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Does Financial Inclusion Reduce Poverty and Income Inequality in Developing Asia?

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Introduction

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 the formal financial system for all members of an economy. The lack of access to the formal financial system ('financial exclusion') can be voluntary or involuntary. The World Bank (2014) defines voluntary exclusion as a condition where a segment of the population or of firms chooses 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 profiles or from discrimination and market failures and imperfections. Policy and research initiatives must focus on involuntary exclusion, as it can be

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addressed by appropriate economic programs and policies designed to increase income levels and correct market failures and imperfections.

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

This chapter contributes to the existing literature by (1) constructing a financial inclusion measure which utilizes available cross-country data, (2) determining which domestic factors are highly correlated with financial inclusion for an across-country sample including those in developing Asia,[1] and (3) understanding the link between financial inclusion and poverty and income inequality in an across-country sample, including those in developing Asia. By creating our own measure of financial inclusion indicator based on existing methodology, we can identify which factors are highly correlated with financial inclusion across a large set of countries. We can then compare which factors remain significantly correlated with financial inclusion both for the full and the developing Asia samples. By focusing on developing Asia, we cover a diverse group of countries including large, growing economies like the People's Republic of China, India, the Republic of Korea, Singapore, and Indonesia; small developing countries like Bhutan, Cambodia, Nepal, and Samoa; and transitioning economies like Kazakhstan, Armenia, and Georgia, among

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[1] In this chapter, developing Asia refers to 37 economies in the region including Afghanistan (AFG); Armenia (ARM); Azerbaijan (AZE); Bangladesh (BGD); Bhutan (BTN); Brunei Darussalam (BRN); Cambodia (KHM); the People's Republic of China (CHN); Fiji (FJI); Georgia (GEO); Hong Kong, China (HKG); India (IND); Indonesia (IDN); Kazakhstan (KAZ); Kiribati (KIR); the Republic of Korea (KOR); the Kyrgyz Republic (KGZ); the Lao People's Democratic Republic (LAO); Malaysia (MAL); the Maldives (MLV); Mongolia (MNG); Myanmar (MMR); Nepal (NPL); Pakistan (PAK); Papua New Guinea (PNG); the Philippines (PHL); Samoa (WSM); Singapore (SGP); Solomon Islands (SLB); Sri Lanka (LKA); Tajikistan (TJK); Thailand (THA); Timor-Leste (TMP); Tonga (TON); Uzbekistan (UZB); Vanuatu (VUT); and Vietnam (VNM).

others. Common to this diverse set of economies is their sustained economic expansion, especially 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 for both the full and the developing Asia samples. This study asks the following questions: First, what are the factors that influence the level of financial access both in the full and developing Asia samples? Second, does financial access affect poverty and income inequality in the full and developing Asia samples?[2]

Following the methodology of Sarma (2008), we constructed a financial inclusion indicator for a sample of 177 advanced, emerging, and developing countries which broadly resembles that of Honohan (2008) and Sarma (2008). The estimation results show that per capita income, rule of law, and demographic characteristics are significantly correlated with financial inclusion in both the full and developing Asia samples. Primary education completion and literacy are highly associated with financial inclusion in the full sample but not in the developing Asia sample. The findings also indicate that financial inclusion is significantly correlated with lower poverty levels in both the full and the developing Asia samples, but there appears to be no significant correlation between financial inclusion and income inequality in either sample.

This chapter is organized as follows. Section 'Related Literature' discusses financial inclusion and provides a literature review. Section 'Financial Inclusion Indicator' provides the methodology for the construction of our financial inclusion indicator and some stylized facts. Section 'Empirical Methodology and Data Sources' presents the empirical methodology, data sources, and determinants of poverty and income inequality, including our financial inclusion indicator. Section 'Empirical Results' highlights the key findings. Section 'Summary and Policy Implications' summarizes and offers some policy recommendations.

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[2] Full sample includes all countries with available data for constructing the financial inclusion indicator. The Developing Asia sample refers to the 37 regional economies that are members of the Asian Development Bank.

Related Literature

The existing literature on financial inclusion offers various definitions of the concept. Several 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 the formal financial system, while Sinclair (2001) focuses on the inability to access necessary financial services in an appropriate form. In contrast, Amidžić et al. (2014) and Sarma (2008) directly define financial inclusion. Amidžić et al. (2014) state that financial inclusion is an economic state where individuals and firms are not denied access to basic financial services. This chapter follows the definition of Sarma (2008), as outlined in Chap. 1 of this volume, which views financial inclusion as a process that ensures the ease of access, availability, and usage of financial services for all members of society. Unlike the definition of Amidžić et al. (2014), Sarma's (2008) definition builds the concept of financial inclusion 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, 2008) constructed a financial access indicator that captures the fraction of the 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 economies for which no household survey on financial access was available, 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, 2008) measure provides a snapshot of financial inclusion and might not be applicable for understanding changes over time and across economies.

Amidžić et al. (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).[3] Each measure is normalized, statistically identified for each dimension, and then aggregated using statistical weights. The aggregation technique follows a weighted geometric mean. A drawback of 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.

In Chap. 1, Sarma followed a different approach to construct the indicator. The author 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 the fact that it does not impose varying weights for each dimension. For these reasons, this chapter 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 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 accounts in rural Malawi improved the well-being of poor households as it provided access to their savings for agricultural input use. Allen et al. (2013) found that increased bank penetration of commercial banks has positive and significant impact on household's use of bank accounts and bank credit particularly those with low income, no salaried job, and less education in Kenya. Their results suggest that increased bank activity

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

can impact poverty and income inequality especially if bank penetration focuses on microfinance.

Unlike Amidžić et al. (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. Honohan's (2008) indicator uses financial access data from household surveys for countries with available data. For those countries, without household financial access survey data, the indictor is constructed as a function of the average size of bank account for each country. Using the financial access indicator, he assessed country characteristics that might influence financial access. 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, Honohan's results showed that financial access significantly reduces poverty, but only when financial access is the sole regressor; financial access 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, Rojas-Suarez (2010) used weighted least squares estimation to account for heteroskedasticity in their sample.

Financial Inclusion Indicator

Before testing the significance of financial inclusion in reducing poverty and lowering income inequality in developing Asia, we first constructed our own financial inclusion indicator. The motivations for constructing our own financial inclusion indicator are as follows: (1) we needed to include as many economies as possible in our sample, and using previously computed indicators would have limited 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 all countries including those in developing Asia; and (3) we can compare our own financial inclusion indicator with previous measures.

We closely followed the methodology of Sarma (2008) in constructing our financial inclusion indicator. Specifically, we included five measures—namely, number of automated teller machines per 100,000 adults, number of commercial bank branches per 100,000 adults, borrowers from commercial banks per 1000 adults, depositors with commercial banks per 1000 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 refer 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 177 economies are included, including 37 economies from developing Asia.

After computing the period average for each financial inclusion indicator for 177 economies, we then calculated the dimension index, following the specification of Sarma (2008), where the dimension index for ith dimension d_i is derived as:

$$d_i = \frac{A_i - m_i}{M_i - m_i}$$

(3.1)

where A_i is the actual value of dimension i, m_i is the minimum value of dimension i, and 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 the Euclidean distance of point d_i computed in Eq. (3.1) from the ideal point I which is equal to 1. Specifically, the formula is given by:

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

(3.2)

where the second term of the numerator in Eq. (3.2) is the Euclidean distance from an ideal point, normalizing it by the square root of the number of observations and subtracting it from 1, giving the inverse normalized distance. We normalized the indicator 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 and Sarma's (2008) indicator is that we include all available data regardless of dimension. In Sarma's (2008) indicator, domestic credit and domestic deposit were included as measures of the 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 a smaller sample size. Using the above-mentioned five measures makes our indicator more precise as it utilizes all available information.

Table 3.1 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 that of Honohan (2008) and Sarma (2008). In fact, our ranking is highly consistent with that of Sarma (2008). Second, some small, developing economies have very high financial inclusion indicators. For instance, St. Kitts and Nevis, the Bahamas, Antigua and Barbuda, Aruba, and Grenada fall in the top one-third of the ranking table, perhaps due to fact that these countries

Table 3.1 Financial inclusion index

Country	FII	Rank	Country	FII	Rank	Country	FII	Rank
Spain	90.98	1	Seychelles	39.68	61	West Bank and Gaza	19.50	121
Portugal	81.97	2	Cabo Verde	39.13	62	Egypt, Arab Rep.	18.77	122
Luxembourg	81.96	3	Romania	38.94	63	Swaziland	18.33	123
United States	80.10	4	Serbia	37.74	64	Bolivia	18.10	124
Iceland	79.72	5	Lithuania	37.70	65	Bangladesh	16.75	125
Japan	78.32	6	Barbados	37.66	66	Nicaragua	16.68	126
Canada	74.90	7	Poland	37.35	67	Belarus	15.97	127
Switzerland	74.41	8	Jordan	37.11	68	Azerbaijan	15.54	128
Belgium	70.70	9	Costa Rica	37.09	69	Gambia, The	15.27	129
Australia	69.48	10	Slovak Republic	36.62	70	Bhutan	14.91	130
United Kingdom	68.95	11	Colombia	35.14	71	Paraguay	14.51	131
Korea, Rep.	68.89	12	Uruguay	34.21	72	Nepal	14.46	132
Denmark	68.30	13	Fiji	34.00	73	Kenya	13.42	133
Italy	67.48	14	Maldives	33.70	74	Pakistan	12.40	134
Ireland	66.99	15	Czech Republic	33.67	75	Nigeria	11.92	135
St. Kitts and Nevis	65.93	16	Dominica	33.04	76	Solomon Islands	11.56	136
Croatia	64.87	17	United Arab Emirates	32.60	77	Zimbabwe	11.50	137
France	63.51	18	Ecuador	32.33	78	Syrian Arab Republic	11.08	138
Estonia	61.96	19	Suriname	32.18	79	Mauritania	10.90	139
Bulgaria	59.71	20	Macedonia, FYR	31.03	80	Ghana	10.23	140
Israel	58.97	21	Uzbekistan	30.99	81	Algeria	9.62	141
Greece	58.73	22	Morocco	30.86	82	Tajikistan	9.36	142
New Zealand	58.73	23	Argentina	30.85	83	Togo	8.71	143
Netherlands	58.27	24	China	30.22	84	Kiribati	8.18	144
Singapore	58.24	25	Samoa	29.86	85	Lesotho	7.97	145

Table 3.1 (continued)

Country	FII	Rank	Country	FII	Rank	Country	FII	Rank
Slovenia	57.64	26	St. Vincent and the Grenadines	29.80	86	Papua New Guinea	7.80	146
Germany	55.90	27	Guatemala	29.56	87	Haiti	7.62	147
Malta	55.63	28	Tunisia	29.29	88	Kyrgyz Republic	7.58	148
Austria	53.91	29	Iran, Islamic Rep.	28.43	89	Guinea	7.56	149
Brazil	53.66	30	Venezuela, RB	28.37	90	Angola	7.04	150
Bahamas, The	52.90	31	Kazakhstan	27.95	91	Cote d'Ivoire	6.99	151
Antigua and Barbuda	52.69	32	Georgia	27.57	92	Gabon	6.82	152
Brunei Darussalam	52.30	33	Tonga	27.49	93	Ethiopia	6.76	153
Latvia	51.68	34	Mexico	27.26	94	Malawi	6.54	154
Chile	51.08	35	Vanuatu	27.12	95	Cambodia	6.42	155
Lebanon	50.83	36	Dominican Republic	26.95	96	Djibouti	6.05	156
Hong Kong SAR, China	50.76	37	Albania	25.69	97	Sudan	5.74	157
Turkey	50.64	38	Honduras	25.50	98	Mali	5.49	158
Hungary	50.59	39	El Salvador	25.15	99	Mozambique	5.34	159
Aruba	47.39	40	Peru	24.87	100	Benin	5.31	160
Malaysia	47.09	41	Myanmar	24.85	101	Zambia	5.08	161
Oman	46.42	42	Indonesia	24.36	102	Timor-Leste	5.06	162
Ukraine	46.26	43	Saudi Arabia	24.34	103	Tanzania	5.01	163
Sweden	45.96	44	India	24.14	104	Equatorial Guinea	4.90	164
Thailand	45.59	45	Moldova	24.00	105	Uganda	4.82	165
Grenada	44.78	46	Armenia	23.81	106	Sierra Leone	4.35	166
Finland	44.03	47	Botswana	23.60	107	Lao PDR	4.22	167
Mongolia	44.02	48	Liberia	22.79	108	Burundi	4.02	168
South Africa	43.61	49	Libya	22.59	109	Rwanda	3.97	169

Country	FII	Rank	Country	FII	Rank	Country	FII	Rank
Montenegro	43.31	50	Trinidad and Tobago	22.03	110	Yemen, Rep.	3.93	170
Russian Federation	43.22	51	Afghanistan	21.95	111	Comoros	3.61	171
Panama	43.00	52	Vietnam	21.28	112	Central African Republic	2.83	172
Norway	42.35	53	Congo, Dem. Rep.	20.88	113	Madagascar	2.75	173
Belize	42.27	54	Jamaica	20.88	114	Cameroon	2.58	174
Kuwait	42.01	55	Chad	20.71	115	Guinea-Bissau	2.49	175
St. Lucia	40.87	56	Namibia	20.71	116	Congo, Rep.	2.38	176
Qatar	40.60	57	Sao Tome and Principe	20.42	117			
Kosovo	40.46	58	Sri Lanka	20.17	118			
Bosnia and Herzegovina	39.90	59	Guyana	19.66	119			
Mauritius	39.70	60	Philippines	19.63	120			

Source: Authors' calculations
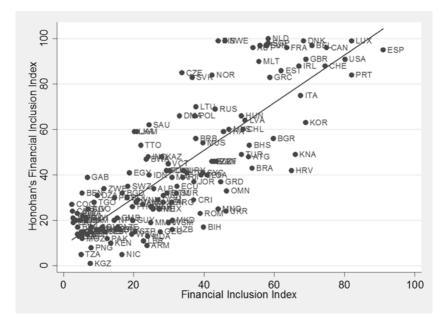
Note: FII financial inclusion index

Fig. 3.1 Financial inclusion indicator and Honohan's (2008) indicator

are offshore financial centers. Third, our computed financial inclusion indicator follows the same pattern as those of Honohan (2008) and Sarma (2008).

Figure 3.1 shows the comparison with Honohan's (2008) indicator, and Fig. 3.2 with Sarma's (2008) measure. For economies where we calculated a high (or low) financial inclusion indicator, both Honohan (2008) and Sarma (2008) also computed a high (or low) level of financial inclusion, suggesting that the various measures give similar results. Last, across developing Asia, there is variation in the level of financial inclusion. Figure 3.3 illustrates that some economies in Asia have very high financial inclusion, while others have very low financial inclusion. The median level of financial inclusion is 24. Surprisingly, some developing economies in Asia have higher-than-expected financial inclusion, such as Mongolia, Fiji, the Maldives, Uzbekistan, and Samoa.
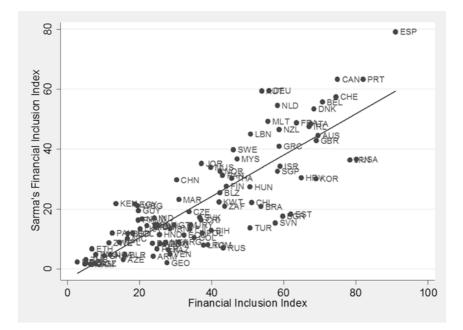
Fig. 3.2   Financial inclusion indicator and Sarma's (2008) indicator
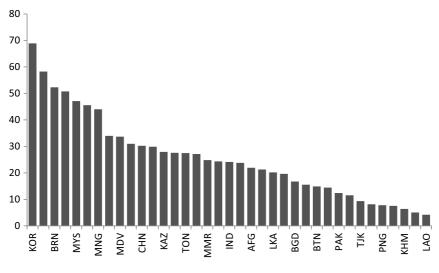

Fig. 3.3   Financial inclusion indicator, developing Asia

Empirical Methodology and Data Sources

In order to answer the main research questions in this chapter, we ran three regression models. First, we tested which factors significantly increase or decrease financial inclusion for both full and developing Asia samples. Using the computed financial inclusion indicator for the 177 economies, including 37 economies from the developing Asia region presented in the previous section, we used its log value as the dependent variable and tested the significance of various regressors, following Honohan's (2008) regressors.

We tested the significance of per capita income and found that higher per capita income increases financial inclusion as those with insufficient income and high risk profiles will no longer be excluded from financial services (Fig. 3.4). Better rule of law should also increase financial
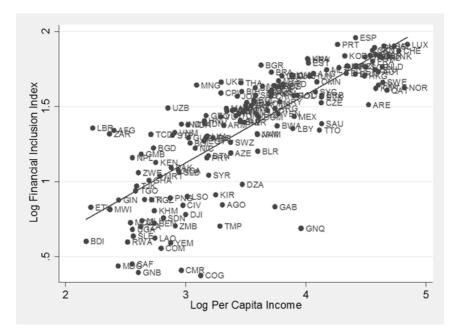

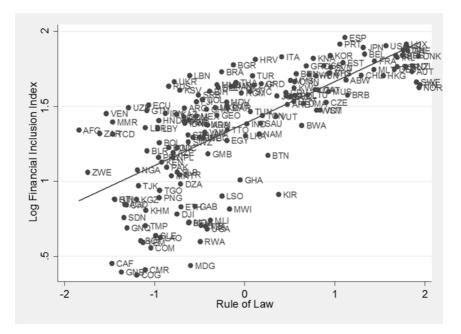**Fig. 3.4** Per capita income and financial inclusion

Fig. 3.5   Rule of law and financial inclusion

inclusion as it improves enforcement of financial contracts (Fig. 3.5). A 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 (Fig. 3.6). 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 (Fig. 3.7). We also controlled for country income classification and the developing Asia region using dummy variables.[4]

After testing the significance of the above-mentioned indicators on financial access, we examined the significance of financial inclusion in reducing poverty rates. We expected that as financial inclusion increases,

[4] We based our country income classification using World Bank classification. Advanced countries refer to those which are members of OECD, developing countries are low-income countries, and the rest are classified as emerging economies.
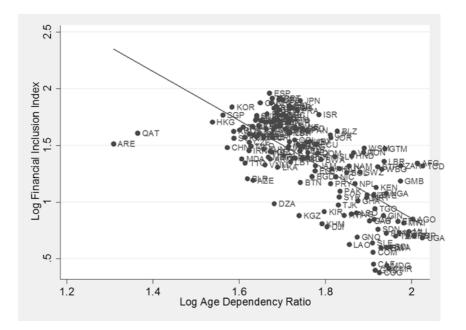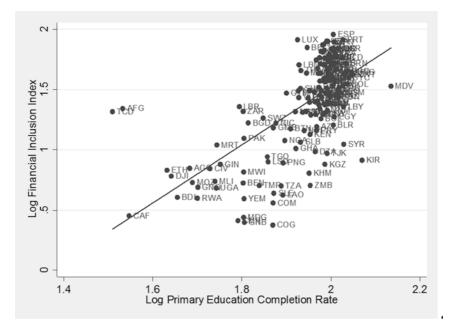
Fig. 3.6 Age dependency ratio and financial inclusion

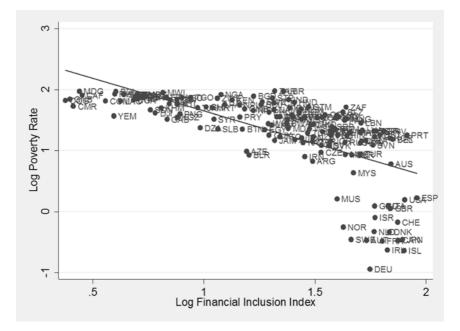**Fig. 3.7** Primary school completion and financial inclusion

Fig. 3.8   Financial inclusion and poverty

poverty rates should decline as more people have access to financial services to smooth their consumption and engage in productive activities. Figure 3.8 illustrates the negative relationship between poverty rates and financial inclusion. We also considered several indicators apart from poverty rate: (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; and (4) Growth in bank claims, which measures financial depth. We also controlled for advanced and developing economies as well as developing Asia using dummy variables. In addition, we included growth rates, rule of law, and an interaction term between per capita income and financial inclusion in some specifications.

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
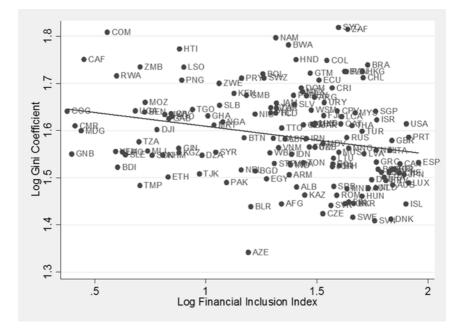
Fig. 3.9 Financial inclusion and income inequality

will have access to financial services. Figure 3.9 shows that there is a weak relationship between financial inclusion and income inequality.[5] We also test the significance of inflation, primary school completion, and growth in bank claims. Similar to the previous specification, we also control for advanced and developing economies as well as developing Asia using dummy variables and include growth rates, rule of law, and an interaction term between poverty and financial inclusion in some specifications.

Data are sourced from the World Bank's World Development Indicators, Global Financial Development Database, and Worldwide Governance Indicators. Data on poverty rates refer to poverty headcount ratio at the national poverty line as a percent of total population, while income inequality refers to the Gini index. For economies with unavailable data on poverty rates and Gini coefficients, data were sourced from the Key

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

Indicators of the Asian Development Bank and national sources accessed online. In cases where some countries do not have available poverty and income inequality measures from 2004 onwards, we used earlier measures. Age dependency ratio refers to the ratio 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, 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 Worldwide 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 a percent of broad money.

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. Both advanced and developing economies dummy variables follow the World Bank classifications. The advanced economy dummy variable takes a value of 1 if it is an advanced economy, and 0 otherwise. The same follows for developing economies which corresponds to low-income countries. We limit the number of regressors in our model specifications, given that our sample size for developing Asia 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 for our developing Asia sample. To address heteroskedasticity, robust standard errors are used.

Empirical Results

Tables 3.2 and 3.3 present the estimates for financial inclusion indicator for the full sample and the developing Asia sample, respectively. Various specifications were used to test the robustness of the results and address

Table 3.2 Regression results financial inclusion, full sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per capita GNI (log)	0.449***	0.270***	0.413***			0.232***	0.004
	[9.990]	[4.655]	[8.456]			[3.229]	[0.167]
Rule of law (log)				0.112***	0.210***	0.066*	0.116***
				[4.399]	[6.709]	[1.866]	[3.555]
Dependency ratio (log)		-0.585**		-0.996***		-0.543**	-0.952***
		[-2.334]		[-4.318]		[-2.136]	[-3.897]
Population (log)			0.028		0.047**	0.026	0.016
			[1.391]		[2.152]	[1.299]	[0.784]
Education completion (log)		0.880**		0.888**		0.866**	0.869**
		[2.342]		[2.335]		[2.411]	[2.296]
Literary (log)			0.560**		1.018***	-0.073	0.056
			[2.238]		[3.863]	[-0.276]	[0.218]
Advanced countries	0.006	0.095*	-0.008	0.140***	-0.002	0.021	0.113*
	[0.122]	[1.874]	[-0.157]	[2.828]	[-0.028]	[0.370]	[1.823]
Developing countries	-0.043	0.045	0.039	-0.046	-0.086	0.018	-0.044
	[-0.559]	[0.555]	[0.442]	[-0.600]	[-0.887]	[0.208]	[-0.541]
Developing Asia	0.090*	0.017	0.071	-0.037	-0.008	0.010	-0.038
	[1.961]	[0.326]	[1.522]	[-0.725]	[-0.151]	[0.182]	[-0.744]
Constant	-0.231	-0.290	-1.368***	1.398	-0.871	-0.216	1.138
	[-1.405]	[-0.345]	[-2.837]	[1.405]	[-1.575]	[-0.231]	[1.003]
Observations	173	164	173	166	176	164	166
R-squared	0.631	0.696	0.647	0.678	0.598	0.704	0.679

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1 %, 5 %, and 10 %, respectively

Table 3.3 Regression results financial inclusion, developing Asia

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per capita GNI (log)	0.454***	0.338***	0.439***			0.262*	-0.009
	[6.734]	[3.537]	[6.256]			[1.730]	[-0.087]
Rule of law (log)				0.181***	0.250***	0.100	0.204**
				[3.174]	[5.411]	[1.155]	[2.470]
Dependency ratio (log)		-0.889*		-1.232***		-0.462	-0.926*
		[-1.833]		[-3.657]		[-0.846]	[-2.034]
Population (log)			0.065**		0.077**	0.043	0.019
			[2.262]		[2.501]	[1.155]	[0.463]
Education completion (log)		-0.008		-0.199		-0.412	-0.812
		[-0.014]		[-0.299]		[-0.474]	[-0.878]
Literary (log)			0.518		0.769	0.588	0.780
			[0.960]		[1.513]	[1.058]	[1.365]
Developing countries	0.191	0.219	0.231	0.160	0.194	0.216	0.174
	[1.655]	[1.674]	[1.499]	[1.503]	[1.384]	[1.474]	[1.408]
Constant	-0.183	1.764	-1.586	3.902**	-0.633	0.655	2.930
	[-0.735]	[1.123]	[-1.511]	[2.466]	[-0.614]	[0.298]	[1.398]
Observations	36	36	36	37	37	36	37
R-squared	0.499	0.570	0.570	0.536	0.500	0.599	0.556

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1 %, 5 %, and 10 %, respectively

multicollinearity among the regressors. Specifications (1)–(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 separated both per capita income and rule of law in specifications (1)–(5) because these two variables are highly correlated.[6] We also addressed potential multicollinearity between the two variables in specification (7) where we used standardized values of the two variables.

The results show that among the country characteristics for the full sample (Table 3.2), per capita income, rule of law, demographic structure, primary education completion, and literacy are significantly correlated with the level of financial inclusion. Specifically, higher per capita income, rule of law, population size, primary school completion, and literacy are significantly associated with higher financial inclusion, and a higher age dependency ratio is significantly associated with lower financial inclusion. The estimates also reveal that when both per capita income and rule of law are considered, per capita income loses its significance, suggesting that rule of law is the main determinant for financial inclusion for the full sample and that involuntary financial exclusion across countries is likely driven largely by market failures and weak enforcement of contracts rather than insufficient household income and high risk profiles. These results are consistent with the findings of Honohan (2008). However, unlike the estimates of Honohan (2008), we found robust evidence of the importance of per capita income on financial inclusion. These findings also hold true for the developing Asia sample (Table 3.3), except that primary education completion and literacy are not significantly correlated with financial inclusion.

Tables 3.4 and 3.5 show the results of the conditional correlation of financial access on poverty for full and developing Asia samples, respectively. Across specifications, we added other variables used by Honohan (2008) on the regressors of poverty rate and also added specifications with the interaction term between per capita income and financial inclusion as well as growth rates and rule of law. Our estimates offer further evidence that there is a strong correlation between higher financial inclusion and lower poverty rates for both the full sample and the developing Asia sample.

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

Table 3.4 Regression results poverty, full sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial inclusion (log)	-0.479*** [-7.570]		-0.335*** [-4.699]	-0.541*** [-7.765]	-0.506*** [-7.482]	-0.421*** [-5.357]	-0.412*** [-5.215]	-0.412*** [-5.215]
Ratio of highest to lowest 20 % income				0.463*** [3.156]	0.514*** [3.580]	0.553*** [3.642]	0.592*** [4.140]	0.592*** [4.140]
Inflation (log)					0.259** [2.207]	0.296** [2.266]	0.247* [1.932]	0.247* [1.932]
Education completion (log)						-0.618*** [-2.706]	-0.626*** [-2.747]	-0.626*** [-2.747]
Bank claims (log)							0.053 [0.521]	0.053 [0.521]
GDP growth (log)			0.322** [2.543]					
Rule of law (log)			-0.154*** [-2.624]					
GNI * Financial inclusion		-0.142*** [-8.222]						

Table 3.4 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Advanced countries	-0.940***	-0.681***	-0.634***	-0.938***	-0.801***	-0.781***	-0.692***	-0.692***
	[-6.405]	[-4.492]	[-3.559]	[-6.132]	[-4.813]	[-4.496]	[-3.379]	[-3.379]
Developing countries	0.190***	0.072	0.153***	0.194***	0.195***	0.122**	0.132**	0.132**
	[4.222]	[1.540]	[3.627]	[3.447]	[3.700]	[2.415]	[2.602]	[2.602]
Developing Asia	0.018	-0.007	-0.028	0.094	0.103	0.124*	0.132*	0.132*
	[0.309]	[-0.114]	[-0.453]	[1.338]	[1.499]	[1.699]	[1.880]	[1.880]
Constant	2.079***	2.099***	1.634***	1.714***	1.412***	2.433***	2.382***	2.382***
	[26.227]	[27.876]	[11.415]	[10.110]	[7.002]	[6.283]	[6.090]	[6.090]
Observations	154	153	150	138	137	132	120	120
R-squared	0.655	0.686	0.688	0.723	0.723	0.727	0.700	0.700

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1%, 5%, and 10%, respectively

Table 3.5 Regression results poverty, developing Asia

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial inclusion (log)	−0.482***		−0.496***	−0.485***	−0.442***	−0.404***	−0.363***	−0.363***
	[−4.664]		[−3.978]	[−4.999]	[−4.352]	[−3.807]	[−3.220]	[−3.220]
Ratio of highest to lowest 20 % income				0.032	0.182	0.230	0.286	0.286
				[0.075]	[0.394]	[0.477]	[0.587]	[0.587]
Inflation (log)					0.220	0.263	0.389	0.389
					[0.803]	[0.911]	[1.168]	[1.168]
Education completion (log)						−0.352	−0.387	−0.387
						[−0.852]	[−0.813]	[−0.813]
Bank claims (log)							−0.018	−0.018
							[−0.108]	[−0.108]
GDP growth (log)			−0.053					
			[−0.260]					
Rule of law (log)			0.003					

Table 3.5 (continued)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GNI * Financial inclusion		−0.097***	[0.060]					
		[−3.917]						
Developing countries	0.221***	0.152*	0.225**	0.226**	0.219**	0.171*	0.151	0.151
	[2.920]	[1.805]	[2.539]	[2.137]	[2.051]	[1.723]	[1.498]	[1.498]
Constant	2.069***	1.866***	2.128***	2.048***	1.699***	2.270***	2.171**	2.171**
	[16.224]	[17.577]	[9.674]	[5.444]	[3.098]	[2.884]	[2.455]	[2.455]
Observations	33	33	33	33	33	33	32	32
R-squared	0.398	0.405	0.400	0.399	0.413	0.423	0.431	0.431

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1%, 5%, and 10%, respectively

Across specifications, financial inclusion appears significant and with a negative sign. Our results for the full sample regression (Table 3.4) also show a significant correlation between educational attainment and lower poverty rates, although not for the developing Asia sample (Table 3.5). 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. As expected, low-income economies tend to have higher poverty rates, while advanced economies have lower poverty rates. This holds true for both the full and the developing Asia samples. Another interesting finding is that for developing Asia, financial inclusion appears to be the only variable significantly associated with poverty rates, unlike for the full sample regression where other variables are significantly correlated. Last, the interaction term between per capita income and financial inclusion is significantly correlated with lower poverty rates for both samples, giving further support to the importance of raising income levels in lowering poverty rates.

Tables 3.6 and 3.7 present the results of the significance of financial inclusion on income inequality for both the full and developing Asia samples. The specifications and variables closely follow those of Tables 3.4 and 3.5, except that we dropped the proportion of high-income to low-income groups, and replaced the interaction term with poverty rate. Our estimates show that there is no significant conditional correlation between income inequality and financial inclusion across all specifications and for the two samples. A possible explanation for this is that when financial inclusion increases, all income groups are affected, in which case the impact disappears for income inequality measure using the Gini coefficient. Among the other determinants of income inequality, inflation is more significantly correlated with lower income inequality for developing Asia (Table 3.7) than for the full sample (Table 3.6). The 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

Table 3.6 Regression results income inequality, full sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial inclusion (log)	0.004		-0.005	-0.002	-0.017	-0.006	-0.006
	[0.181]		[-0.214]	[-0.111]	[-0.628]	[-0.198]	[-0.198]
Inflation (log)				-0.061**	-0.076***	-0.040	-0.040
				[-2.219]	[-2.662]	[-1.218]	[-1.218]
Education completion (log)					0.062	0.092	0.092
					[0.776]	[0.992]	[0.992]
Bank claims (log)						-0.097***	-0.097***
						[-2.929]	[-2.929]
GDP growth (log)			0.010				
			[0.286]				
Rule of law (log)			0.010				
			[0.765]				
Poverty*Financial inclusion		0.023***					
		[2.753]					
Advanced countries	-0.113***	-0.080***	-0.129***	-0.137***	-0.143***	-0.126***	-0.126***
	[-5.292]	[-3.805]	[-3.900]	[-5.738]	[-5.926]	[-4.879]	[-4.879]
Developing countries	0.005	0.008	0.008	0.005	-0.002	-0.003	-0.003
	[0.277]	[0.423]	[0.422]	[0.288]	[-0.104]	[-0.163]	[-0.163]
Developing Asia	-0.057***	-0.059***	-0.057***	-0.056***	-0.059***	-0.057***	-0.057***
	[-3.355]	[-3.549]	[-3.433]	[-3.450]	[-3.580]	[-3.541]	[-3.541]
Constant	1.617***	1.581***	1.627***	1.674***	1.587***	1.590***	1.590***
	[57.749]	[92.771]	[41.314]	[45.546]	[11.371]	[10.150]	[10.150]
Observations	154	151	150	153	146	131	131
R-squared	0.231	0.256	0.237	0.250	0.270	0.280	0.280

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1 %, 5 %, and 10 %, respectively

Table 3.7 Regression results income inequality, developing Asia

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial inclusion (log)	0.050		-0.030	-0.001	-0.016	-0.036	-0.036
	[1.177]		[-0.696]	[-0.015]	[-0.424]	[-0.870]	[-0.870]
Inflation (log)				-0.190***	-0.200***	-0.171**	-0.171**
				[-3.095]	[-3.225]	[-2.326]	[-2.326]
Education completion (log)					0.144***	0.240**	0.240**
					[3.734]	[2.352]	[2.352]
Bank claims (log)						-0.084	-0.084
						[-1.048]	[-1.048]
GDP growth (log)			-0.058				
			[-0.748]				
Rule of law (log)			0.043**				
			[2.556]				
Poverty*Financial inclusion		0.038					
		[0.986]					
Developing countries	-0.069***	-0.083***	-0.039*	-0.047*	-0.026	-0.021	-0.021
	[-2.765]	[-3.939]	[-1.766]	[-2.000]	[-1.290]	[-0.978]	[-0.978]
Constant	1.507***	1.502***	1.667***	1.719***	1.463***	1.367***	1.367***
	[24.978]	[19.003]	[18.970]	[20.524]	[10.967]	[7.717]	[7.717]
Observations	33	33	33	33	33	32	32
R-squared	0.146	0.150	0.291	0.329	0.352	0.419	0.419

Source: Authors' estimates

Note: Values in brackets are t-stat. ***, **, and * refer to significance at 1 %, 5 %, and 10 %, respectively

households. On the other hand, higher inflation is associated with stronger economic growth, which in turn can increase income inequality.[7] Our estimates favor the former explanation, where higher inflation leads to lower income inequality in developing Asia, due to wealth redistribution effects. Our results also show that primary school completion is significantly associated with higher income inequality in developing Asia but not for the full sample, possibly related to stronger wage and skills differentials in the region.

To conduct sensitivity tests, we tested our findings using Honohan's (2007, 2008) and Sarma's (2008) indicators. Our estimates on financial inclusion in Tables 3.2 and 3.3 hold for both the full and developing Asia samples. Using Honohan's (2007, 2008) and Sarma's (2008) indicators, we also confirmed that higher financial inclusion and primary education completion are significantly correlated with lower poverty rates. Last, we checked for income inequality. We found Sarma's measure to be significant to only one specification at 10 % level of significance, hence the correlation is weak. But for the rest of the variables, again there is no significant correlation with higher financial inclusion and lower income inequality. Based on these sensitivity tests, we argue that we have similar findings on financial inclusion, poverty, and income inequality using our measure, Honohan's (2008) and Sarma's (2008) measures.

Summary and Policy Implications

To test whether financial inclusion helps reduce poverty and income inequality across countries and in developing Asia, we constructed our own financial inclusion indicator for 177 economies including 37 from the developing Asia region using various dimensions of financial inclusion, such as availability and usage. We closely follow the methodology of Sarma (2008), although we utilized more data in our indicator. Our financial inclusion indicator showed a similar pattern (in terms) of ranking as those of Honohan (2008) and Sarma (2008). We then tested which factors significantly influence financial

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

inclusion. Our estimates show the importance of per capita income, rule of law, and demographic factors for both the full and developing Asia samples. Next, we tested whether financial inclusion in the region is significantly correlated with lower poverty and income inequality. Our findings show a robust and significant correlation between higher financial inclusion and lower poverty but not between financial inclusion and income inequality. The findings are robust using Honohan's (2008) and Sarma's (2008) financial access indicators. Based on our empirical results, we offer several policy implications.

First, the demographic characteristics of economies in developing Asia are significantly related to 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. This has important policy implications, especially for economies with rapidly aging populations. 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 suggests that to broaden financial access, economies in developing Asia must continue to improve the quality of governance and institutions, specifically by strengthening the rule of law, including enforcing financial contracts and providing 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. To reduce poverty rates in the region, policymakers must implement policies that will address impediments to financial inclusion. In this regard, efforts to promote inclusive growth must complement those to increase financial inclusion. Of growing importance is the role of microfinance. If lower-income groups have access to credit, their access to financial services is improved, which in turn enables them to undertake productive activities and smooth their consumption in the face of short-term adverse shocks.

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