financial inclusion in developing Asia. Furthermore, we find that financial inclusion significantly reduces poverty; and there is also evidence that it lowers income inequality. Our findings suggest that the provisions for young and old-age populations, e.g., retirement pensions; and stronger rule of law, including enforcement of financial contracts and financial regulatory oversight, will broaden financial inclusion, thereby contributing to poverty reduction and lower income inequality.



Keywords: financial inclusion, developing Asia, poverty, income inequality

JEL Classification: G18, O11, O16

# I. INTRODUCTION

One of developing Asia's success stories is its sustained economic expansion which lifted millions out of poverty. But poverty remains a stubborn challenge across the region, with evidence pointing to deteriorating income equality in recent years. The challenge for the region's policymakers is to the reach of the socioeconomic benefits associated with rapid economic expansion. Financial inclusion is critical as increasing the poor's access to financial services is often considered as an effective tool that can help reduce poverty and lower income inequality.

Financial inclusion is a broad concept. As defined by Sarma (2008), financial inclusion is the process that ensures the ease of access, availability, and usage of formal financial system for all members of an economy. However, it is also important to distinguish between voluntary versus involuntary exclusion. The World Bank (2014) defines voluntary exclusion as a condition where the segment of the population or firms choose not to use financial services either because they have no need for them or due to cultural or religious reasons. In contrast, involuntary exclusion arises from insufficient income and high risk profile or due to discrimination and market failures and imperfections. Policy and research initiatives must then focus on involuntary exclusion as it can be addressed by appropriate economic programs and policies which can be designed to increase income levels and correct market failures and imperfections.

Although financial inclusion has become topical on the global policy agenda for sustainable development, economic literature on financial inclusion is still in its infancy. Most studies have looked into the appropriate measures of financial inclusion both at household and country levels, while some papers focused on the role of financial access in lowering poverty and income inequality. Other papers have dealt with varying levels of financial inclusion both in advanced and emerging economies. These papers have laid the foundations in this field and provide key policy insights on the importance of financial inclusion on sustainable development. However, more work needs to be done.

This paper contributes to the existing literature by 1) developing a financial inclusion measure which utilizes available cross-country data, 2) focusing on developing Asian economies,[1] and 3) understanding the link between financial inclusion and poverty and income inequality in developing Asia. By creating our own measure of financial inclusion based on existing methodology, we can increase our sample for developing Asia as well as utilize all available data for each economy. By focusing on developing Asia, we cover diverse samples ranging from large growing economies like the People's Republic of China, India, the Republic of Korea, Singapore, and Indonesia; to small developing countries like Bhutan, Cambodia, Nepal, Samoa, and to transition economies like Kazakhstan, Armenia, and Georgia, among others. Common to this diverse set of economies is their sustained economic expansion, more so during the last decade, but they do exhibit varying levels of development and economic structures. Lastly, using our own financial inclusion indicator, we test the importance of financial inclusion in reducing poverty and lowering income inequality in developing Asia. This study asks the following questions: First, what are the factors that influence the level of financial access in

[1] In this paper, developing Asia refers to 37 economies in the region including Afghanistan (AFG); Armenia (ARM); Azerbaijan (AZE); Bangladesh (BAN); Bhutan (BHU); Brunei Darussalam (BRU); Cambodia (CAM); the People's Republic of China (PRC); Fiji (FIJ); Georgia (GEO); Hong Kong, China (HKG); India (IND); Indonesia (INO); Kazakhstan (KAZ); Kiribati (KIR); the Republic of Korea (KOR); the Kyrgyz Republic (KGZ); the Lao People's Democratic Republic (LAO); Malaysia (MAL); the Maldives (MLD); Mongolia (MON); Myanmar (MYA); Nepal (NEP); Pakistan (PAK); Papua New Guinea (PNG); the Philippines (PHI); Samoa (SAM); Singapore (SIN); Solomon Islands (SOL); Sri Lanka (SRI); Tajikistan (TAJ); Thailand (THA); Timor-Leste (TIM); Tonga (TON); Uzbekistan (UZB); Vanuatu (VAN); and Viet Nam (VIE).

developing Asia? Second, does financial access affect poverty and income inequality in developing Asia?

Following the methodology of Sarma (2008), we constructed financial inclusion indicator for each developing Asian economy in the sample which broadly resembles those of Honohan (2008) and Sarma (2008). The estimation results show that per capita income, rule of law, and population size increase financial inclusion; while age dependency ratio lowers financial inclusion. Importantly, the findings also indicate that financial inclusion lowers poverty and income inequality in developing Asia.

This paper is organized as follows. Section II discusses financial inclusion and provides a literature review. Section III provides the methodology for the construction of our financial inclusion indicator and some stylized facts. Section IV presents the empirical methodology, data sources, and determinants of poverty and income inequality, including our financial inclusion indicator. Section V highlights the key findings. Section VI summarizes and offers some policy recommendations.

## II. RELATED LITERATURE

Existing literature on financial inclusion has varying definitions of the concept. Many studies define the concept in terms of financial exclusion, which relates to the broader context of social inclusion. For example, Leyshon (1995) highlights the exclusion of some groups and individuals from gaining access to formal financial system, while Sinclair (2001) focuses on the inability to access necessary financial services in an appropriate form. In contrast, Amidžić, Massara, and Mialou (2014) and Sarma (2008) directly define financial inclusion. Amidžić, Massara, and Mialou (2014) stated that financial inclusion is an economic state where individuals and firms are not denied access to basic financial services. This paper follows the definition of Sarma (2008) which views financial inclusion as a process that ensures the ease of access, availability, and usage of financial services of all members of society. Unlike the definition of Amidžić, Massara, and Mialou (2014), the advantage of Sarma's (2008) definition is that it builds the concept of financial inclusion based on several dimensions, including accessibility, availability, and usage, which can be discussed separately.

Although there is consensus on how financial inclusion is defined, there is no standard method by which it can be measured. Consequently, existing studies offer varying measures of financial inclusion. For instance, Honohan (2007 and 2008) constructed a financial access indicator which captures the fraction of adult population in a given economy with access to formal financial intermediaries. The composite financial access indicator was constructed using household survey data for economies with available data on financial access. For those without household survey on financial access, the indicator was derived using information on bank account numbers and GDP per capita. The dataset was constructed as a cross-section series using the most recent data as the reference year, which varies across economies. However, Honohan's (2007 and 2008) measure provides a snapshot of financial inclusion and might not be applicable for understanding changes over time and across economies.

Amidžić, Massara, and Mialou (2014) constructed a financial inclusion indicator as a composite indicator of variables pertaining to its dimensions, outreach (geographic and demographic penetration), usage (deposit and lending), and quality (disclosure requirement, dispute resolution, and

cost of usage).[2] Each measure is normalized, statistically identified for each dimension, and then aggregated using statistical weights. The aggregation technique follows weighted geometric mean. A drawback from this approach is that it uses factor analysis method to determine which variables are to be included for each dimension. Therefore, it does not fully utilize all available data for each country. Furthermore, it assigns various weights for each dimension, which implies the importance of one measure versus another.

Sarma (2008) follows a different approach to construct the indicator. He first computed a dimension index for each dimension of financial inclusion and then aggregated each index as the normalized inverse of Euclidean distance, where the distance is computed from a reference ideal point, and then normalized by the number of dimensions included in the aggregate index. The advantage of this approach is its ease of computation and it does not impose varying weights for each dimension. For this reasons, this paper closely follows Sarma's (2008) approach.

Previous studies have also looked into the impact of financial inclusion on poverty and income inequality. Burgess and Pande (2005) found that state-led expansion of rural bank branches in India has helped reduce poverty. Specifically, the authors found robust evidence that opening bank branches in rural unbanked locations in India was associated with reduction in rural poverty rates in those areas. Similarly, Brune et al. (2011) found that increased financial access through commitment saving account in rural Malawi improves the well-being of poor households as it provides access to their savings for agricultural input use. Allen et al. (2013) found that by tapping underprivileged households, commercial banks can help improve financial access of the poor in Kenya.

Unlike Amidžić, Massara, and Mialou (2014) and Sarma (2008), Honohan (2008) constructed a financial access indicator for 160 economies that combines both household survey datasets and published financial institutions data into a composite indicator; and assessed country characteristics that might influence financial access. Among the variables tested, aid as percent of gross national income (GNI), age dependency ratio, and population density significantly lower financial access; while mobile phone subscription and quality of institutions significantly increase financial access. Looking at the cross-country link between poverty and financial access, his results show that financial access significantly reduces poverty, but the result is valid only when financial access is the sole regressor, i.e., it loses significance when other variables are added as regressors.

In an earlier version of his paper, Honohan (2007) tested the significance of his financial access indictor in reducing income equality. His results show that higher financial access significantly reduces income inequality as measured by the Gini coefficient. However, the link between the two variables depends on which specification is used, i.e., when the access variable is included on its own and/or includes financial depth measure, the results are significant, but the same does not hold when per capita income and dummy variables are included.

Rojas-Suarez (2010) used the same indicator constructed by Honohan (2008) to test the significance of various macroeconomic and country characteristics for a group of emerging economies, including some from developing Asia. The results show that economic volatility, weak rule of law, higher income inequality, and social underdevelopment and regulatory constraints significantly lower financial access. In addition, various country grouping dummy variables were also found to be significant especially for large emerging economies. However, unlike the estimation of Honohan,

[2] Although Amidžić, Massara, and Mialou (2014) defined proxies for quality measure, they did not include it in their composite indicator due to lack of reliable and available data.

Rojas-Suarez (2010) used weighted least squares estimation to account for heteroskedasticity in their sample.

## III. FINANCIAL INCLUSION INDICATOR

Before testing the significance of financial inclusion in reducing poverty and lowering income inequality in developing Asia, we first construct our own financial inclusion indicator. The motivations for constructing our own financial inclusion indicator are as follows: 1) we need to include as many developing Asian economies in our sample; using previously computed indicator will limit our sample size, which can lead to biased results; 2) there is a need to develop a consistent measure of financial inclusion for a large sample of economies, which will be used to standardize the measure for developing Asia; and 3) we can compare our own financial inclusion indicator with previous measures.

We closely follow the methodology of Sarma (2008) in constructing our financial inclusion indicator. Specifically, we include five measures namely, automated teller machines (ATM) per 100,000 adults, commercial bank branches per 100,000 adults, borrowers from commercial banks per 1,000 adults, depositors with commercial banks per 1,000 adults, and domestic credit to GDP ratio. The first two measures pertain to availability of banking services as a dimension of financial inclusion, while the last three refers to the usage dimension of financial inclusion. All indicators are sourced from the World Bank's World Development Indicators, and each indicator for each economy pertains to the average value from 2004 to 2012. We chose to use period average values, instead of focusing on a particular year, to avoid annual fluctuations and to include as many economies as possible. In total, data for 188 economies are downloaded, including those from developing Asia.

After computing the period average for each financial inclusion indicator for 188 economies, we then calculate the dimension index, following the specification of Sarma (2008), where the dimension index for *ith* dimension $d_i$ is derived as:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

where $A_i$ is the actual value of dimension $i$, $m_i$ is the minimum value of dimension $i$, $M_i$ is the maximum value of dimension $i$. The index of financial inclusion for country $i$ is then measured by the normalized inverse of Euclidean distance of point $d_i$ computed in Equation (1) from the ideal point $I$ which is equal to 1. Specifically, the formula is given by:

$$FII_i = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \ldots (1-d_n)^2}}{\sqrt{n}} \quad (2)$$

where the second term of the numerator in Equation (2) is the Euclidean distance from an ideal point, normalizing it by the square root of the number of observations and subtracting it by 1, giving the inverse normalized distance. We normalized the indicator in order to make the computed values lie between 0 and 1, where 1 corresponds to the highest financial inclusion index and 0 is the lowest, following Sarma (2008).

One difference between our measure with Sarma's (2008) indicator is that we include all available data regardless of dimension. In Sarma's (2008) index, domestic credit and domestic deposit are included as measures of usage dimension. In our index, we include borrowers and depositors on

commercial banks, along with domestic credit (% of GDP) as a measure of usage. The main reason for this is to increase our sample size. If we restrict our variables to those used by Sarma (2008), we will have smaller sample size. Using the above-mentioned five measures make our indicator more precise as it utilizes all available information.

Table 1 presents our computed financial inclusion indicator. Several observations are noted. First, advanced countries tend to have higher financial inclusion than emerging and developing economies. This observation is similar to those of Honohan (2008) and Sarma (2008). In fact, our ranking is highly consistent with those of Sarma's (2008). Second, interestingly, some small economies have very high financial inclusion indicators despite being developing economies. For instance, St. Kitts and Nevis, the Bahamas, Antigua and Barbuda, Aruba, and Grenada are included in the top one-third of the ranking table, maybe due to fact that these countries are offshore financial centers. Third, our computed financial inclusion indicator follows the same pattern as those of Honohan (2008) and Sarma (2008). Figure 1 shows the comparison with Honohan's (2008) indicator, and Figure 2 for Sarma's (2008) measure. Both figures imply that for economies where we calculated a high (low) financial inclusion indicator, both Honohan (2008) and Sarma (2008) also computed a high (low) financial inclusion, suggesting a similar pattern between various measures. Lastly, across developing Asia, there is a variation on the level of financial inclusion. Figure 3 illustrates that some economies in Asia have very high financial inclusion, while others have very low. The median level of financial inclusion is 24. Surprisingly, some developing economies in Asia have higher-than-expected financial inclusion indicator, such as Mongolia, Fiji, the Maldives, Uzbekistan, and Samoa.

## Table 1: Financial Inclusion Index

| Economy | FII | Rank | Economy | FII | Rank | Economy | FII | Rank |
|---|---|---|---|---|---|---|---|---|
| Spain | 90.98 | 1 | Brazil | 53.66 | 30 | Bosnia and Herzegovina | 39.90 | 59 |
| Portugal | 81.97 | 2 | Bahamas, The | 52.90 | 31 | Mauritius | 39.70 | 60 |
| Luxembourg | 81.96 | 3 | Antigua and Barbuda | 52.69 | 32 | Seychelles | 39.68 | 61 |
| United States | 80.10 | 4 | Brunei Darussalam | 52.30 | 33 | Cabo Verde | 39.13 | 62 |
| Iceland | 79.72 | 5 | Latvia | 51.68 | 34 | Romania | 38.94 | 63 |
| Japan | 78.32 | 6 | Chile | 51.08 | 35 | Serbia | 37.74 | 64 |
| Canada | 74.90 | 7 | Lebanon | 50.83 | 36 | Lithuania | 37.70 | 65 |
| Switzerland | 74.41 | 8 | Hong Kong, China | 50.76 | 37 | Barbados | 37.66 | 66 |
| Belgium | 70.70 | 9 | Turkey | 50.64 | 38 | Poland | 37.35 | 67 |
| Australia | 69.48 | 10 | Hungary | 50.59 | 39 | Jordan | 37.11 | 68 |
| United Kingdom | 68.95 | 11 | Aruba | 47.39 | 40 | Costa Rica | 37.09 | 69 |
| Korea, Rep. of | 68.89 | 12 | Malaysia | 47.09 | 41 | Slovak Republic | 36.62 | 70 |
| Denmark | 68.30 | 13 | Oman | 46.42 | 42 | Colombia | 35.14 | 71 |
| Italy | 67.48 | 14 | Ukraine | 46.26 | 43 | Uruguay | 34.21 | 72 |
| Ireland | 66.99 | 15 | Sweden | 45.96 | 44 | Fiji | 34.00 | 73 |
| St. Kitts and Nevis | 65.93 | 16 | Thailand | 45.59 | 45 | Maldives | 33.70 | 74 |
| Croatia | 64.87 | 17 | Grenada | 44.78 | 46 | Czech Republic | 33.67 | 75 |
| France | 63.51 | 18 | Finland | 44.03 | 47 | Dominica | 33.04 | 76 |
| Estonia | 61.96 | 19 | Mongolia | 44.02 | 48 | United Arab Emirates | 32.60 | 77 |
| Bulgaria | 59.71 | 20 | South Africa | 43.61 | 49 | Ecuador | 32.33 | 78 |
| Israel | 58.97 | 21 | Montenegro | 43.31 | 50 | Suriname | 32.18 | 79 |
| Greece | 58.73 | 22 | Russian Federation | 43.22 | 51 | Macedonia, Rep. of | 31.03 | 80 |
| New Zealand | 58.73 | 23 | Panama | 43.00 | 52 | Uzbekistan | 30.99 | 81 |
| Netherlands | 58.27 | 24 | Norway | 42.35 | 53 | Morocco | 30.86 | 82 |
| Singapore | 58.24 | 25 | Belize | 42.27 | 54 | Argentina | 30.85 | 83 |
| Slovenia | 57.64 | 26 | Kuwait | 42.01 | 55 | China, People's Rep. of | 30.22 | 84 |
| Germany | 55.90 | 27 | St. Lucia | 40.87 | 56 | Samoa | 29.86 | 85 |
| Malta | 55.63 | 28 | Qatar | 40.60 | 57 | St. Vincent and the Grenadines | 29.80 | 86 |
| Austria | 53.91 | 29 | Kosovo | 40.46 | 58 | Guatemala | 29.56 | 87 |

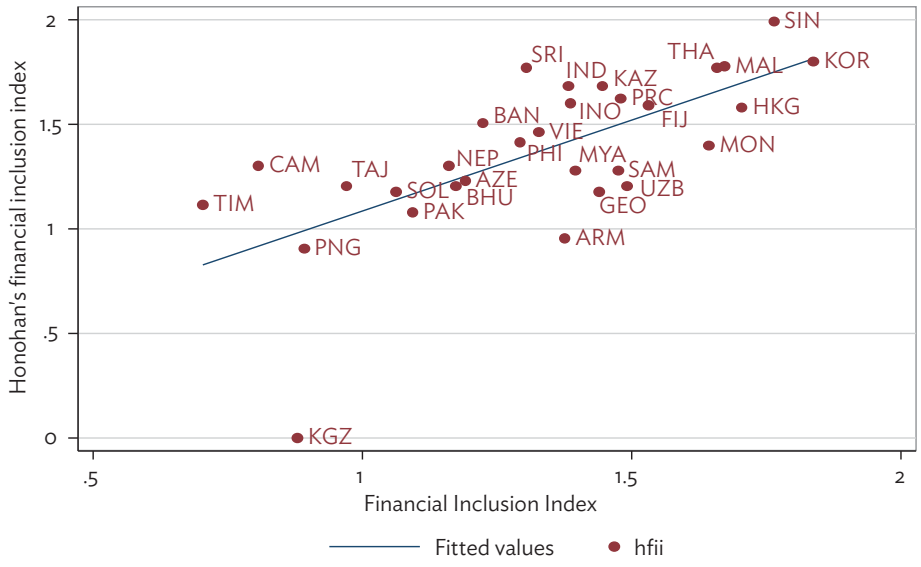
*continued on next page*

*Table 1 continued*

| Economy | FII | Rank | Economy | FII | Rank | Economy | FII | Rank |
|---|---|---|---|---|---|---|---|---|
| Tunisia | 29.29 | 88 | Sri Lanka | 20.17 | 118 | Kyrgyz Republic | 7.58 | 148 |
| Iran, Islamic Rep. of | 28.43 | 89 | Guyana | 19.66 | 119 | Guinea | 7.56 | 149 |
| Venezuela, RB | 28.37 | 90 | Philippines | 19.63 | 120 | Angola | 7.04 | 150 |
| Kazakhstan | 27.95 | 91 | West Bank and Gaza | 19.50 | 121 | Cote d'Ivoire | 6.99 | 151 |
| Georgia | 27.57 | 92 | Egypt, Arab Rep. | 18.77 | 122 | Gabon | 6.82 | 152 |
| Tonga | 27.49 | 93 | Swaziland | 18.33 | 123 | Ethiopia | 6.76 | 153 |
| Mexico | 27.26 | 94 | Bolivia | 18.10 | 124 | Malawi | 6.54 | 154 |
| Vanuatu | 27.12 | 95 | Bangladesh | 16.75 | 125 | Cambodia | 6.42 | 155 |
| Dominican Republic | 26.95 | 96 | Nicaragua | 16.68 | 126 | Djibouti | 6.05 | 156 |
| Albania | 25.69 | 97 | Belarus | 15.97 | 127 | Sudan | 5.74 | 157 |
| Honduras | 25.50 | 98 | Azerbaijan | 15.54 | 128 | Mali | 5.49 | 158 |
| El Salvador | 25.15 | 99 | Gambia, The | 15.27 | 129 | Mozambique | 5.34 | 159 |
| Peru | 24.87 | 100 | Bhutan | 14.91 | 130 | Benin | 5.31 | 160 |
| Myanmar | 24.85 | 101 | Paraguay | 14.51 | 131 | Zambia | 5.08 | 161 |
| Indonesia | 24.36 | 102 | Nepal | 14.46 | 132 | Timor-Leste | 5.06 | 162 |
| Saudi Arabia | 24.34 | 103 | Kenya | 13.42 | 133 | Tanzania | 5.01 | 163 |
| India | 24.14 | 104 | Pakistan | 12.40 | 134 | Equatorial Guinea | 4.90 | 164 |
| Moldova | 24.00 | 105 | Nigeria | 11.92 | 135 | Uganda | 4.82 | 165 |
| Armenia | 23.81 | 106 | Solomon Islands | 11.56 | 136 | Sierra Leone | 4.35 | 166 |
| Botswana | 23.60 | 107 | Zimbabwe | 11.50 | 137 | Lao PDR | 4.22 | 167 |
| Liberia | 22.79 | 108 | Syrian Arab Republic | 11.08 | 138 | Burundi | 4.02 | 168 |
| Libya | 22.59 | 109 | Mauritania | 10.90 | 139 | Rwanda | 3.97 | 169 |
| Trinidad and Tobago | 22.03 | 110 | Ghana | 10.23 | 140 | Yemen, Rep. of | 3.93 | 170 |
| Afghanistan | 21.95 | 111 | Algeria | 9.62 | 141 | Comoros | 3.61 | 171 |
| Viet Nam | 21.28 | 112 | Tajikistan | 9.36 | 142 | Central African Republic | 2.83 | 172 |
| Congo, Dem. Rep. of the | 20.88 | 113 | Togo | 8.71 | 143 | Madagascar | 2.75 | 173 |
| Jamaica | 20.88 | 114 | Kiribati | 8.18 | 144 | Cameroon | 2.58 | 174 |
| Chad | 20.71 | 115 | Lesotho | 7.97 | 145 | Guinea-Bissau | 2.49 | 175 |
| Namibia | 20.71 | 116 | Papua New Guinea | 7.80 | 146 | Congo, Rep. of | 2.38 | 176 |
| Sao Tome and Principe | 20.42 | 117 | Haiti | 7.62 | 147 | | | |

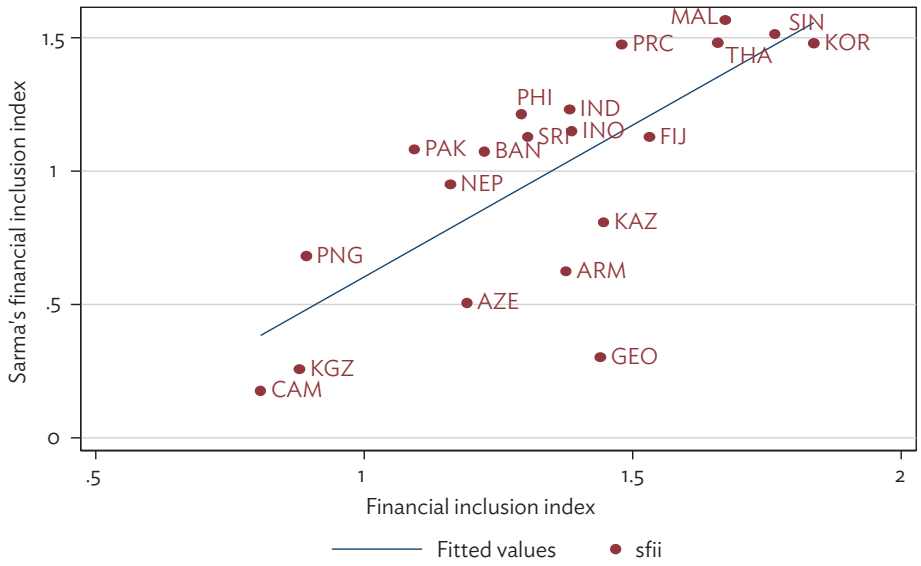
FII = financial inclusion index, LAO PDR = Lao People's Democratic Republic, Venezuela RB = Bolivarian Republic of Venezuela.
Source: Authors' calculations.

## Figure 1: Financial Inclusion Indicator and Honohan's (2008) Indicator



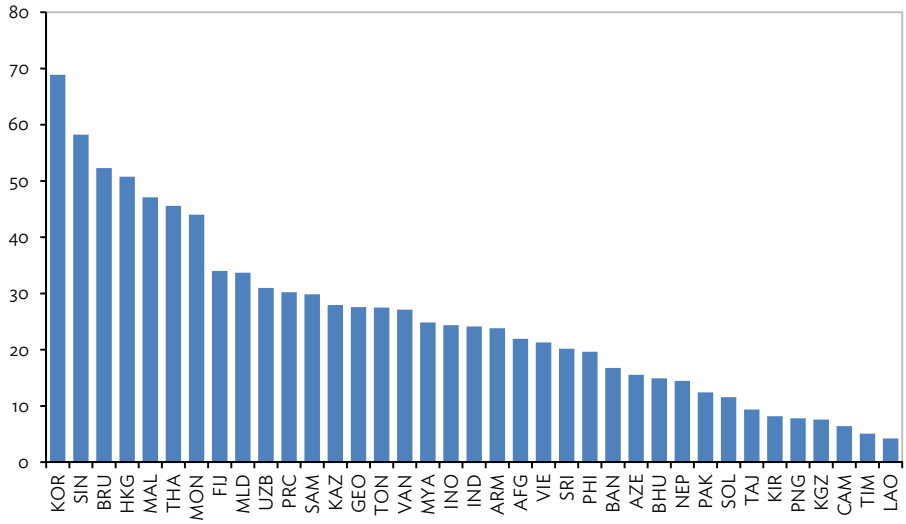

hfii = Honohan's financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Source: Honohan (2008) and authors' calculations.

## Figure 2: Financial Inclusion Indicator and Sarma's (2008) Indicator




sfii = Sarma's financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Source: Sarma (2008) and authors' calculations.

Figure 3: Financial Inclusion Indicator, Developing Asia



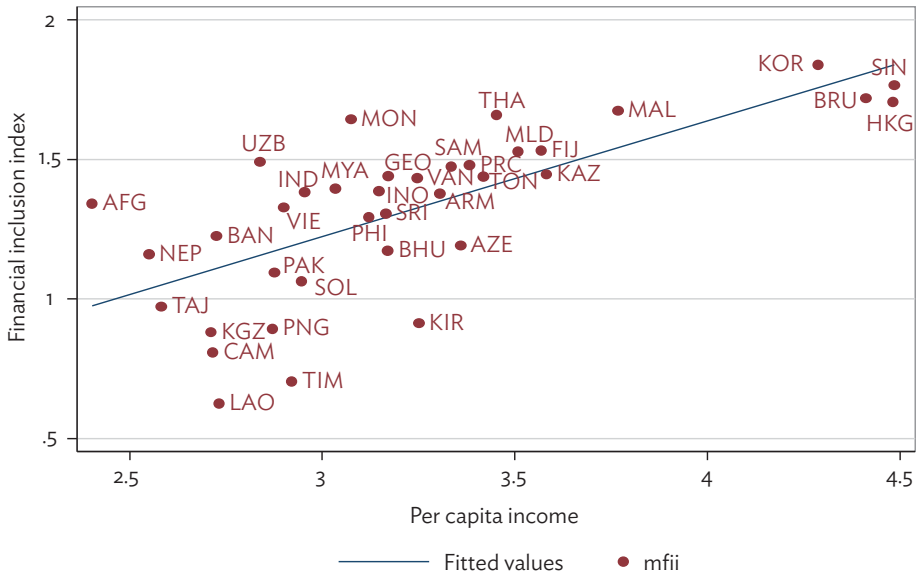

Note: See footnote 1 for the definition of the codes.
Source: Authors' calculations.

## IV. EMPIRICAL METHODOLOGY AND DATA SOURCES

In order to answer the main research questions in this paper, we ran three regression models. First, we test which factors significantly increase or decrease financial inclusion in developing Asia. Using the computed financial inclusion indicator for 37 developing Asian economies presented in the previous section, we use its log value as the dependent variable and test the significance of various regressors, following Honohan's (2008) regressors.

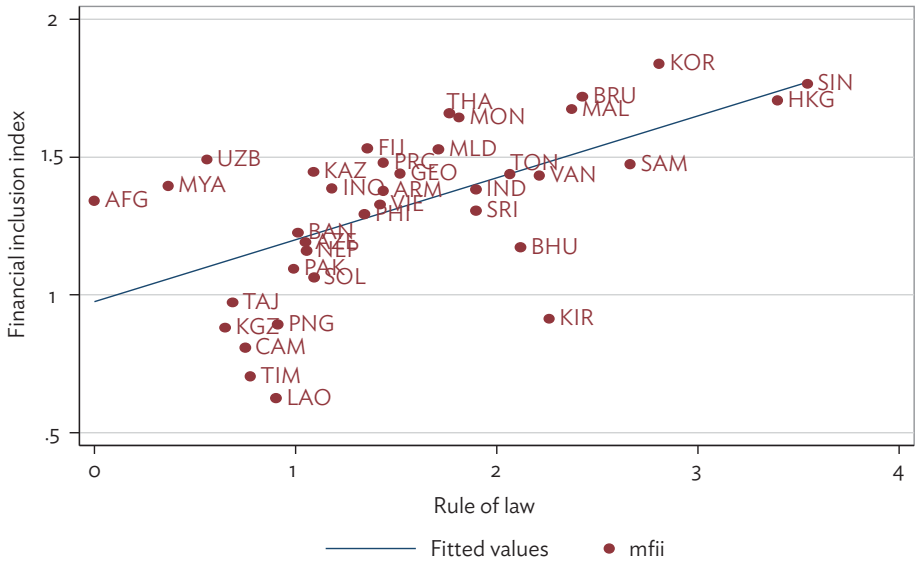
We test the significance of per capita income and argue that higher per capita income should increase financial inclusion as those with insufficient income and high risk profile will no longer be excluded from financial services (Figure 4). Better rule of law should also increase financial inclusion as it improves enforcement of financial contracts (Figure 5). Higher age dependency ratio should reduce financial inclusion as a larger segment of the population are either too young or above the retirement age which impedes their access to financial services as they do not earn income (Figure 6). In contrast, a larger population should increase financial access as it indicates a larger market size. Higher primary school completion and literacy rates should also lead to higher access to financial services (Figure 7). A dummy variable for low-income economy is also included to control for small developing economies in the region.

## Figure 4: Per Capita Income and Financial Inclusion



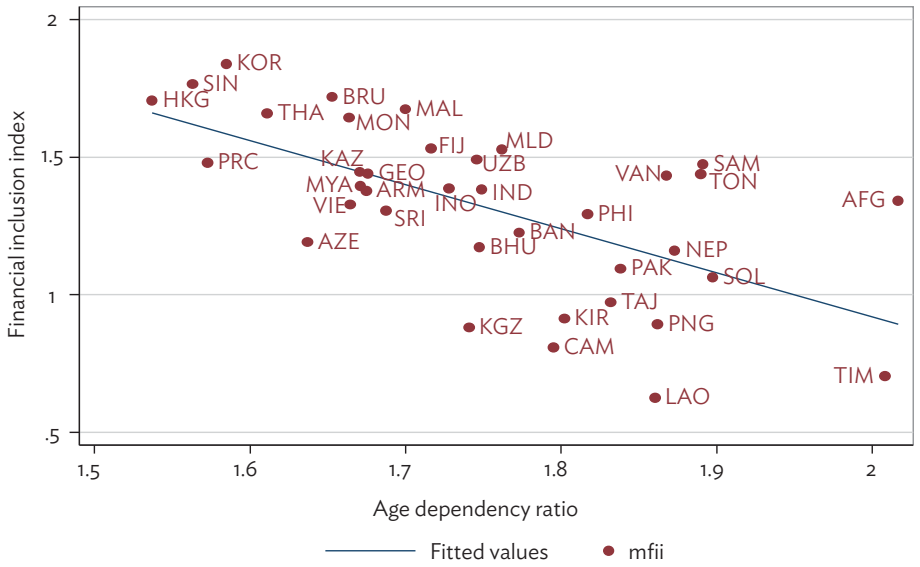

mfii = modified financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations and World Bank, World Development Indicators.

## Figure 5: Rule of Law and Financial Inclusion



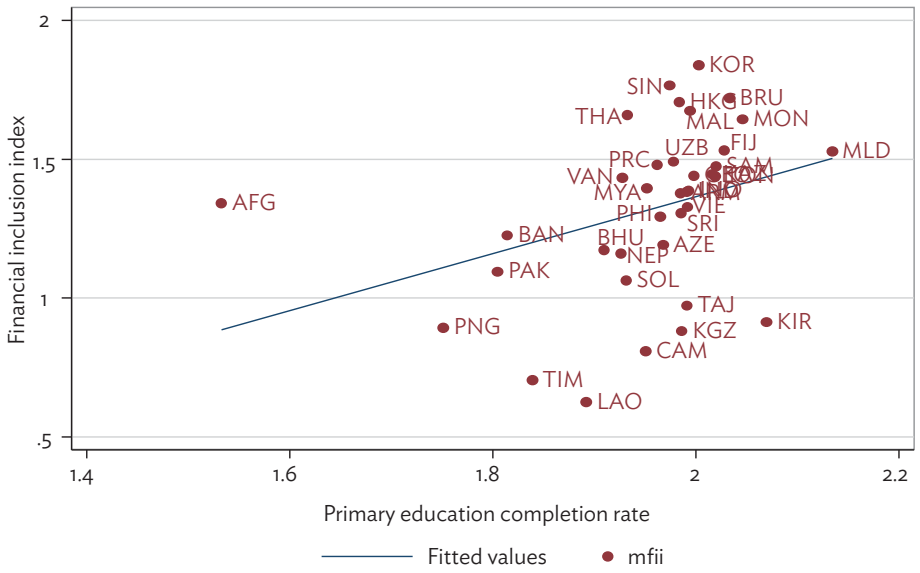

mfii = modified financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations and World Bank, World Governance Indicators.

**Figure 6: Age Dependency Ratio and Financial Inclusion**




mfii = modified financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations and World Bank, World Development Indicators.

**Figure 7: Primary School Completion and Financial Inclusion**

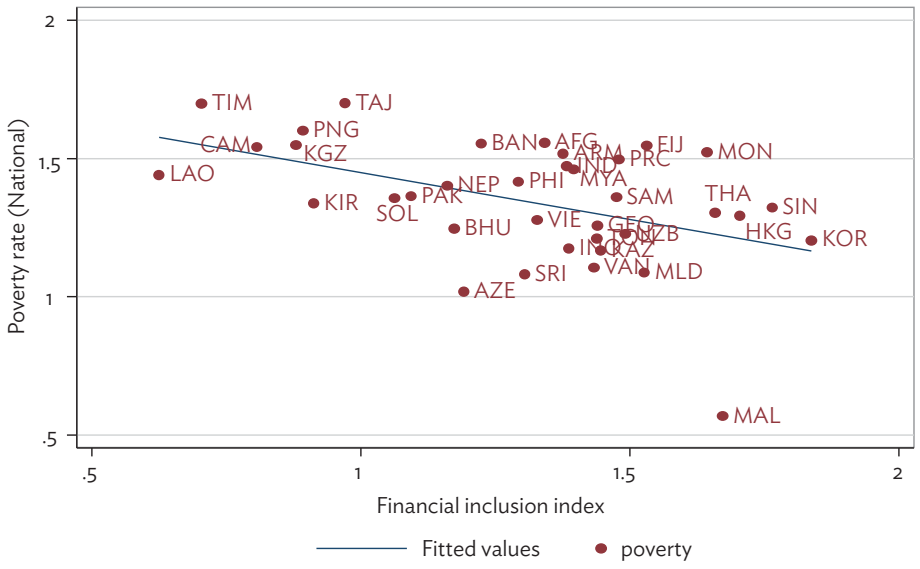



mfii = modified financial inclusion index.
Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations and World Bank, World Development Indicators.

After testing the significance of above-mentioned indicators on financial access, we examine the significance of financial inclusion in reducing poverty rates, along with various indicators. We expect that as financial inclusion increases, poverty rates should decline as more people have access to financial services to smooth their consumption and engage in productive activities. Figure 8 illustrates

this negative relationship between poverty rates and financial inclusion. Aside from poverty rate, several indicators are also considered. 1) Ratio of highest to lowest 20% income group to account for income inequality. 2) Inflation as a measure of macroeconomic stability or an indicator of wealth distribution between debtor and creditor. 3) Primary school completion ratio, which tends to reduce poverty rates. 4) Growth in bank claims, which measures financial depth. We also control for small developing economies through dummy variables. In addition, we include growth rates, rule of law, and an interaction term between per capita income and financial inclusion in some specifications.

**Figure 8: Financial Inclusion and Poverty**




Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations and World Bank, World Development Indicators.

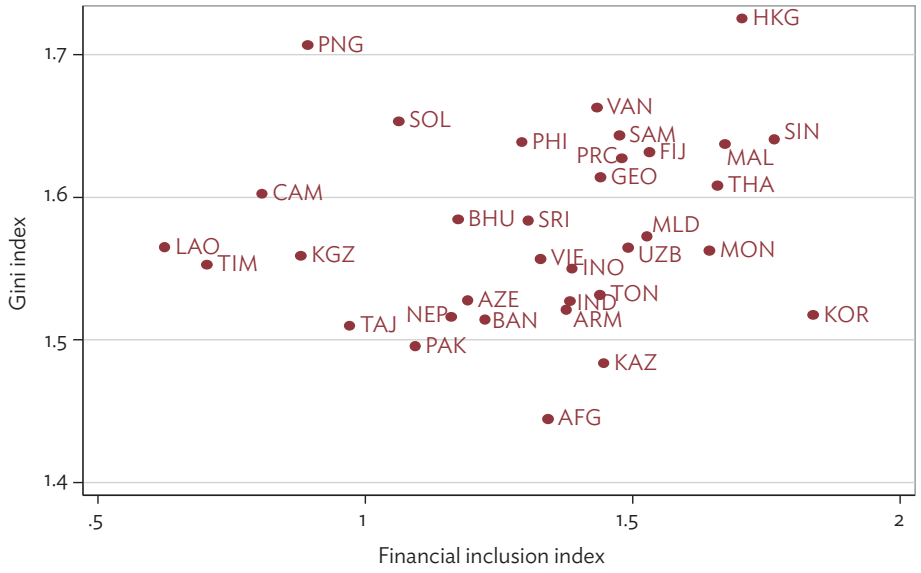
Finally, we test the significance of financial inclusion and other variables on income inequality. We expect that as financial inclusion increases, income inequality should decline as more people at the lower income strata will have access to financial services. Figure 9 shows that there is a weak relationship between financial inclusion and income inequality.[3] We also test the significance of inflation, primary school completion, and growth in bank claims. Similar to the previous specification, we also control for low-income economies and include growth rates, rule of law, and an interaction term between poverty and financial inclusion in some specifications.

Data are sourced from World Development Indicators, Global Financial Database, and World Governance Indicators of the World Bank. Data on poverty rates refer to poverty headcount ratio at the national poverty line as percent of total population, while income inequality refers to the Gini index. For economies with unavailable data on poverty rates and Gini coefficient, data were sourced from the Key Indicators of the Asian Development Bank and national sources accessed online. Age dependency ratio refers to the percentage of dependents to working-age population. Inflation is the year-on-year change in consumer price index. Per capita income refers to GNI per capita at constant $ 2005 prices. Literacy rate is the percentage of people ages 15 and above who can, with understanding,

[3] Honohan (2007) and Rojas-Suarez (2010) found a negative relationship between financial inclusion and income inequality for their full sample series.

read and write a short, simple statement on their everyday life. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts as well as the likelihood of crime and violence. Data are taken from the World Governance Indicators. Primary education completion rate is the percentage of students completing the last year of primary school expressed as a percentage of the relevant age group. Growth rate refers to the year-on-year change of real GDP. Growth in bank claims refers to the annual growth of bank claims to the private sector as percent of broad money.

**Figure 9: Financial Inclusion and Income Inequality**




Note: See footnote 1 for the definition of the codes.
Sources: Authors' calculations, World Bank, Asian Development Bank, and national sources.

Cross-sectional data for each indicator refers to the average values from 2004 to 2012, whenever data is available. All variables are expressed in log scale, except for the rule of law index, which is rebased, i.e., the lowest value take 0. The low income dummy variable follows the World Bank classification of low-income economy. The variable takes a value of 1 if it is a low-income economy, and 0 otherwise. We limit the number of regressors in our model specifications, given that our sample size is relatively small. Adding more regressors in our specifications will compromise the efficiency of our estimates as additional regressors will use up degrees of freedom. To address heteroskedasticity, robust standard errors are used.

## V. EMPIRICAL RESULTS

Table 2 presents the estimates for financial inclusion indicator. Various specifications are used to test the robustness of the results and address multicollinearity among the regressors. Specifications (1) to (3) include per capita income and other determinants, while specifications (4) and (5) include rule of law and other determinants. Specifications (6) and (7) include all regressors. We separate both per capita income and rule of law in specifications (1) to (5) because these two variables are highly

correlated.[4] We also address potential multicollinearity between the two variables in specifications (6) and (7) where we used standardized values of the two variables.

Table 2: Regression Results on Financial Inclusion

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| GNI per capita (log) | 0.429*** | 0.321*** | 0.431*** | | | 0.321* | 0.337** |
| | [5.638] | [3.460] | [5.789] | | | [2.040] | [2.175] |
| Rule of law (log) | | | | 0.153** | 0.230*** | 0.061 | 0.046 |
| | | | | [2.734] | [4.711] | [0.755] | [0.566] |
| Dependency ratio (log) | | −0.751* | | −1.215*** | | −0.281 | −0.292 |
| | | [−1.713] | | [−3.468] | | [−0.492] | [−0.493] |
| Population (log) | | | 0.069** | | 0.084** | 0.059 | 0.057 |
| | | | [2.514] | | [2.621] | [1.631] | [1.542] |
| Education completion (log) | | −0.164 | | −0.290 | | −0.051 | −0.000 |
| | | [−0.274] | | [−0.430] | | [−0.066] | [−0.000] |
| Literacy (log) | | | 0.185 | | 0.536 | 0.131 | 0.085 |
| | | | [0.382] | | [0.957] | [0.246] | [0.157] |
| Low-income economy dummy | 0.038 | 0.008 | 0.022 | −0.019 | 0.005 | 0.030 | 0.025 |
| | [0.328] | [0.074] | [0.196] | [−0.169] | [0.040] | [0.255] | [0.213] |
| Constant | −0.075 | 1.914 | −0.911 | 3.781** | −0.646 | 0.114 | 1.389 |
| | [−0.267] | [1.297] | [−0.943] | [2.423] | [−0.552] | [0.054] | [0.717] |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| R-squared | 0.510 | 0.553 | 0.567 | 0.514 | 0.469 | 0.578 | 0.575 |

GNI = gross national income.
Note: Values in brackets are t-stat. ***, **, and * refer to significant at p<0.01, p<0.05, and p<0.10, respectively.
Source: Authors' estimates.

The results show that among the country characteristics, per capita income, rule of law, and demographic structure significantly influence the level of financial inclusion in developing Asia. Specifically, higher per capita income, rule of law, and population significantly increase financial inclusion; while higher age dependency ratio significantly reduces financial inclusion. The estimates reveal that when both per capita income and rule of law are considered, the latter loses its significance, suggesting that per capita income is the main determinant for financial inclusion in developing Asia and that involuntary financial exclusion in the region may be driven largely by insufficient household income and high risk profile rather than market failures and weak enforcement of contracts. These results are consistent with the findings of Honohan (2008). However, unlike the estimates of Honohan (2008), we find robust evidence showing the importance of per capita income on financial inclusion. But similar to Honohan's (2008) results, primary education completion and literacy rates have no significant effect on the level of financial inclusion in developing Asia.

Table 3 shows the results on the impact of financial access on poverty. Across specifications, we added other variables used by Honohan (2008) on the regressors of poverty rate and also added specifications with interaction term between per capita income and financial inclusion as well as growth rates and rule of law. Some economies were dropped from the estimation due to unavailable data. Our estimates offer further evidence that there is a strong correlation between financial inclusion

[4] The pairwise correlation between rule of law and per capita income is around 0.80, which is high.

and lower poverty rates. Across specifications, financial inclusion appears significant and with a negative sign. Our results also provide support on the role of educational attainment in lowering poverty rates, although it loses significance when more determinants are added. This finding is consistent with the view that education reduces poverty as it enables individuals to acquire and use knowledge and skills that increase their employment prospects and, therefore, earn higher wages. For specification (8), where all variables are included, the dummy variable for low-income economies within developing Asia is significant, suggesting that low-income economies tend to have higher poverty rates. Lastly, the interaction term between per capita income and financial inclusion significantly lowers poverty rates, giving further support on the importance of raising income levels in lowering poverty rates.

Table 3: Regression Results on Poverty

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Financial inclusion (log) | −0.339*** | | −0.229** | −0.315*** | −0.321*** | −0.276*** | −0.290** | −0.255* |
| | [−3.110] | | [−2.077] | [−3.201] | [−3.113] | [−2.864] | [−2.294] | [−1.983] |
| Ratio of highest to lowest 20% income | | | | −0.301 | −0.339 | −0.276 | −0.289 | −0.208 |
| | | | | [−1.025] | [−1.257] | [−1.089] | [−1.082] | [−0.678] |
| Inflation (log) | | | | | −0.041 | −0.026 | −0.043 | −0.065 |
| | | | | | [−0.240] | [−0.160] | [−0.167] | [−0.239] |
| Education completion (log) | | | | | | −0.428** | −0.386 | −0.278 |
| | | | | | | [−2.213] | [−1.628] | [−1.110] |
| Growth in bank claims (log) | | | | | | | −0.004 | −0.001 |
| | | | | | | | [−0.031] | [−0.009] |
| Low-income economy dummy | | | | | | | | 0.130* |
| | | | | | | | | [1.763] |
| Growth rate (log) | | | −0.047 | | | | | |
| | | | [−0.326] | | | | | |
| Rule of law (log) | | | −0.074 | | | | | |
| | | | [−1.488] | | | | | |
| GNI*Financial inclusion | | −0.069*** | | | | | | |
| | | [−2.911] | | | | | | |
| Constant | 1.789*** | 1.639*** | 1.790*** | 2.001*** | 2.071*** | 2.783*** | 2.751*** | 2.418*** |
| | [13.557] | [18.191] | [10.476] | [6.982] | [6.393] | [6.204] | [5.526] | [4.118] |
| Observations | 36 | 36 | 36 | 35 | 35 | 35 | 33 | 33 |
| R-squared | 0.215 | 0.232 | 0.257 | 0.254 | 0.255 | 0.290 | 0.288 | 0.324 |

GNI = gross national income.
Note: Values in brackets are t-stat. ***, **, and * refer to significant at p<0.01, p<0.05, and p<0.10, respectively.
Source: Authors' estimates.

Table 4 presents the results on the significance of financial inclusion on income inequality. The specifications and variables closely follow those of Table 3, except that we dropped the proportion of high-income to low-income groups, and replaced the interaction term with per capita GNI. Our estimates show that the correlation between income inequality and financial inclusion is significant only for some specifications. Although the coefficients have the correct sign, only specifications (6) and (7), where more regressors are considered, show significant negative correlation between the two measures. Among the other determinants of income inequality, inflation significantly lowers income inequality, and the estimates are robust across specifications. Economic literature has long debated

the impact of inflation on income inequality. On one hand, some papers argue that higher inflation tends to redistribute wealth between creditor and debtor, with the latter repudiating debt when unexpected inflation is high. This helps reduce income inequality especially among the heavily indebted lower income households. On the other hand, higher inflation is associated with stronger economic growth, which in turn can increase income inequality.[5] Our estimates favor the former explanation where higher inflation leads to lower income inequality in developing Asia, due to wealth redistribution effects.

Table 4: Regression Results on Income Inequality

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Financial inclusion (log) | 0.033 | | −0.068 | −0.029 | −0.052 | −0.065* | −0.073* |
| | [0.897] | | [−1.616] | [−0.834] | [−1.505] | [−1.741] | [−1.742] |
| Inflation (log) | | | | −0.211*** | −0.219*** | −0.217*** | −0.201*** |
| | | | | [−4.420] | [−4.736] | [−3.734] | [−3.411] |
| Education completion (log) | | | | | 0.153** | 0.186* | 0.150 |
| | | | | | [2.065] | [2.029] | [1.643] |
| Growth in bank claims (log) | | | | | | −0.033 | −0.033 |
| | | | | | | [−0.624] | [−0.597] |
| Low-income economy dummy | | | | | | | −0.035 |
| | | | | | | | [−1.599] |
| Growth rate (log) | | | −0.009 | | | | |
| | | | [−0.178] | | | | |
| Rule of law (log) | | | 0.055*** | | | | |
| | | | [3.559] | | | | |
| Poverty*Financial inclusion | | 0.006 | | | | | |
| | | [0.212] | | | | | |
| Constant | 1.534*** | 1.568*** | 1.590*** | 1.781*** | 1.518*** | 1.505*** | 1.580*** |
| | [31.550] | [35.913] | [23.517] | [25.258] | [8.608] | [7.865] | [7.980] |
| Observations | 34 | 34 | 34 | 34 | 34 | 33 | 33 |
| R-squared | 0.023 | 0.001 | 0.287 | 0.396 | 0.447 | 0.480 | 0.514 |

Note: Values in brackets are t-stat. ***, **, and * refer to significant at p<0.01, p<0.05, and p<0.10, respectively.
Source: Authors' estimates.

To conduct some robustness checks, we also tested the results using Honohan's (2007 and 2008) financial access indicator for 30 economies in developing Asia with derived data. However, we dropped per capita income to test the significance of other indicators. Our estimates on financial inclusion index show that rule of law and demographic indicators are highly significant and robust across specifications. On poverty rates, financial access indicator of Honohan (2008) significantly lowers poverty rates in the developing Asian sample; and we also find that primary education completion rate likewise is associated with lower poverty rates. Lastly, we also check Honohan's indicator on income inequality. Again, we find that greater financial access is highly correlated with lower income inequality, although the estimates are significant only for some specifications. Based on

[5] See Sarel (1997) for a discussion on the determinants of income inequality and inflation.

these robustness checks, we argue that we have similar findings on financial inclusion, poverty, and income inequality using our own measure and Honohan's (2008) indicator.

## VI. SUMMARY AND POLICY IMPLICATIONS

In order to test whether financial inclusion helps reduce poverty and income inequality in developing Asia, we constructed our own financial inclusion indicator for 37 economies in the region using various dimensions of financial inclusion, e.g., availability and usage. We closely follow the methodology of Sarma (2008), although we utilized more data in our indicator. Our financial inclusion indicator shows a similar pattern (in terms) of ranking as those of Honohan (2008) and Sarma (2008). We then tested which factors significantly influence financial inclusion indicator in developing Asia. Our estimates show the importance of per capita income, rule of law, and demographic factors. Next, we test whether or not financial inclusion in the region helps reduce poverty and income inequality. Our findings clearly show a robust and significant correlation between higher financial inclusion and lower poverty and income inequality. The findings are robust using Honohan's (2008) financial access indicator. Based on our empirical results, we offer several policy implications.

First, demographic characteristics of economies in developing Asia significantly influence the level of financial inclusion. Economies with large population sizes tend to have greater access to financial services, while those with high dependency ratios have lower access to financial services. These have important policy implications, especially for economies that have rapidly aging population structures. For these economies, the provision of retirement pensions and other old-age benefits would be crucial in broadening access to financial services of old-age population.

Second, similar to the findings of Honohan (2008) and Rojas-Suarez (2010), good governance and high institutional quality significantly increase financial inclusion. This implies that to broaden financial access, economies- in developing Asia must continue to improve the quality of its governance and institutions, specifically through strengthening the rule of law, including enforcement of financial contracts and financial regulatory oversight. Maintaining high quality rule of law will reduce involuntary financial exclusion of large segments of the population.

Third, our estimates offer evidence of a strong correlation between financial access and poverty rates. To reduce poverty rates in the region, policymakers must implement policies that will address impediments to financial inclusion. In this regard, promoting inclusive growth must complement efforts to increase financial inclusion. Of growing importance is the role of microfinance. Availability of credit to lower income groups improves their access to financial services, which in turn enables them to undertake productive activities and smoothen their consumption in the face of short-term adverse shocks.

Finally, our estimates provide some evidence on the role of financial inclusion on income inequality. Increasing financial inclusion or reducing involuntary financial exclusion lowers income inequality in developing Asia. To further reduce income inequality, more measures must be taken to address financial exclusion of low-income groups from financial services. In this context, programs that will help alleviate poverty will likewise address growing income inequality in the region.

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## Financial Inclusion, Poverty, and Income Inequality in Developing Asia

The authors present a broad-based financial inclusion indicator to assess various macroeconomic and country-specific factors affecting the degree of financial inclusion for 37 selected developing Asian economies. Using the newly constructed financial inclusion indicator, the authors find that per capita income, rule of law, and demographic structure are highly correlated with financial inclusion. Empirical findings also show that financial inclusion is significantly associated with lower poverty and income inequality in the region.

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