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MICRO AND MACRO FINANCIAL INCLUSION AND THEIR IMPACTS ON ECONOMIC GROWTH: EVIDENCE FROM ASIAN ECONOMIES WITH ALTERNATIVE APPROACHES

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A R T I C L E I N F O

A B S T R A C T

This study examines the impacts of financial inclusion on economic growth in a panel of 20 Asian economies using annual data over the period 1995-2017. Two separate indices, namely micro-financial inclusion and macro-financial inclusion were constructed following Sarma (2008) and the Dynamic Factor Model. The impact of each index, as well as individual indicators of financial inclusion, is analyzed to get deeper insights into the impact of financial inclusion on economic growth in Asian economies. The impact of the micro-financial inclusion index based on Saram's (2008) methodology is found to be significant, while the impact of macro-financial inclusion index remains insignificant. In contrast, the impact of DFM-based micro and macro-financial inclusion indices exerts an insignificant impact on economic growth. The difference in results could be due to the fact that Sharma's index measures the level of financial inclusion, while DFM-based indices reflect the growth of financial inclusion indicators. With regard to the individual indicators of financial inclusion, the results show that a number of banks, borrower accounts, and deposit accounts have a significant positive impact on economic growth, while financial system deposits and insurance premium exerts an insignificant impact on economic growth.

Disciplinary: Financial Management and Economic Sciences.

1 INTRODUCTION

Financial inclusion is a multi-dimensional term used to describe a financial system that provides easy access to financial services at affordable costs to households and businesses, irrespective of their size and market value (Mohan, 2006). It is a process that ensures access to financial services to every member of society in a transparent manner and at affordable prices through the proper institutional setup. World Bank (2008, p. 27) defines financial inclusion as "the

access to financial services without non-price and price barriers to all members of society". Deposits, credit, payments, and insurance are generally considered as the main indicators of financial inclusion. Allen et al. (2012) argued that bank account increases savings, empowers women, boost household consumption and raise productive investment, which in turn accelerate economic growth. Financial inclusion enables institutions to operate under comprehensive regulations, organizational framework and industry-specific performance standards. It brings sustainability in the performance of institutions and ensures financial stability through continuity of funds. It helps in allocating financial risks to those agents who have the capacity to bear it without hurting their financial position (Demirguc-Kunt et al, 2008). Financial inclusion enhances market competition through increasing choices among different financial products and affordability for potential customers. It also augments inclusive growth, economic development, and financial deepening thereby reduce poverty and income inequality. In contrast, financial exclusion leads to the emergence of unorganized and exploitative financial markets and financial illiteracy (Sharma, 2016).

Schumpeter (1911) is the pioneer detecting a link between finance and economic growth that an effective and organized financial system is important for facilitating economic growth through the channelization of funds. Economic growth can be simulated by having a well-functional financial system with reasonable financial depth. The deepening of the financial sector increases the supply of financial services, which in turn stimulates economic growth. In the modern socio-economic development policy agenda, broader accessibility to various financial products and services is considered an important enabling factor (Buera et al, 2011). Financial inclusion is vital for economic development and decreasing poverty (Beck & Torre, 2006).

The available literature on the impact of Asian financial inclusion and economic growth is scant. Many studies concentrated on specific geographical areas like the Organization of Islamic Countries (OIC) and the Middle East and North Africa (MENA), while Asian has been largely neglected. It would be very interesting to examine the impact of financial inclusion on Asian economic growth. Asia is diverse in terms of culture, political system, economic size and level of economic development. Asia is the biggest continent on the basis of population as it hosts 60% of the world's population and it covers 30% of the land area. The average Asian GDP growth rate was more than 5% per annum. The Organization for Economic Cooperation and Development (OECD, 2017) projected that the Asia-pacific region is expected to grow at a rate of more than 5% in the coming years. The growth of China and India is exceptional in the region. The other economies are also growing at an average rate of 5%. The nominal GDP of Asia was $31.58 trillion; while per capita income was $7351 (IMF, 2019). Despite the large economic size and exceptional economic growth, a large number of population has still a very low level of financial access in Asia as compared to other parts of the world. According to the Global Findex (2017) more than half of the financially excluded peoples living in China, India, Bangladesh, Pakistan, Indonesia, Nigeria, and Mexico. This indicates that Asia is also hosting the largest segment of the world's financially excluded peoples. Thus, improving financial access can lead to Asia as an important stimulus for achieving sustainable economic growth.

Several empirical studies (inter alia by Demirguç-Kunt et al, 2013; Efobi et al, 2014; Allen et al, 2016; Muhammad et al, 2017) focused on individual characteristics of financial inclusion and

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overlooked the role of a macro-level factor in determining economic growth. Given the importance of financial inclusion in economic growth, the main objective of this study is to examine the impact of micro-based and macro-based indicators of financial inclusion on economic growth for a panel of 20 Asian countries for 1995-2017, as no previous studies found. This study uses the Dynamic Factor Model (DFM), which is a relatively new approach for the construction of micro-based and macro-based financial inclusion indices. The DFM method is useful to deal with the issues of multicollinearity and dimensionality. To check the robustness we also construct micro-based and macro-based financial inclusion indices using Sarma (2008) methodology. The empirical analysis based on micro and macro-based indices of financial inclusion allows us to understand their relative importance in the determination of economic growth in the Asian region. This study also investigates the impact of each component of financial inclusion on economic growth in 20 Asian countries.

2 LITERATURE REVIEW

Theoretically, Schumpeter (1911) argued that a well-functional financial sector facilitates the real sector's growth which enhances the economic growth of an economy. Shaw (1973) and Mckinnon (1973) asserted that a well-developed financial sector decreases monitoring and transaction costs and minimizes asymmetric information and thus enhances financial intermediation in an economy. Financial inclusion received much attention after the late 1990s and the early 2000s. In 2010, G20 countries accepted financial services accessibility as one of the major pillars of the world development agenda (Zins & Weill, 2016). Many researches on financial inclusion shown mixed results on the relationship between finance and economic growth, divided into three groups. The first group concluded positive relationships between financial inclusion and economic growth, using a variety of financial inclusion indicators (FII). For example, Wong (2015) found positive impacts of financial access on economic growth in developing countries. Inoue and Hamori (2016) detected positive impacts of commercial bank branches on economic growth in 37 Sub-Saharan African economies. Subrahmanyam & Acharya (2017) demonstrated that financial inclusion as a component of the supply-leading strategy of the financial development model can clearly create faster economic growth. Kim et al. (2018) examined the impact of financial access on economic growth in 55 economies of the OIC region. Their results showed that a high level of financial access causes faster economic growth. Likewise, Sethi & Acharyaa (2018) concluded that financial inclusion exerted a positive impact on economic growth in a panel of 31 countries.

At the country level, the positive effects of financial inclusion on economic growth were reported by (Aduda & Kalunda, 2012; Onalapo, 2015; Babajide et al, 2015; Sharma, 2016) using different approaches. They concluded that access to finance spurs economic growth in different countries. For instance, Dev (2006) demonstrated that in India financial inclusion can work as a strategic tool for improving rural enterprises and livelihood of underprivileged farmers. Mehrotra et al. (2009) reported that access to financial services enables saving, transferring and investing money, which faster economic growth. Similarly, Swamy (2010) emphasized the importance of access to finance for long term inclusive growth. Lenka & Sharman (2017) revealed a positive association between economic growth and access to finance in India. The second group demonstrated that financial inclusion has a negative impact on economic growth. For example,

Naceur et al. (2007) explored that in MENA region bank development adversely affected economic growth, meaning that banking sector development has a negative effect on economic growth. They also observed that private sector credit exerted an insignificant impact on growth in MENA countries. Pearce (2011) demonstrated that financial inclusion enhances the economic growth of a smaller social class, while the disadvantaged groups like underprivileged, elders, women and uneducated populations cannot get benefits from the financial system. Thus, financial inclusion does not affect the economic growth of disadvantaged groups. The third group explored the causal links of financial inclusion and economic growth. For instance, Apergis et al. (2007) found bidirectional causality between financial inclusion and economic growth in a panel of 65 OECD and non-OECD countries. Sharma (2016) explored bi-directional causality between financial inclusion and economic growth. Similarly; Kim et al. (2018) also revealed the presence of a bi-directional causal relationship between financial inclusion and economic growth in OIC countries.

The conflicting evidence with respect to the link between financial inclusion and economic growth creates a need for an investigation to gain new insights. It is worthwhile for developing regions like Asia to examine how micro and macro-level financial inclusion impacts economic growth. Since financial intermediaries work as catalysts for economic growth in developing economies like Asia, therefore, economic growth is assumed to be dependent on financial sector development.

3   MODEL, METHODOLOGY, AND DATA

The present study investigates different dimensions of financial inclusion in 20 Asian countries in a more comprehensive way. To get deep insights into financial inclusion and economic growth nexus, we have used different statistical techniques such as Sarma (2008), DFM and dynamic panel Generalized Moment Method (GMM) estimator.

3.1   FINANCIAL INCLUSION AND ECONOMIC GROWTH

To examine the impact of financial inclusion on economic growth, we have used a two-step procedure. In the first step, we have examined the impact of financial inclusion on economic growth in a panel of 20 Asian countries. We have constructed two separate indices for micro and macro-financial inclusion. Then, we have examined the impact of individual indicators of financial inclusion on economic growth. Following Kim et al. (2018), we specify the empirical model

$$LnGDPPC_{it} = \beta_0 + \theta LnGDPPC_{it-1} + \beta_1 INF_{it} + \beta_2 POP_{it} + \beta_3 SE_{it} + \beta_4 Trade_{it}$$
$$+ \beta_5 Unemp_{it} + \beta_6 FII_{it} + v_i + \varepsilon_{it} \tag{1},$$

where cross-sectional units are represented by i, while t represents the time period, that is, 1995-2017. The term v_i represents country-specific effects, while the error term ε_{it} is assumed to be identically and independently distributed (iid) over the whole sample period. In Equation (1), one lag of $LnGDPPC_{it}$ is included to control the endogeneity problem. The dependent variable $LnGDPPC$ is the logarithmic value of GDP per capita which is used as a proxy of economic growth, FII is the financial inclusion index. INF is the inflation rate, POP is the population growth rate, SE indicates school enrolment and $Unemp$ represents the unemployment rate. To examine the impact of individual indicators of financial inclusion on economic growth, we can rewrite Equation (1) as:

$$LnGDPPC_{it} = \beta_0 + \theta LnGDPPC_{it-1} + \beta_1 INF_{it} + \beta_2 POP_{it} + \beta_3 SE_{it} + \beta_4 Trade_{it} + \beta_5 Unemp_{it}$$

$$+ \sum_{i=1}^{6} \gamma_i \left\{ , LnBanks_{it}, LnDA_{it}, LnBA_{it}, LnIP_{it}, LnFSD_{it}, LnPC_{it} \right\} + \nu_i + \varepsilon_{it}$$

(2),

where DA, BA, IP, FSD and PC are the deposit accounts, borrower accounts, insurance premium relative to GDP, total deposits in the financial system and private sector credit relative to GDP, respectively. The description of variables and data sources is given in Table 1.

Table 1: Definition of variables and data source.

Variable	Symbol	Definition of Variable	Data Source
Real GDP per capita	$GDPPC_{it}$	Real GDP per capita is obtained as gross domestic product adjusted for inflation dividing by the population of each country.	World Bank
Population growth	POP_{it}	The population growth rate for the year t is the growth rate of the midyear population from $t-1$ to t.	World Bank
Unemployment rate	$Unemp_{it}$	The unemployment rate measures the number of people actively looking for jobs as a percentage of the total labor force.	International Labour Organization
Inflation rate	INF_{it}	Inflation is calculated as changes in Consumer Price Index (CPI) with base year 2010=100.	World Bank/ International Monetary Fund (IMF)
School enrolment	SE_{it}	Net primary enrollment is obtained as the ratio of school age who are enrolled in school and population of official school age.	UNESCO Institute of Statistics
Trade Openness	$Trade_{it}$	Sum of exports and imports relative to GDP.	World Bank/IMF
Deposit accounts	DA_{it}	A number of deposit accounts with commercial banks per 100000 of the population.	IMF/World Bank's World Development Indicators and respective country central bank and statistics department
Borrower accounts	BA_{it}	A number of borrower accounts with commercial banks per 100000 of the population.	
No of banks	$Banks_{it}$	Number of commercial bank per 100000 of population	
Private sector credit relative to GDP	PC_{it}	Total credit distributed to the private sector as a percentage of GDP.	World Bank/IMF
Financial system deposits relative to GDP	FSD_{it}	Total demand, time and saving deposits with banks and other financial institutions as a percentage of GDP.	World Bank/ IFS
Insurance premium relative to GDP	IP_{it}	Total life and non-life insurance premium as a percentage of GDP.	World Bank

3.2 DATA

This study main object is to explore the impact of financial inclusion on economic growth in 20 Asian economies. The available 1995-2017 data on various variables shown in Table 1 are extracted from the World Development Indicators (WDI), IMF's World Governance Indicators, United Nations Education, Scientific, and Cultural Organization (UNESCO), United Nation Development Programme (UNDP), International Financial Statistics (IFS), Oxford University Database, Central Banks, and Statistical Ministries of respective countries.

3.3 METHODOLOGY

One objective of this study is to construct a financial inclusion index to overcome the issues of multi-dimensionality and multicollinearity among the different indicators of financial inclusion. To this end, we have used Sarma's (2008) methodology and DFM advanced by Stock and Watson (2002) for the construction of micro-based and macro-based financial inclusion indices.

3.3.1 SHARMA'S METHODOLOGY

Following Sarma (2008), we have constructed a micro-based financial inclusion index by considering the following indicators (justification given in Pina (2018)):

- o A number of branches of commercial banks per 100,000 adults.
- o A number of commercial banks deposit accounts per 100,000 adults.
- o A number of borrowers from commercial banks per 100,000 adults.

For the construction of macro-financial inclusion index, we consider the following indicators:

- o Private credit as a percentage of GDP.
- o Insurance premium as a percentage of GDP.
- o Deposits in the financial system as a percentage to GDP.

The average of each indicator for the selected economies is computed first and then we calculated the index of each indicator following Sarma (2008) as

$$D_i = \frac{A_j - m_j}{M_j - m_j} \tag{3},$$

where A_j is the actual value of the indicator j, m_j is the minimum value of indicator i and M_j is the maximum value of the indicator j. Financial inclusion index for the country I is measured by the normalized inverse of Euclidean distance of point d_i computed in Equation (3) from the ideal point which is considered as 1. We used the following formula to compute financial inclusion index (FII):

$$FII_i = 1 - \frac{\sqrt{(1-d_1)^2 + (1-d_2)^2 + \ldots\ldots\ldots + (1-d_n)^2}}{\sqrt{n}} \tag{4},$$

where numerator of the second term in Equation (4) is the Euclidean distance from an ideal point which is assumed to be 1, it is normalized by the square root of the number of observations and subtracting d_i from ideal value 1, giving the inverse normalized distance. All indicators are normalized for making it standardized and its value lies between 0 and 1, where 1 shows the highest level of financial inclusion and 0 reflects the lowest level of financial inclusion.

It can be argued that Saram's (2008) methodology is based on static factor models that involved the issue of multicollinearity. It also reflects the level of financial inclusion regardless of growth in FII. To overcome this issue, we have used the DFM technique to construct the financial inclusion index that is a relatively new methodology.

3.3.2 DYNAMIC FACTOR MODEL

The DFM has the ability to overcome problems of high dimensionality and multicollinearity. The DFM method can decompose each variable into common and idiosyncratic components which make the variables different. Following Stock & Watson (2002) we have constructed micro-based and macro-based financial inclusion indices using the DFM methodology.

3.4 TRENDS OF FINANCIAL INCLUSION INDICES

The trends of financial inclusion index based on Sarma's (2008) methodology are depicted in Figure 1. In order to get deeper insights into the accessibility and usage of financial services, we have constructed two different indices, the micro-FII that reflects the micro-side of financial inclusion. Micro-FII is constructed using the information on number of bank branches per 100,000

adults, number of deposit accounts per 100,000 adults and number of saving accounts per 100.000 adults, while macro-FII deals with macro-side of financial inclusion, which is constructed using the financial development indicators such as insurance premium relative to GDP, private sector credit relative to GDP and total deposits in financial system of economy. The score of *FII* lies between 0 and 1, 0 indicates a minimal level of financial inclusion; while 1 reflects the highest level of financial inclusion.
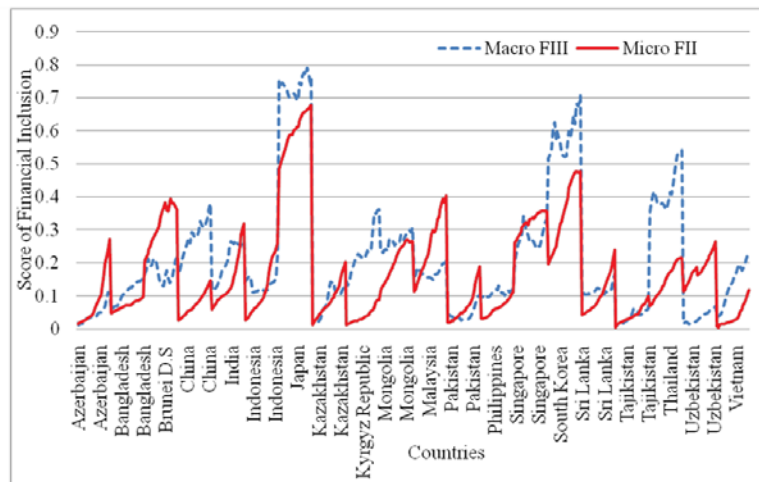

Figure 1: Trends of Macro and Micro financial inclusion indices (1995-2017)
(Sources: Authors calculations)

Figure 1, Japan has the highest score in micro-FII and macro-FII, followed by Indonesia, South Korea, and Singapore. The relatively high discrepancy between micro and macro-financial inclusion indices in some countries could be due to the difference between the level of financial accessibility and financial sector development. For example, Thailand has quite a good financial development level as compared to the level of financial accessibility. We have ranked countries based on the level of financial inclusion. Table 2 depicts macro-FII and micro-FII ranking.

Table 2: Ranking of Asian Countries by Micro-FII and Macro-FII (1995-2017).
(Sources: Authors calculation).

Rank	Country	Micro-FII	Rank	Country	Macro-FII
1	Japan	0.601	1	Japan	0.735
2	South Korea	0.356	2	South Korea	0.591
3	Singapore	0.325	3	Thailand	0.421
4	Brunei-DS	0.317	4	China	0.277
5	Magnolia	0.256	5	Singapore	0.276
6	Malaysia	0.206	6	Malaysia	0.265
7	Uzbekistan	0.182	7	Kyrgyz rep	0.234
8	India	0.146	8	India	0.205
9	Thailand	0.145	9	Brunei-DS	0.174
10	Indonesia	0.116	10	Magnolia	0.171
11	Sri Lanka	0.104	11	Vietnam	0.135
12	Khazikistan	0.088	12	Indonesia	0.133
13	Azerbaijan	0.085	13	Sri Lanka	0.114
14	China	0.074	14	Philippine	0.109
15	Bangladesh	0.070	15	Bangladesh	0.109
16	Pakistan	0.070	16	Khazikistan	0.084
17	Philippine	0.063	17	Pakistan	0.046
18	Tajikistan	0.042	18	Azerbaijan	0.043
19	Kyrgyz Rep	0.039	19	Tajikistan	0.037
20	Vietnam	0.038	20	Uzbekistan	0.035

Table 2, on the basis of micro-FII, Japan has the highest level of financial inclusion, followed

by South Korea, Singapore, and Brunei Darussalam, while Vietnam and the Kyrgyz Republic have the lowest level. Pakistan is in the 16th position; it means that access to financial services in Pakistan is better than Philippine, Tajikistan, Kyrgyz Republic and Vietnam.

Macro-FII reflects the level of financial sector development. Again, Japan has the highest score, followed by South Korea, Thailand, China, Singapore, and Malaysia, while Uzbekistan has the lowest score. Pakistan is in the 17th position based on the level of financial sector development.

3.5 DYNAMIC FACTOR MODEL-BASED FINANCIAL INCLUSION INDICES
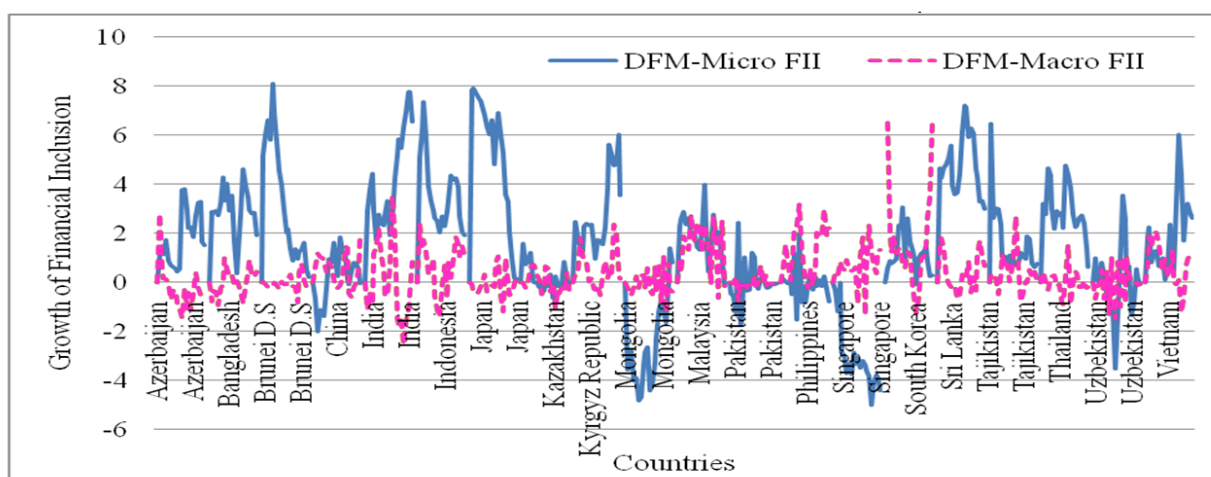The micro-FII and macro-FII based on the DFM approach are depicted in Figure 2.

Figure 2: Trends of Macro-FII and Micro-FII based on DFM Approach (1995-2017)
(Sources: authors' calculations).

The Micro-FII depicted in Figure 2 shows higher variation across countries. This means that countries with a high level of financial inclusion have a higher score based on the DFM approach. However, macro-FII indicates relatively less variation as compared to the fluctuation associated with micro-FII. This clearly indicates that micro-FII is more volatile than macro-FII and in terms of access to finance because Asian economies are more heterogeneous.

4 RESULT

4.1 DESCRIPTIVE STATISTICS
In Table 3, the mean values of all variables are positive. More importantly, positive mean values of Micro-FII and Macro-FII indicates an important role of access to financial services and financial development in economic growth in selected Asian countries. The mean value of micro-level financial inclusion, such as the number of bank branches, the number of deposit accounts and a number of borrower accounts is positive. Among the micro-level FII, the mean value of a number of deposit accounts is highest (112865.6), followed by a number of borrower accounts (23755.96), showing the key role of these variables in economic growth. Similarly, the large difference between maximum and minimum values for all variables indicating that the selected sample is heterogeneous with large and small countries. On the other hand, the mean value of macro-level FII is also positive with a mean value of private sector credit is 53.40, followed by financial system deposits relative to GDP (49.46). The standard deviation of all variables is positive. However, the standard deviation of deposit accounts (DA) and borrower accounts (BA) has the highest variation among all the variables, showing large volatility in these variables. The standard deviation of

Sarma's micro and macro-financial inclusion indices is lowest because of the standardization of indices values between 0 and 1.

Table 3: Descriptive statistics.

Variable	Mean	SD	Min	Max
$LnGDPPC_{it}$	8.93	1.15	6.65	11.45
$DFM:Macro-FII_{it}$	0.37	0.99	-2.51	6.66
$DFM:Micro-FII_{it}$	1.58	2.55	-5.02	8.10
$Sarma:Macro-FII_{it}$	0.21	0.18	0.01	0.79
$Sarma:Micro-FII_{it}$	0.17	0.15	0.01	0.67
SE_{it}	91.08	8.91	42.23	99.92
$Trade_{it}$	95.73	74.67	16.68	437.3
$Unemp_{it}$	5.15	3.10	0.39	16.5
POP_{it}	1.30	0.79	-1.75	5.32
INF_{it}	9.49	32.38	-8.52	512.3
$Banks_{it}$	13.55	13.38	0.081	71.61
DA_{it}	112865.6	153097.5	462.79	726909
BA_{it}	23755.96	26136.8	207.42	123300
PC_{it}	53.40	48.40	0.94	192.46
FSD_{it}	49.46	48.58	1.42	221.13
IP_{it}	2.33	2.83	0.02	13.18

To examine the possibility of multicollinearity among the variables under consideration, we performed Pearson's correlation analysis and the results are reported in Table 4.

Table 4: Correlation analysis.

	Ln (GDPPC)	SE	Trade	Unemp	POP	INF	Banks	DA	BA	PC	FSD	IP
Ln (GDPPC)	1.00											
SE	0.44	1.00										
Trade	0.38	0.32	1.00									
Unemp	-0.23	0.02	0.01	1.00								
POP	-0.12	-0.29	0.27	-0.12	1.00							
INF	-0.24	-0.13	0.02	0.27	-0.01	1.00						
Banks	0.41	0.22	0.01	-0.09	-0.02	-0.10	1.00					
DA	0.62	0.35	0.01	-0.17	-0.35	-0.13	0.39	1.00				
BA	0.81	0.37	0.39	-0.21	-0.13	-0.16	0.33	0.77	1.00			
PC	0.38	0.45	0.01	-0.33	-0.38	-0.16	0.34	0.55	0.37	1.00		
FSD	0.44	0.34	-0.09	-0.19	-0.39	-0.15	0.19	0.84	0.61	0.64	1.00	
IP	0.51	0.36	0.16	-0.28	-0.33	-0.13	0.09	0.79	0.68	0.50	0.74	1.00

The correlation coefficients reported in Table 4 show that unemployment, population growth, and inflation rate are negatively correlated with real GDP per capita. The reason for the negative correlation of these variables with real GDP per capita could be the adverse effect of macro and micro variables on economic growth. Population growth without a proper plan and economic resources leads to serious socioeconomic problems; the main issue is that it can cause unemployment. An increase in unemployment may decreases productivity and reflects the underutilization of human resource. Similarly, inflation adversely affects a household's consumption and savings, which in turn have a negative impact on real GDP per capita growth. Among the financial inclusion indicators, BA and DA have a positive correlation with real GDP per capita with correlation coefficients are 0.62 and 0.81 respectively. It reflects that an increase in borrower accounts and deposit accounts causes to increase in real GDP per capita in Asian

countries. The positive correlation could be due to the fact that it facilitates a pro-growth environment that enables inclusive growth.

4.2 IMPACT OF MICRO FINANCIAL INCLUSION ON ECONOMIC GROWTH

Using a dynamic GMM estimator, we have estimated five models by considering micro-FII and individual components of financial inclusion. The main aim of using individual indicators of financial inclusion is to get deeper insights regarding the impact of each indicator on economic growth. Table 5 presents the estimated result when micro-level FII is considered.

Table 5: Estimates of micro-FII and economic growth. (Dependent variable: $LnGDPPC_{it}$).

Variable	Model (A)	Model (B)	Model (C)	Model (D)	Model (E)
$LnGDPPC_{it-1}$	0.787*** (7.05)	0.90*** (12.13)	0.085*** (11.75)	0.81*** (7.02)	0.76*** (9.73)
SE_{it}	0.0024 (0.53)	0.0043 (0.63)	0.0008 (1.55)	0.0032 (0.36)	0.002** (2.26)
$Trade_{it}$	0.0015** (2.05)	0.0013* (1.89)	0.0003** (2.05)	0.0022*** (3.07)	0.0012* (1.82)
INF_{it}	0.00007 (0.09)	-0.0008 (-1.64)	-0.010*** (-3.75)	0.00023 (0.26)	-0.052** (-2.05)
POP_{it}	-0.16 (-1.10)	-0.094* (-1.99)	-0.024** (-2.22)	-0.11 (-1.48)	-0.028 (-0.76)
$Unemp_{it}$	-0.041** (-2.11)	-0.03** (-2.18)	-0.0023 (-0.74)	-0.042*** (-3.53)	-0.038*** (-2.91)
$Sarma:Micro-FII_{it}$	0.022** (2.19)	-	-	-	-
$DFM:Micro-FII_{it}$	-	-0.007 (-1.15)	-	-	-
$LnBanks_{it}$	-	-	0.004** (2.15)	-	-
$LnDA_{it}$	-	-	-	0.024** (2.21)	-
$LnBA_{it}$	-	-	-	-	0.029** (2.14)
Observations	460	460	460	460	460
AR(2)	0.27	0.13	0.21	0.19	0.52
Hansen test	0.63	0.68	0.64	0.55	0.71
F-state	230.23***	435.16***	683.4***	110.86**	184.01***

Note: Values in parentheses are the t-stat. *, **, *** respectively indicate significance at the 10%, 5% and 1% level.

The results associated with Model (A) indicate the impact of the financial inclusion index based on Sarma's (2008) method. The finding shows that financial inclusion based on micro indicators exerts a significant positive impact on economic growth. This implies that an increase in the accessibility of financial services plays an important role in enhancing economic growth in the Asian region. Furthermore, one period lagged GDPPC, trade openness and unemployment has a statistically significant impact on economic growth. Concerning the control variables, the result reveals that trade openness exerts a significant positive impact on economic growth as it improves the usage of financial services and also increases the circulation of capital. The impact of the unemployment rate on economic growth is negative and significant. It could be due to the fact that when unemployment increases, economic activities slowed down, which in turn deteriorates economic growth. Other control variables such as school enrolment, inflation rate, and population growth exert an insignificant impact on economic growth. Model (B) shows the impact of DFM-based micro-FII on economic growth. The result indicates that DFM-based micro-FII exerts an insignificant negative impact on economic growth in Asian countries. Other variables such as lagged GDPPC, trade openness, population growth and unemployment rate have a significant

impact on economic growth, while school enrolment and inflation rate are insignificant.

With regard to the individual indicators of financial inclusion, in the model (C) a number of bank branches are positively related to economic growth. This implies that an increase in the number of bank branches providing access to financial services, which in turn exerts a positive impact on economic growth. The positive association shows that the increase in banking penetration is a key factor in deriving economic growth. Furthermore, the impact of lagged GDPPC, trade openness, inflation rate and unemployment rate are statistically significant. Model (D) indicates that the impact of deposit accounts on economic growth is positive and statistically significant. This reveals that an increase in the number of deposit accounts enhances economic growth in Asian countries. This finding is important in the sense that an increase in the number of deposit accounts is a very basic step towards achieving financial inclusion. Additionally, lagged GDPPC, trade openness, inflation rate and population growth have a significant impact on economic growth. Finally, in Model (E) the impact of borrower accounts on economic growth is positive and significant, implying that an increase in loan accounts leads to enhances economic growth in Asian countries. Other variables entered in the Model (E) with a statistically significant impact on economic growth. Overall, the results reported in Models (C) to (E) reveal a positive and significant relationship of a number of banks, deposits accounts and borrower's accounts with economic growth which supports the financial inclusion-growth nexus in selected Asian countries.

4.3 IMPACT OF MACRO FINANCIAL INCLUSION ON ECONOMIC GROWTH

Table 6 estimates the impact of macro-financial inclusion index as well as individual macro-indicators of financial inclusion on economic growth. It gives useful insights into the impact of financial deepening on economic growth in Asian countries.

Table 6: Estimations of macro-FII and economic growth in Asian countries
(Dependent variable: $LnGDPPC_{it}$).

Variable	Model (F)	Model (G)	Model (H)	Model (I)	Model (J)
$LnGDPPC_{it-1}$	0.877*** (10.08)	0.867*** (8.24)	0.961*** (13.05)	0.864*** (11.74)	0.910*** (13.34)
SE_{it}	0.006 (0.45)	0.011 (1.08)	-0.022** (-2.20)	0.0027 (0.20)	0.0032 (0.51)
$Trade_{it}$	0.001* (1.94)	0.001 (1.33)	0.002*** (3.07)	0.001** (2.28)	0.001*** (3.24)
INF_{it}	-0.0004 (-0.20)	0.001 (1.13)	0.001 (-1.35)	0.0007 (0.32)	-0.0001 (-0.04)
POP_{it}	-0.160 (-1.41)	-0.21 (-1.34)	-0.054* (-1.86)	-0.13 (-1.02)	-0.190 (-1.37)
$Unemp_{it}$	-0.043* (-1.88)	-0.470** (-2.15)	-0.037*** (-2.77)	-0.052** (-2.22)	-0.046 (-1.39)
$Sarma:Macro-FII_{it}$	-0.007 (-0.56)	-	-	-	-
$DFM:Macro-FII_{it}$	-	-0.010 (-0.58)	-	-	-
$LnPC_{it}$	-	-	0.003* (1.73)	-	-
$LnFSD_{it}$	-	-	-	0.003** (2.06)	-
$LnIP_{it}$	-	-	-	-	-0.029 (-1.18)
Observations	460	460	460	460	460
AR(2)	0.21	0.20	0.89	0.14	0.23
Hansen test	0.80	0.39	60.4	0.45	0.77
F-stat	309.05***	340.35***	88.41***	141.01***	429.2***

Note: 1) Values in parentheses are the t-stat. *, **, *** respectively indicate significance at the 10%, 5% and 1% level.

It is evident from Table 6 (Model (F)) that the impact of macro-financial inclusion index (macro-FII) due to Sarma's (2008) on economic growth is insignificant. This means that the financial deepening-side of financial inclusion does not influence economic growth significantly in selected countries of the Asian region. In addition, lagged GDPPC, trade openness and the unemployment rate has a statistically significant impact on economic growth. Similarly, in Model (G) the impact of macro-financial inclusion index based on DFM (DFM-macro-FII) on economic growth has also insignificant. However, lagged GDPC, trade openness, and the unemployment rate has a significant impact on economic growth in selected Asian countries. This implies that the growth of the financial sector does not produce any significant impact on economic growth in Asian countries.

With respect to individual macro components of financial inclusion, Model (H) reflects that private sector credit relative to GDP has a significant positive impact on economic growth. This implies that an increase in private sector credit exerts a positive impact on economic growth, although the impact of this variable on economic growth is too small. The impact of total deposit with the financial sector ($LnFSD_{it}$) on economic growth in Model (I) is positive and statistically significant. This also implies that the growth of total deposits of the financial system has a positive impact on economic growth. However, the coefficient of this variable is also too small. On the other hand, in Model (J) the effect of insurance premium ($LnIP_{it}$) on economic growth is found to be negative but statistically insignificant. This means the insurance sector does not play any role in economic growth in Asian countries. The impact of lagged GDPPC and other control variables, such as trade openness, population growth, and the unemployment rate is statistically significant in Model(s) (H) through (J), suggesting the key role of these macroeconomic variables in the growth process in Asian countries.

Overall, this study result is consistent with the existing literature. For example, Kendall et al. (2010) revealed that economic development is associated with bank branches, deposit accounts, loan accounts and ATM's availability. Andrianaivo & Kpodar (2011) found a positive and statistically significant effect of financial inclusion on economic growth. Similarly, Demirguc & Klapper (2013) observed that those economies where the commercial bank branches and the volume of deposits are high, the income level of households in those areas also increases at a faster pace. Wong (2015) revealed that growth in developing countries was positively affected by access to finance. Likewise, Inoue & Hamori (2016) detected the positive impact of financial inclusion on the economic growth of selected countries. More recently Kim et al. (2018) found that a high level of financial access causes faster economic growth in OIC economies. They also detected the significant positive impact of ATMs, bank branches, borrower accounts, deposit accounts and private sector credit was significant on economic growth, while the role of insurance premium on economic growth was insignificant. Likewise, Sethi & Acharyaa (2018) concluded that economic growth in OIC economies was positively affected by financial inclusion. They reported bi-directional causality between financial inclusion and economic growth. Thus, the above-cited literature confirms that financial access is among the main drivers which cause economic growth in various part of the world.

5 CONCLUSION

To measure financial inclusion, we have constructed two separate indices, namely micro and macro-financial inclusion, using Sarma (2008) and Stock & Watson's (2002) Dynamic Factor Model. The result of micro-financial inclusion based on Sarma's (2008) method reveals a positive association of financial inclusion and economic growth, while the impact of DFM-based financial inclusion index on economic growth is insignificant. The difference between the results could be due to the fact that Sarma's index measures the level of financial inclusion, while DFM considers the growth of FII. This suggests that the level of financial inclusion contributes to economic growth rather than the growth of financial inclusion. Furthermore, we have also examined the impact individual indicator of micro-level financial inclusion on economic growth and the results show that the number of banks, number of borrower accounts and number of deposit accounts have a statistically significant positive impact on economic growth in selected Asian countries. The impact of macro-financial inclusion indices based on Sarma and DFM methods on economic growth was found to be insignificant. Additionally, the impact of individual indicators of financial deepening-side of financial inclusion is also examined. We find that the impact of private credit relative to GDP and financial system deposits relative to GDP has a significant impact on economic growth, while the impact of insurance premium on economic growth remains insignificant.

The results show that micro-level financial inclusion index and indicators of financial inclusion such as the number of bank branches, number of borrower accounts and number of deposit accounts have a significant positive impact on economic growth in Asian countries. Therefore, to stimulate economic growth in Asian economies, policymakers may strengthen financial services accessibility. It can be argued that improved accessibility of financial services works as a stimulus of capital accumulation and financial resources mobilization, which in turn gradually promotes economic growth and social welfare. Therefore, Asian countries may increase the penetration of financial services and eliminate barriers to financial access in order to stimulate economic growth in the region. Furthermore, the expansion of the financial sector can also contribute to economic growth in these economies.

6 DATA AND MATERIAL AVAILABILITY

Information regarding this study is available by contacting the corresponding author.

7 ACKNOWLEDGEMENT

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