

Digital Financial Inclusion for Poverty alleviation and for Income Inequality in Emerging Markets

*Dr.Nageswara Rao Dara

Dr.Nageswara Rao Dara is a Post-Doctoral Fellow(UGC), Department of Economics, Andhra University, Visakhapatnam

Corresponding Author: Dr.Nageswara Rao Dara

Abstract: The global digital finance creates new enablers for development impact on poverty alleviation and inequalities at the macro, meso, and micro levels. The technology will change the country's appetite for digital financial services as well as the numerous crosscutting development themes across the ecosystem. Digital Financial Inclusion is often considered an effective tool that can help reduce poverty that makes growth inclusive can enable economic agents to make longer-term consumption and investment decisions. Digital Financial Services (DFS) with the prospect of alleviation of poverty and reaching billions of financially excluded and underserved populations, building on the digital approaches that have been used for years to improve access channels for those already served by the formal financial sector. But poverty remains a persistent challenge across the countries with evidence pointing to worsening income equality in recent years. Most importantly, understanding the link between digital 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 digital financial inclusion in developing Asia. Furthermore, we find that digital 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.

Key words: Digital Financial Services, poverty reduction and lower income inequality, financial contracts and financial regulatory

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I. Introduction

The global digital finance creates new enablers for development impact on poverty alleviation and inequalities at the macro, meso, and micro levels. The technology will change the country's appetite for digital financial services as well as the numerous crosscutting development themes across the ecosystem. Digital Financial Inclusion is often considered an effective tool that can help reduce poverty that makes growth inclusive can enable economic agents to make longer-term consumption and investment decisions. Digital Financial Services (DFS) with the prospect of alleviation of poverty and reaching billions of financially excluded and underserved populations, building on the digital approaches that have been used for years to improve access channels for those already served by the formal financial sector. But poverty remains a persistent challenge across the countries with evidence pointing to worsening income equality in recent years. Most importantly, understanding the link between digital 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 (Kate Lauer and Timothy Lyman, 2015)¹

¹Kate Lauer and Timothy Lyman(2015), Digital Financial Inclusion: Implications for Customers, Regulators, Supervisors, and Standard-Setting Bodies, published CGAP (the Consultative Group to Assist the Poor) <http://www.cgap.org/sites/default/files/Brief-Digital-Financial-Inclusion-Feb-2015.pdf>

Global development trends indicate that the number of people living in extreme poverty is likely to continue to decline as incomes continue to rise in many parts of the world. Digital finance is the technical tool with playing crucial role for financial inclusion and inclusive finance. The prospective entry of millions of unbanked and underbanked consumers into the financial system is the result of the increasing prevalence of mobile devices. Digital Financial Services are not only promises accelerated economic growth, but also will yield significant changes in business practices and replace traditional methods of financing. Access to finance from formal banking system and outstanding to unequal access to infrastructure, made worse by low financial literacy and difficult know-your-customer, this population are excluded from basic financial services. Whereas the majority of the unbanked and underbanked population lacks regular access to the internet, mobile phones with MNO prepaid SIM (subscriber identity module) card are almost universal (**World Bank Report, 2015**)².

Relationship between Digital financial inclusion and poverty Alleviation

Financial inclusion is considered to be one of the sources of poverty reduction, included in the Sustainable Development Goals: Eradicate extreme poverty and hunger. This issue is not just related to charity: market opportunities among the poorest are underestimated and should be explored by multinational companies, as there is an evidence that multinationals that provide services to the bottom-of-the-pyramid are successfully doing business in developing countries (**Prahalad and Hammonds, 2002**)³. There is an evidence that financial inclusion policies impact economies as it contributes to the reduction of poverty, pro-poor growth and accelerated economic growth and also submits that institutional infrastructure of the financial system contributes to reducing financial information asymmetry, contraction in transaction, costs, which in turn reduce poverty and increase the level of economic growth. The research results found causality between access to a range of appropriate and affordable financial services and improvement in poor people's welfare and income. To support the previous view on this issue, (**Demirgüç-Kunt, 2008**)⁴ says that inclusive access to finance is not only pro-growth but also pro-poor as well as reducing income inequality and poverty. Financial inclusion is essential to put in place inclusive growth and it is a condition for sustainable economic growth and development. Harnessing the power of technology is one of the most effective ways of integrating the unbanked population into the financial mainstream. Technology enables the provision of a host of services from depositing money into various government schemes to micro loans and micro insurance (**Levine, 2005**)⁵.

A sound financial system can promote economic growth and stability. Some theories have suggested that the creation and promotion of efficient financial markets (institutions) are necessary for a genuine and enduring economic growth process; that financial markets can ameliorate risk, improve corporate governance, mobilize savings, reduce transaction and information costs, and promote specialization, while other models show that financial development reduces poverty and income inequality directly, by disproportionately relaxing credit constraints on the poor, and indirectly, by improving the allocation of capital and accelerating growth (**Jahan and McDonald, 2011**)⁶

Financial Development and Inequality

Financial development enables bigger investments and more productive allocation of capital, which lead to higher income growth. But the benefits of financial development extend beyond financing investment, and often start by offering better and cheaper services for saving money and making payments. These services allow firms and households to avoid the cost of barter or cash transactions, cut the costs of remitting funds, and provide the opportunity to accumulate assets and smooth income. Insurance services help firms and households cope with shocks and reduce their vulnerability to adverse situations, reducing the risk of falling into poverty.

²World Bank Report (2015), Digital Financial Inclusion published by World Bank Report, <http://www.worldbank.org/en/topic/financialinclusion/publication/digital-financial-inclusion>

³Prahalad, C. K., & Hammond, A. (2002). Serving the world's poor, profitably. Harvard business review, 80(9), 48-59.

⁴Demirgüç-Kunt, A., and Klapper, L. (2012). Financial Inclusion in Africa. World Bank Policy Research Working Paper, WPS6088. Available at <http://elibrary>.

⁵Levine, P. (2005). Finance and Growth: Theory, Mechanisms and Evidence, in Aghion. Handbook of Economic Growth Elsevier.

⁶Sarwat Jahan and Brad McDonald (2011), A Bigger Slice of a Growing Pie Finance & Development, published International Monetary Fund, US, Vol. 48, No. 3

Well-developed domestic financial markets may be instrumental in moderating boom-bust cycles triggered by sudden stops in financial flows (Bencivenga and Smith, 1991)⁷.

The relationship between financial inclusion and poverty could be viewed from two perspectives; the direct and indirect links. The direct link could present when the benefits of financial inclusion transcends to reducing poverty and income inequality while the indirect link on the other hand presents when financial inclusion exerts a positive effect on economic growth and how such gains from growth are channeled to the benefit of the poor (Ogunsakin, Sanya and Fawehinmi Festus Olumide, 2017)⁸. Right from the discovery of finance as a pivot to economic growth, studies have shown that the development of financial inclusion can ease the credit constraints hitherto faced by the poverty stricken class, which has hindered their ability to undertake productive investments. Whenever, access to credit is increased and made easy, the very low income (poor) would improve their welfare by spending more on consumption. The ease of accessing credit will also enable them the opportunity to raise capital from financial intermediaries for productive investment, which ordinarily were left to those in the rich income strata. In the works of Greenwood and Jovanovic (2009)⁹, they submit that the relationship between income inequality and financial development takes on an inverted-U-shaped curve; that in the early stages of development, the poor will not be able to afford the initial setup costs associated with accessing financial intermediaries and thus the benefits of enhanced financial intermediation will be felt only by the rich. This would result in a widening of income inequality. In a similar situation, when the lending rates are fixed very high, it will limit the number of poor households obtaining credit because when the poor take out credit at high rates, there will be increase in default of nonperformance in loans; hence financial fragility. The digital revolution adds new layers to the material cultures of financial inclusion, offering the state new ways of expanding the inclusion of the 'legible', and global finance new forms of 'profiling' poor households into generators of financial assets Daniela (Gabor & Sally Brooks, 2016)¹⁰.

Statement of the Research Problem

According to global Multidimensional Poverty Index (MPI) report shows a total of 1.45 billion people from 103 countries are multidimensionally poor; 26.5% of the people living in these countries (Sabina Alkire and Gisela Robles, 2017)¹¹. There are also financial inequality increasing in the recent times, generally, the term inequality is used to mean income inequality, as it's the basis for most measures. Development Finance International, Inequality can be a problem in itself, given its potential to undermine the confidence of the poor and to fuel political discontent. But it may also reduce growth through credit market imperfections that exclude the poor, or from a political economy in which policy distortions arise from the lobbying of the rich. Inequality is usually associated with a low elasticity of growth to poverty reduction. This arises when inequality of opportunity is embedded in society, so that the poor are denied the assets by which they might build their livelihoods, and are disadvantaged – indeed, in some cases face outright discrimination – in markets. Not only do the poor suffer, but so too does the economy as a whole, since the working poor are unable to contribute substantially (The Guardian Report, 2017)¹². The recent Deloitte report (2017) also indicates that globally, approximately 2.5 billion people do not have formal accounts at a financial institution, with 65% and 58% of the population in Latin America and South Asia considered unbanked respectively. As a result, millions of formerly excluded and underserved poor customers are moving from exclusively cash-based transactions to formal financial services payments, transfers, savings, credit, insurance, and even securities using a mobile phone or

⁷Bencivenga and Smith, (1991), Financial Intermediation and Endogenous Growth, published by Review of Economic Studies

⁸Ogunsakin, Sanya and Fawehinmi Festus Olumide (2017), Financial Inclusion as an Effective Policy Tool of Poverty Alleviation: A Case of Ekiti State, published by IOSR Journal of Economics and Finance (IOSR-JEF) e-ISSN: 2321-5933, p-ISSN: 2321-5925. Volume 8, Issue 4 Ver. II (Jul.– Aug. 2017), PP 01-10

⁹Jeremy Greenwood and Boyan Jovanovic (2009), Financial Development, Growth, and the Distribution of Income published by Chicago Journals and the University of Chicago Press

¹⁰Daniela Gabor & Sally Brooks (2016), the digital revolution in financial inclusion: international development in the fintech era published by Trndfonline, <http://www.tandfonline.com/doi/abs/10.1080/13563467.2017.1259298?src=recsys&journalCode=cnpe20>

¹¹Sabina Alkire and Gisela Robles (2017), Global Multidimensional Poverty Index 2017, published by Oxford Poverty & Human Development Initiative, Odid, U.K, http://www.ophi.org.uk/wp-content/uploads/B47_Global_MPI_2017.pdf

¹²The Guardian Report (2017), Inequality index: where are the world's most unequal countries? <https://www.theguardian.com/inequality/datablog/2017/apr/26/inequality-index-where-are-the-worlds-most-unequal-countries>

other digital technology to access these services. And the picture is continuing to shift rapidly with the emergence of ever more new technologies (Deloitte Report, 2017)¹³.

Supply-side barriers; The high costs of accessing financial services (monetary and time-wise); minimum bank balance requirements, high ledger fees (costs for maintaining micro-accounts), and physical barriers stemming from the distance between people's homes to financial institutions' branches or financial touch points, greatly hindered access to financial services. Further, the lack of traditional physical collateral, the provision of inappropriate products not suited for customers with low and irregular income, perceived high risk and lack of information increased costs and premiums placed on the poor and low income borrowers by banks.

Demand-side barriers, which included: Lack of income, low incomes and lack of permanent income flows or employment; o low education and financial literacy levels; and o cultural, religious and social barriers. In view of these impediments, it became necessary to reform the financial sector to adequately meet the needs of the emerging markets citizenry. One of the ways of enhancing financial inclusion was to catalyse the development of innovative, less complex and cost effective financial instruments through policy reforms and initiatives in order to better serve the unbanked and underserved segments of the population.

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, 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

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 1). Better rule of law should also increase financial inclusion as it improves enforcement of financial contracts (Figure2). 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 (Figure3). 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 4). A dummy variable for low-income economy is also included to control for small developing economies in the region.

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.

¹³Deloitte Report, (2017)The future is now Digital Financial Services in Indonesia, published by Deloitte Southeast Asia Ltd

Figure 1: Per Capita Income and Financial Inclusion

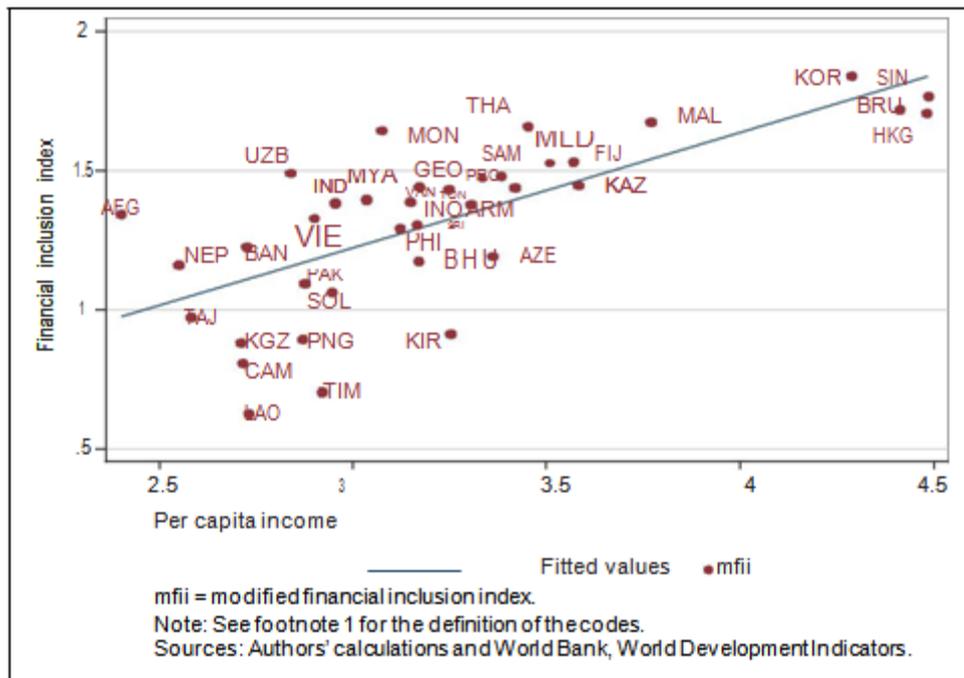
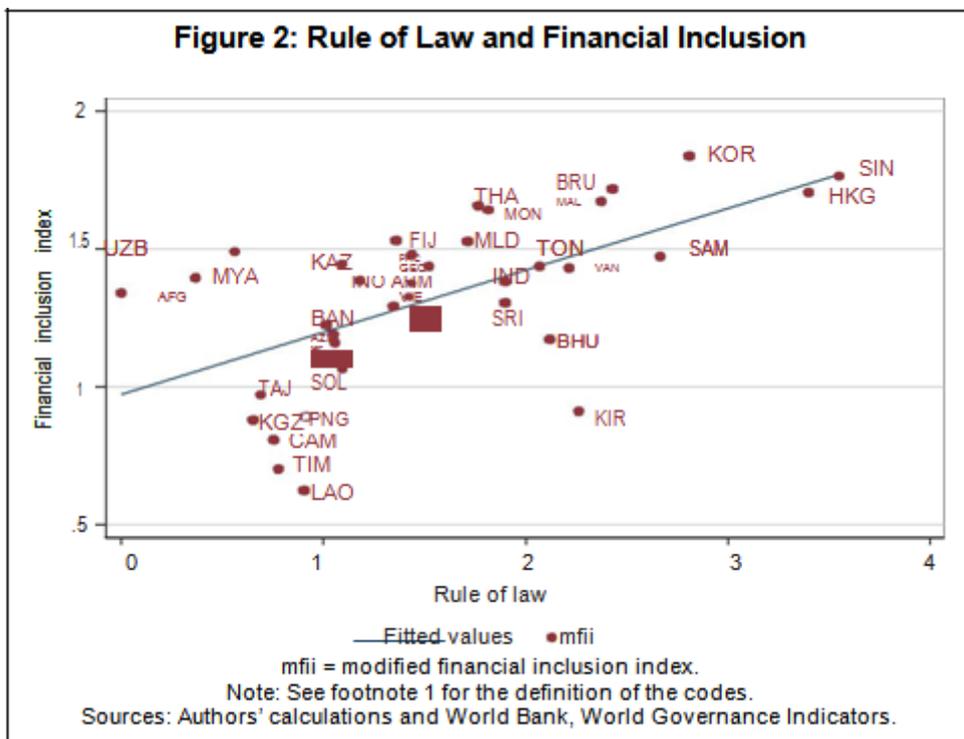
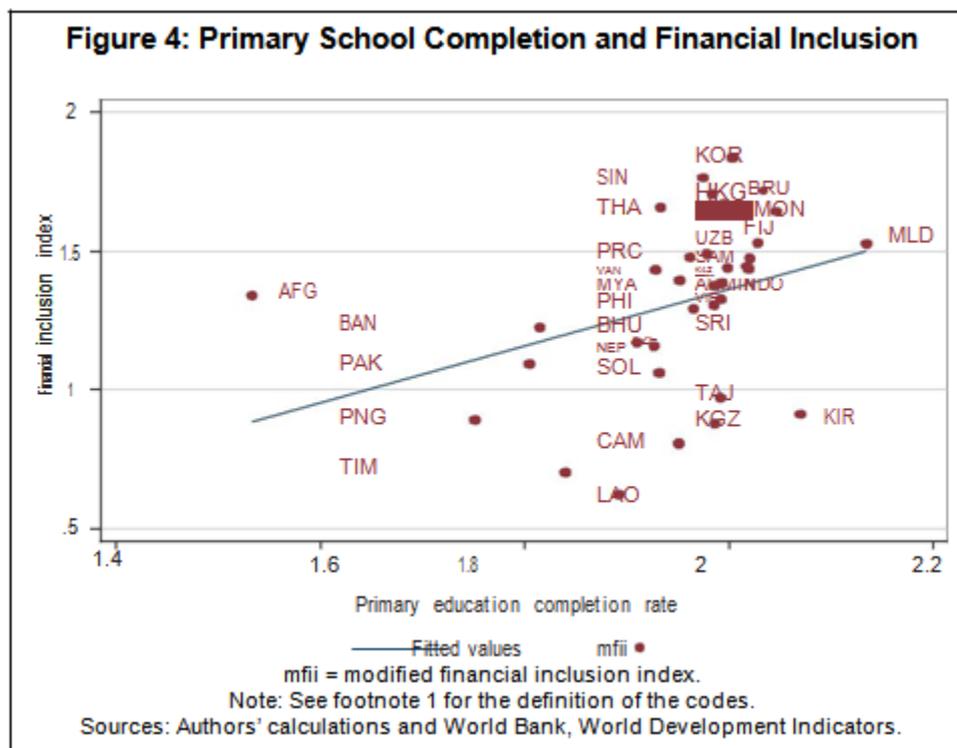
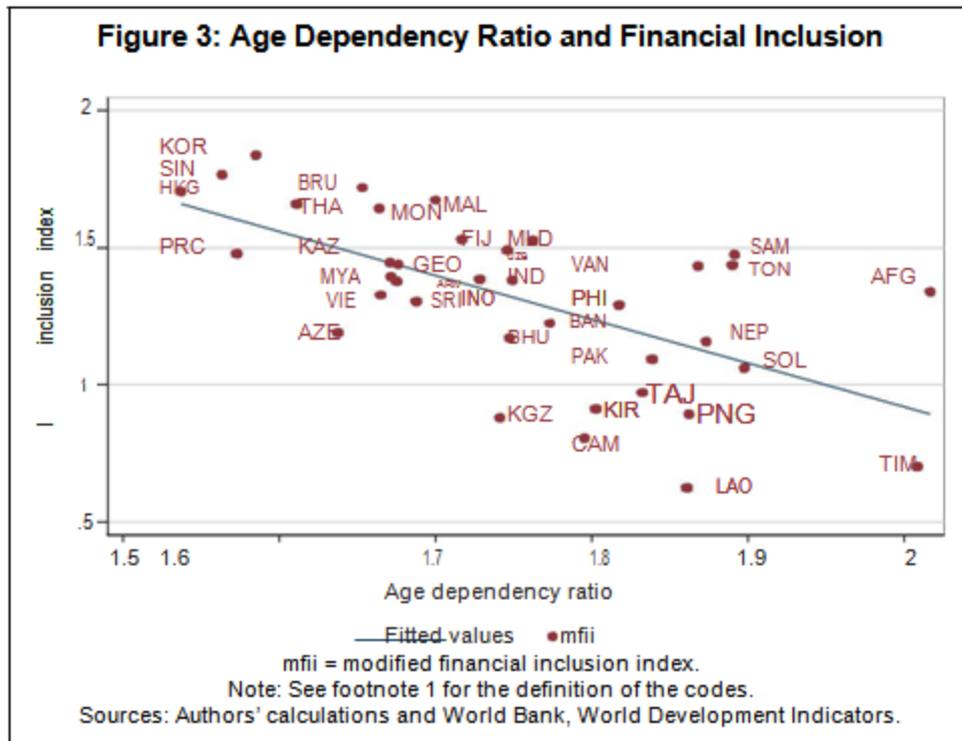


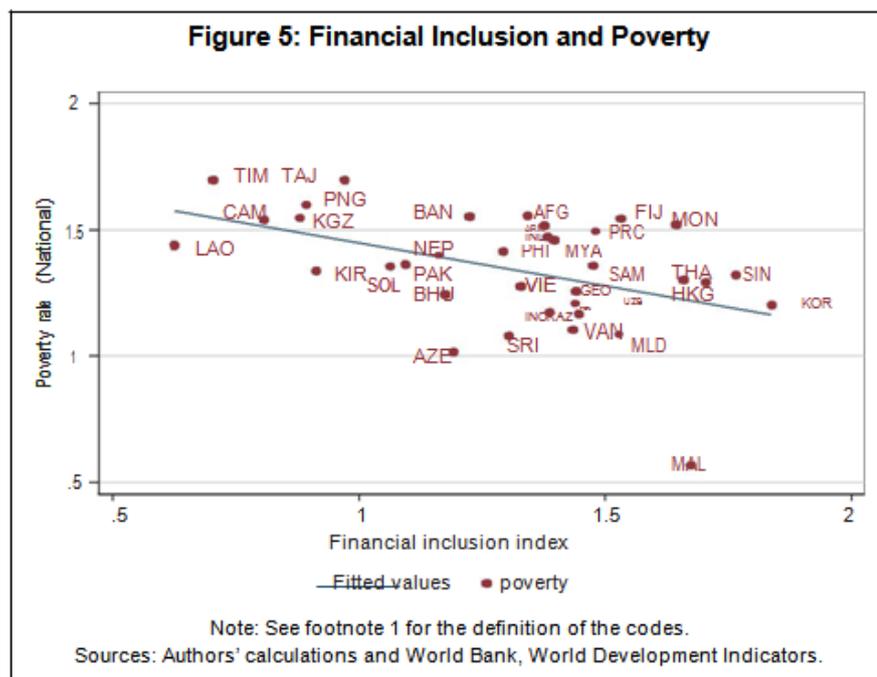
Figure 2: Rule of Law and Financial Inclusion





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 5 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. 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,



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 6 shows that there is a weak relationship between financial inclusion and income inequality. 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.

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.

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.

Empirical Results

Table presents the estimates for financial inclusion indicator. Various specifications are used to test the robustness of the results and address multicollinearity among the regressors.

Table 2: Regression Results on Financial Inclusion

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GNI per capita (log)	0.429*** [5.638]	0.321*** [3.460]	0.431*** [5.789]			0.321* [2.040]	0.337** [2.175]
Rule of law (log)				0.153** [2.734]	0.230*** [4.711]	0.061 [0.755]	0.046 [0.566]
Dependency ratio (log)		-0.751* [-1.713]		-1.215*** [-3.468]		-0.281 [-0.492]	-0.292 [-0.493]
Population (log)			0.069** [2.514]		0.084** [2.621]	0.059 [1.631]	0.057 [1.542]
Education completion (log)		-0.164 [-0.274]		-0.290 [-0.430]		-0.051 [-0.066]	-0.000 [-0.000]
Literacy (log)			0.185 [0.382]		0.536 [0.957]	0.131 [0.246]	0.085 [0.157]
Low-income economy dummy	0.038 [0.328]	0.008 [0.074]	0.022 [0.196]	-0.019 [-0.169]	0.005 [0.040]	0.030 [0.255]	0.025 [0.213]
Constant	-0.075 [-0.267]	1.914 [1.297]	-0.911 [-0.943]	3.781** [2.423]	-0.646 [-0.552]	0.114 [0.054]	1.389 [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 above Specifications (1) to 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 correlated¹⁴. We also address potential multicollinearity between the two variables in specifications (6) and (7) where we used standardized values of the two variables.

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 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

¹⁴The pairwise correlation between rule of law and per capita income is around 0.80, which is high.

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 inequality¹⁵. Our estimates favor the former explanation where higher inflation leads to lower income inequality in developing Asia, due to wealth redistribution effects.

¹⁵See Sarel (1997) for a discussion on the determinants of income inequality and inflation

Table 4: Regression Results on Income Inequality

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial inclusion (log)	0.033 [0.897]		-0.068 [-1.616]	-0.029 [-0.834]	-0.052 [-1.505]	-0.065* [-1.741]	-0.073* [-1.742]
Inflation (log)				-0.211*** [-4.420]	-0.219*** [-4.736]	-0.217*** [-3.734]	-0.201*** [-3.411]
Education completion (log)					0.153** [2.065]	0.186* [2.029]	0.150 [1.643]
Growth in bank claims (log)						-0.033 [-0.624]	-0.033 [-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*** [31.550]	1.568*** [35.913]	1.590*** [23.517]	1.781*** [25.258]	1.518*** [8.608]	1.505*** [7.865]	1.580*** [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 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.

II. 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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