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Issues and Misconceptions of Financial Inclusion Indices: Evidences from Selected Asian Economies

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Abstract

This study aims to revisit the issues and misconceptions about financial inclusion (FI) indices. For indices construction, this study uses two approaches: one approach following the methodology of Sarma (2008) which is based on UNDP methodology, while the other is the Dynamic Factor Model (DFM)-based index of Stock and Watson (2002) and Rehman et al. (2021). The data of 18 economies of Asia from 1997 till 2017 is used for indices construction and analysis. The authors constructed macro and micro-level financial inclusion indices based on the different types of financial inclusion indicators. Second, the authors have critically evaluated two different approaches, and the results show that Sarma (2008)-based index show financial inclusion's level, while DFM-based index reveal fluctuation in the current year's financial inclusion level due to the prior variations. For measuring the level of financial inclusion, the Sarma (2008) index is effective, while for forecasting the level of financial inclusion, the DFM approach is more appropriate. Furthermore, the micro and macro aspects of financial inclusion should be reflected in separate indices for better understanding and in-depth insights.

Keywords: Financial Inclusion, Indices, Dynamic Factor Model, Misconception, Fluctuation

JEL Classification Code: D6, B26, E44

1. Introduction

The importance of financial inclusion (FI) increased significantly in recent years due to its vibrant role in sustainable economic development and improving well-being. According to World Bank (2008, p. 27), financial inclusion is basically "*accessibility to services of financial institutions, without the price and non-price constraints, to every person of society*". Credit, payments, deposits, and insurance are basic components of FI. Despite the focus of the World Bank and the global community, access to finance still needs improvement (Swaiss, 2017). Global Findex Report shows that 69% of the adult population across the world has accounts in financial institutions. There is steady growth in account ownership but still inequalities exist among men and women. Global Findex reports indicate that 72% of men and 65% of women have transaction accounts in financial institutions. The role of financial inclusion is considered important in capital accumulation, financial stability, dealing with money laundering, economic growth, and it also reduces poverty and income distribution gap. Financial inclusion can work as enabling force for 7 out of 17 Sustainable Development Goals (SDGs). In recent studies, Ratnawati (2020). (2020), Na'im et al. (2021) and Nguyen and Ha (2021) have highlighted the importance and multi-dimensional role of financial inclusion.

Financial inclusion is a multi-dimensional term, and it is a challenge to measure it accurately and precisely. Different studies have proposed a number of multi-dimensional indices for measuring FI by using Principal Component Analysis and other approaches like Sarma (2008). Demirguc-Kunt

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and Klapper (2013), Fungacova and Weill (2015), Sha'ban et al. (2020), and Kim et al. (2020) measured FI in different economies by using different proxies. However, these indices have some very serious issues. First, all these indices are static in nature, and the dynamic aspect of FI has not been taken into consideration. Second, these indices use all aspects (micro and macro) of financial inclusion simultaneously in one equation and consider it similar despite their different nature which is basically erroneous and misleading. Koong et al. (2017) had also expressed the need for alternative approaches for indices construction.

To deal with the first issue, this paper considers the dynamic aspect of financial inclusion and utilizes the Dynamic Factor Model (DFM) approach to construct the FI index by following Rahman et al. (2021). The DFM has some advantages over other approaches like, (i) it deals effectively with the issue of high dimensionality, (ii) it shows the growth of multiple indicators, and (iii) it deals with the issue of serial correlation. The DFM models divide each indicator into two different parts, the static and the dynamic parts. The static part does not change with time, while the dynamic part changes with time. This decomposition enables a better understating of the time-varying nature of a variable. To address the second issue, in which different types of variables are included in the same index, this paper differentiated FI indicators into micro- and macro-level indicators, following Pina (2018).

The micro-level and macro-level FI indices are constructed by using micro- and macro-level indicators separately in questions. This will help us to get precise and accurate insights into the level of financial inclusion in selected economies. The micro-financial inclusion indices consider the accessibility side of FI which are bank branches, deposit accounts, and borrower accounts per 100000 population, while on the other hand macro-financial inclusion reflects the financial development side of FI, such as private credit of GDP, total deposits with financial system to GDP, and insurance premium relative to GDP. The construction of indices by using the DFM and Sarma (2008) approaches enables us to compare and contrast outcomes of both indices and methodologies to better understand the phenomenon of FI.

2. Literature Review

Financial inclusion is a multi-dimensional term, and it is difficult to measure it, therefore there is no consistent and universally acceptable method of measuring financial inclusion level in an economy. Different indicators of FI are correlated with each other and create issues of multi-dimensionality as indicated by Bandiera et al. (2000). Bandiera et al. (2000) developed the financial liberalization index by incorporating different indicators. Khan and Qayyum (2007) constructed financial development index by using four indicators. The first attempt for FI index development was made by Beck et al. (2007).

Honohan (2008) measured the level of FI by considering the proportion of households and adults of an economy who have access to financial services like bank accounts. Likewise, Demirguc-Kunt and Klapper (2013) and Demirguc-Kunt et al. (2015, 2018) used indicators such as payment, savings, borrowing, risk management, and payments for measuring FI level. However, according to Camara and Tuesta (2014), FI is a multidimensional term, and it cannot accurately be captured by a single indicator like bank account and ATMs. Sarma (2016) argued that the use of individual indicators of FI can lead to misunderstandings regarding the level of FI. To deal with such issues, Gupte et al. (2012) developed the FI index by taking the average of financial inclusion's four dimensions like usage outreach, cost of the transaction, and ease of transactions. Sarma (2012, 2015, 2016) explored three different dimensions of financial accessibility: banking penetration, usage, and banking services availability. Sarma's index is calculated based on the human development index (HDI) which was developed by UNDP. Park and Mercado (2015, 2018) also developed financial access index by considering five indicators such as ATMs, borrowers, and branches of banks, depositors' numbers, and the ratio of credit to GDP.

Some studies also assigned weights to variables based on their relevance and importance. Assigning different weights was brought under criticism by the academic community across the world. Therefore, to fix this issue of weight assigning, Amidzic et al. (2014) formulated an index through the Principal Component Analysis (PCA) method for determining the appropriate weights for developing FI indices. An issue associated with the Amidzic et al. (2014) index is that this approach uses factor analysis for reducing a set of variables to relatively smaller factors. Therefore, it does not fully utilize all available variables about each economy.

Camara and Tuesta (2014) followed a different approach of two-step PCA. In the first stage, three sub-indices of access, usage, and barriers were estimated, and it was defined as a measure of FI. While in the second stage, using PCA weights were estimated and assigned to dimensions for the construction of the overall FI index by using sub-indices of the first stage. Sha'ban et al. (2020) used data of 95 economies from 2004 to 2015 and developed FI index by using the basic approach by UNDP. Their finding showed cross-country variations in the level of financial inclusion and they also observed changes in the level of financial inclusion over time. Similarly, Kim et al. (2020) also developed FI index by using data of 154 economies, among them 48 economies were from Organization of Islamic Cooperation (OIC) countries. Their study also measured

FI on a scale of 0–1, where 0 shows without access to finance and 1 reflects an economy in which everyone has full access to finance. Each approach on which the FI index is based has its benefits and drawbacks. Therefore, there is still room for improvement in the measurement of overall FI (Park & Mercado 2015, Mialou & Amidzic, 2017).

Demirguc-Kunt and Klapper (2013), Fungacova and Weill (2015), Sha'ban et al. (2020), and Kim et al. (2020) measured the FI level of different economies using different proxies of FI. These studies have proposed different multi-dimensional indices for measuring FI by using various approaches such as PCA and Sarma (2008). However, all these indices of FI are static in nature and the dynamic aspect of FI has not been taken into consideration. Koong et al. (2017) expressed the need for alternative approaches for the construction of FI indices. Ali and Khan (2020) have measured FI in 18 economies of Asia and they have highlighted the need and importance of alternative indices by using different pragmatic approaches. Rehman et al. (2021) implied the need and importance of dynamic factor models for indices construction; therefore, we consider the dynamic aspect of FI and utilize the DFM approach for construction of FI index by taking lead from Rahman et al. (2021). Pina (2018) argued that for getting deeper insights, there is a need to consider micro and macro aspects of FI. We have divided FI into two broader categories, micro-financial inclusion and macro-FI following Pina (2018).

3. Data and Methodology

3.1. Data and Variables

The data is extracted from International Monetary Fund's International Financial Statistics (IFS), World Bank's (WDI), Central Banks, and Statistical Departments of respective countries. Out of 48 Asian economies, we have selected 18 economies from four different regions of Asia due to the availability of data and other computational issues. We have dropped Japan and China from the sample as these economies were creating outliers in the sample. From Southeast Asia, Malaysia, Indonesia, Brunei Dar-Ul-Salam, Thailand, Vietnam, Singapore, and the Philippines, from East Asia, South Korea, and Mongolia, from Central Asia, Azerbaijan, Kyrgyz Republic, Tajikistan, Uzbekistan, and Kazakhstan, while from South Asia, Pakistan, India, Sri Lanka, and Bangladesh, were selected for indices construction and analysis.

3.2. Financial Inclusion's Indicators and Construction of Financial Inclusion Indices

First, we have identified the main components of FI and then these are used for the construction of micro and macro-level FI indices through Sarma (2008) and DFM methodologies for selected Asian economies. Constructing indices by using both the DFM and Sarma (2008) approaches enables the comparison of indices for a better understanding of the dynamics of FI.

3.2.1. The Dynamic Factor Model

Along with the Sarma (2008) methodology, the DFM approach is used for the construction of the FI index. The DFM approach is useful to overcome the issues of high dimensionality as well as its ability of accurate predicting power as compared to static PCA. The DFM is mostly used for modeling multivariate series as linear functions of some unobserved factors. The origin of the DFM can be traced back to the work of Geweke (1977) and Sargent and Sims (1977). In the 1990s, Stock and Watson (1998) extend the DFM to a high level too for estimation. The DFM can decompose each variable into two components, one is a common component, while the other is a unique idiosyncratic component, which makes the variable different. The common part of a variable is driven by some factors producing a similar impact on a variable and is known as the common component of a variable. The idiosyncratic part varies across all variables and makes a specific variable unique by adding different characteristics. The same methodology was used by Rahman et al. (2021), which we have closely followed in indices development of micro and macro-level FI.

Stock and Watson (1998) have made a significant contribution to the development of DFM. It lays the groundwork for comprehending the dynamics of DFM. Assume that X_t is the n-dimensional vector of an indicator for a certain time series, with $t = 1, 2, 3, 4......, T$. Furthermore, we assumed that X_t is the transformed form and that the variables are stationary, and mean of each series is zero. The DFM formula of variable X_t with r common dynamic variables (factors) f_t is:

$$X_t = \rho_i(L)f_t + \varepsilon_t, \tag{1}$$

For $i = 1, 2, 3, 4….., N$, where the $\varepsilon_{it} = (\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t} \,………, \varepsilon_{Nt})$ is an $N \times 1$ vector of unique disturbance terms. $\rho_i(L)$ is lag polynomial in the powers of L, where it is modeled in such a way that have finite order of at most s, so;

$$\rho_i(L) = \sum\nolimits_{j-1}^{s} \rho_{ij} L^j \tag{2}$$

The finite lag assumption permits to rewrite equation (1) as:

$$X_t = \Lambda F_t + \varepsilon_t \tag{3}$$

Where $F_t = (f_t……, f_{ts})$, is an $r \times 1$, while $r \leq (s + 1)\, r$, while i-th row of the Λ is $(\rho_{10}, \rho_{i1} \ldots \rho_{is})$ loading factors matrix.

The given static form of the equation has a significant advantage due to the unobserved elements that may be accurately estimated as N, $T \rightarrow \infty$ combined by examining principal components of the covariance matrix of (Stock & Watson, 2002).

3.2.2. Sarma (2008) Model

Along with the DFM approach, we have also used the Sarma (2008) approach for micro and macro-level FI indices. The Sarma (2008) methodology is consistent with UNDP's indices approach. For the construction of micro and macro-level FI indexes, the relevant variables were determined after an exhaustive literature review, and the methodological lead was taken from Pina (2018). Micro-level FI indices reflected the level of financial services accessibility at the individual level, while macro-level indicators are associated with the country's overall financial sector development. Following components are used for micro and macro-level FI indices.

Micro-level financial inclusion index

Indicators of this index consisting of micro-level FI deal with the usage and availability of finance at the individual level. The number of commercial banks branches directly provides financial services to individuals. Furthermore, deposit accounts and borrower accounts are associated with the usage of financial services. We have used Banks per 100,000 of population, Deposit accounts in banks per 100,000 of population, and Borrowers accounts per 100,000 of the population for the construct of micro-level financial inclusion index.

Macro-level financial inclusion index

The macro-level financial inclusion index is related to the depth and overall development of the financial sector. We have used private credit to GDP's percentage, Insurance premium relative to GDP's percentage, and total deposits in the financial system relative to GDP's percentage for macro-level financial inclusion index construction in the selected regions of Asian countries.

First, the mean of each indicator is calculated. Afterward, the index is made for the individual variable by using Sarma (2008) approach for calculating each dimension's index:

$$D_i = \frac{A_j - m_j}{M_j - m_j}, \qquad (4)$$

Where A_j shows the real value of indicator j, m_j shows the lowest value of indictor, and M_j is the highest value of variable j. FI index of the economy I can be computed by the normalized inverse of Euclidean distance of point d_i calculated by equation (4) from an ideal point which is considered as 1. The following equation can be used for calculating the financial inclusion index (FII):

$$FII_i = 1 - \sqrt{\frac{(1-d_1)^2 + (1-d_2)^2 + \ldots\ldots(1-d_n)^n}{\sqrt{n}}} \qquad (5)$$

The numerator of the second term in Equation (5) is the distance from 1. It is normalized by taking the square root and subtracting it from 1, giving the inverse normalized distance. The variables are normalized to make it standardized, and the value is set between 0 and 1, with 0 being the lowest and 1 being the highest level of *FI*. This is also reported by Sarma (2012).

The FI index is a multi-dimensional measure that considers the information on different dimensions of financial accessibility. It measures financial inclusion on a scale of 0 to 1. Based on values of constructed indices of FI, we classified it as follows.

$0.5 < \text{IFI} \leq 1$ represents a high level of FI.
$0.3 \leq \text{IFI} < 0.5$ represents a medium level of FI.
$0 \leq \text{IFI} < 0.3$ represents low FI.

Our index is more comprehensive as compared to Sarma (2008). We have incorporated diverse and all indicators and decomposed overall FI into micro-level and macro-level FI. The decomposition of FI into two broad categories enables us to get much deeper insights into FI. Our approach is different as we have computed two different indices by following two different methods, one is based on the Sarma method, while the other is based on the DFM methodology. After measuring FI through indices, we examine the impact of both indices on growth, reduction of poverty, and income disparity.

4. Results and Discussion

This section provides a detailed analysis of the empirical findings of this study. In this section, we draw inferences from the empirical results after using different statistical tools.

4.1. Micro and Macro FI Indices

This study divides FI into two different categories following Pina (2018). Two different approaches have been used for the construction of the micro-level and the macro-level financial inclusion indices, following Sarama (2008) as well as Stock and Watson (2002).

4.1.1. Index Based on the Sarma (2008) Methodology

The micro and macro-level FI indices are based on the Sarma (2008) approach which measures FI on a scale from 0 to 1. The score 0 reflects the lowest levels, while score 1 indicates the highest level with a fully inclusive economy. The micro-FI index reflects financial service usage and availability at the individual level. It is developed by incorporating bank branches, saving accounts, and deposit accounts. The macro-FI index shows aggregate financial sector depth and development with respect to the total size of the economy. The macro-level FI index is constructed based on insurance premium relative to GDP, private credit relative to GDP, and total deposits in the financial system with respect to GDP. In the selected sample, South Korea has the highest score in financial services access and usage, followed by Singapore, Brunei, and Mongolia respectively. The high values of micro and macro-level indices could be due to their developed financial system. These countries have relatively well-established financial infrastructure in Asia where peoples have better access to finance. The ranking of micro and macro-level indices is given in Figures 1 and 2, respectively.

It can be seen from Figure 1 that the level of financial accessibility (micro-level FI) is highest in South Korea, while on the other hand, the Kyrgyz Republic has the lowest level of micro-financial inclusion. Singapore is in the second position based on financial accessibility followed by Brunei Darussalam. Pakistan is in the 14th position, based on macro-level FI.

Likewise, the ranking of macro-level FI in Figure 2 shows the financial development (macro-level FI) in selected countries as compared to these economies' size. South Korea has ranked first with the highest score of macro-level FI index, while Uzbekistan has the lowest score. The relatively lower FI in some economies of the sample is due to their

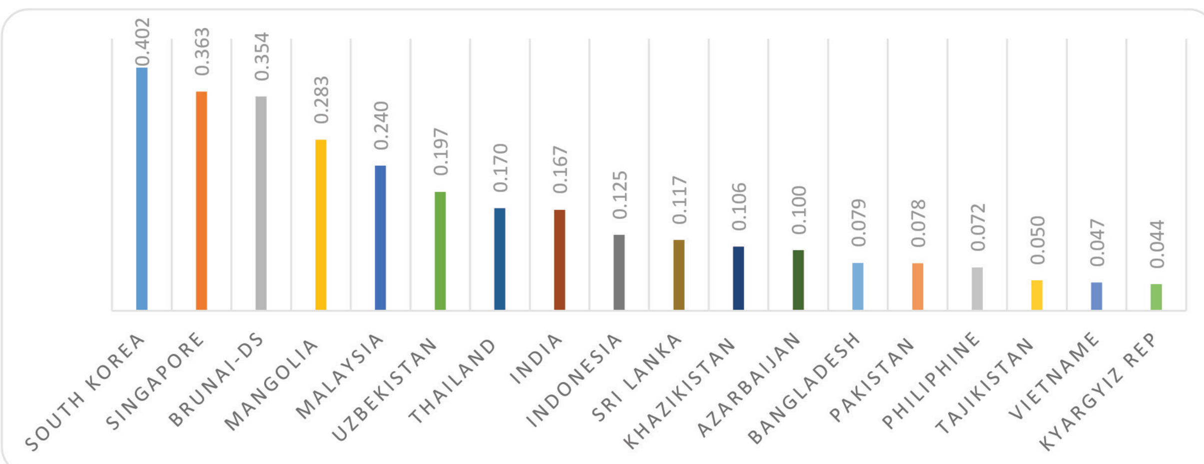

Figure 1: Ranking of Micro-Financial Inclusion Index

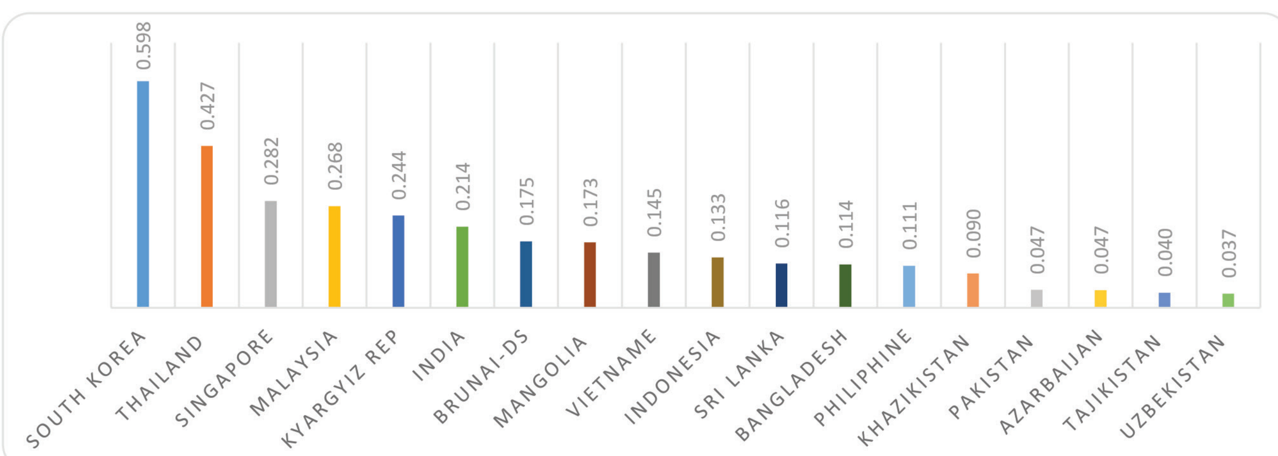

Figure 2: Ranking of Macro-Level Financial Inclusion Index

Table 1: Micro and Macro FII

Rank	Country	Micro-FII Score	Rank	Country	Macro-FII Score
1	South Korea	0.402	1	South Korea	0.598
2	Singapore	0.363	2	Thailand	0.427
3	Brunei-DS	0.354	3	Singapore	0.282
4	Magnolia	0.283	4	Malaysia	0.268
5	Malaysia	0.240	5	Kyrgyz rep	0.244
6	Uzbekistan	0.197	6	India	0.214
7	Thailand	0.170	7	Brunei-DS	0.175
8	India	0.167	8	Magnolia	0.173
9	Indonesia	0.125	9	Vietnam	0.145
10	Sri Lanka	0.117	10	Indonesia	0.133
11	Kazakhstan	0.106	11	Sri Lanka	0.116
12	Azerbaijan	0.100	12	Bangladesh	0.114
13	Bangladesh	0.079	13	Philippine	0.111
14	Pakistan	0.078	14	Kazakhstan	0.090
15	Philippine	0.072	15	Pakistan	0.047
16	Tajikistan	0.050	16	Azerbaijan	0.047
17	Vietnam	0.047	17	Tajikistan	0.040
18	Kyrgyz rep	0.044	18	Uzbekistan	0.037

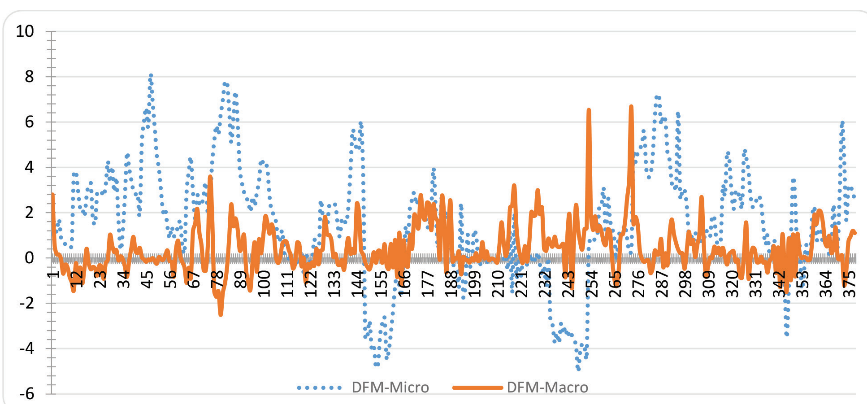

Figure 3: Macro-Level and Micro-Level FI Indices

under-developed infrastructure of the financial system, weaker demand, lack of awareness, and illiteracy.

The ranking along with the score of micro-level and macro-level FI is presented in Table 1, where the FII denotes financial inclusion index.

4.1.2. Dynamic Factor Model

The trend in micro and macro-level FI indices based on the DFM approach is presented in Figure 3.

The micro-level FI index based on the DFM approach (Figure 3) shows mixed evidence, across the sample but across the micro-level aspect, the variation is relatively higher as compared to the macro-level index in sampled countries. However, the macro-level FI index has relatively less variation as compared to the fluctuation of the micro-level FI index. This implies that the micro-level FI index is more volatile than the macro-level FI index. The high level of fluctuation in the micro-level FI index may be because of the inclusion of components in terms of 100000 population, while the figures of the macro-level FI index are based on the percentage with respect to size. Second, the sampled economies are more heterogeneous in nature so this may also lead to higher variation across the selected economies.

5. Conclusion

Sarma (2008) index indicates the level of financial inclusion and scaled it from 0 to 1, where 0 indicates the absence of financial services, and 1 shows availability and access of financial services to each member of society. While the DFM-based indices show the growth and fluctuation in the level of FI over a period of time. The DFM-based micro-level FI index indicates relatively higher variation in sampled countries. This indicates that economies with higher fluctuation of FI have high scores based on the DFM approach. However, the macro-level FI shows relatively less variation as compared to the fluctuation associated with the micro-level FI.

The empirical results of this study provide some new insights to policymakers and practitioners for financial inclusion's indices development. Broadly, financial inclusion can be divided into two different categories based on their nature. Considering all indicators of FI similar can give misleading results. The micro-level financial inclusion indicators reflect access to finance, while the macro-financial inclusion indicators indicate the financial sector's development and depth. It also helps in identifying economies which economy has low financial accessibility and lacks financial sector development.

The index based on Sarma (2008) method presents level, while the DFM indicates growth in FI. The DFM method is useful and effective in forecasting future trends of FI. Therefore, policymakers may use the approach of Sarma (2008) for measuring FI.

This study also has some limitations. Due to computational issues and unavailability of data, only 18 economies of Asia are considered. Furthermore, we have dropped Japan and China from the sample as they were working as outliers in the sample. Another limitation of the study is that it was unable to consider the electronic money or mobile money dimensions of FI due to a lack of data for the time period chosen. Because of the unique character of dynamic factor model-based indices, data from a relatively short time period cannot be used.

In the future, it would be interesting to investigate the influence of the DFM-based indices in various economies throughout the world. Furthermore, the discussion over whether there is a perfect model for evaluating FI is still ongoing; other models for assessing FI must be researched further to arrive at the best feasible model. Because mobile money accounts are still a new phenomenon, future research may want to include electronic money or mobile money.

References

Ali, J., & Khan, M. A. (2020). Micro and macro-financial inclusion and their impacts on economic growth: Evidence from Asian economies with alternative approaches. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, *11*(5), 1–15. https://doi.org/10.14456/ITJEMAST.2020.101

Amidzic, G., Massara, M. A., & Mialou, A. (2014). *Assessing countries' financial inclusion standing-A new composite index* (Working Paper No14/36). Washington DC: International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2014/wp1436.pdf

Bandiera, O., Caprio, G., Honohan, P., & Schiantarelli, F. (2000). Does financial reform raise or reduce saving? *Review of Economics and Statistics*, *82*(2), 239–263. https://www.jstor.org/stable/2646818

Camara, N., & Tuesta, D. (2014). *Measuring financial inclusion: A multidimensional index* (Working Paper No. 14/26). Mexico: BBVA Research. https://www.bbvaresearch.com/wp-content/uploads/2014/09/WP14-26_Financial-Inclusion2.pdf

Demirguc-Kunt, A., & Klapper, L. (2013). Measuring financial inclusion: Explaining variation in the use of financial services across and within countries. *Brookings Papers on Economic Activity*, *20*(1), 279–340. https://www.brookings.edu/wp-content/uploads/2016/07/2013a_klapper.pdf

Demirguc-Kunt, A., Klapper, L. F., Singer, D., & Van Oudheusden, P. (2015). *The global index database 2014: Measuring financial inclusion around the world* (World Bank Policy Research Working Paper No. 7255). Washington DC: World Bank. https://thedocs.worldbank.org/en/doc/681361466184854434-0050022016/original/2014GlobalFindexReportDKSV.pdf

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *The global findex database 2017: Measuring financial inclusion and the fintech revolution*. Washington DC: The World Bank.

Fungacova, Z., & Weill, L. (2015). Understanding financial inclusion in China. *China Economic Review*, *34*, 196–206. https://doi.org/10.1016/j.chieco.2014.12.004

Geweke, J. (1977). The dynamic factor analysis of economic time series. In: D. J. Aigner & A. S. Goldberger (Eds), *Latent variables in socio-economic models* (pp. 412–454) North-Holland, Amsterdam.

Gupte, R., Venkataramani, B., & Gupta, D. (2012). Computation of financial inclusion index for India. *Procedia-Social and Behavioral Sciences*, *37*, 133–149. https://doi.org/10.1016/j.sbspro.2012.03.281

Honohan, P. (2008). Cross-country variation in household access to financial services. *Journal of Banking & Finance*, *32*(11), 2493–2500. https://doi.org/10.1016/j.jbankfin.2008.05.004

Khan, M. A., & Qayyum, A. (2007). *Trade, financial and growth nexus in Pakistan* (Working Paper No. 2007, 14). Munich, Germany: Munich Personal RePEc Archive. https://mpra.ub.uni-muenchen.de/6523/1/Trade_FinancialGrowth_nexus_in_Pakistan.pdf

Kim, D. W., Yu, J. S., & Hassan, M. K. (2020). The influence of religion and social inequality on financial inclusion. *The Singapore Economic Review*, *65*(01), 193–216. https://doi.org/10.1016/j.jce.2011.07.002

Koong, S. S., Law, S. H., & Ibrahim, M. H. (2017). Credit expansion and financial stability in Malaysia. *Economic Modelling*, *61*, 339–350. https://doi.org/10.1016/j.econmod.2016.10.013

Mialou, A., & Amidzic, G. (2017). Assessing countries' financial inclusion standing: A new composite index. *Journal of Banking and Financial Economics, 2*(8), 105–126. https://doi.org/10.7172/2353-6845.jbfe.2017.2.5

Na'im, H., Subagiarta, I. W., Wibowo, R., & Wardhono, A. (2021). An empirical study of financial inclusion and financial system stability in ASEAN-4. *The Journal of Asian Finance, Economics, and Business*, *8*(7), 139–150. https://doi.org/10.13106/jafeb.2021.vol8.no7.0139

Nguyen, Y. H. D., & Ha, D. T. T. (2021). The effect of institutional quality on financial inclusion in ASEAN Countries. *The Journal of Asian Finance, Economics, and Business*, *8*(8), 421–431. https://doi.org/10.13106/jafeb.2021.vol8.no8.0421

Park, C. Y., & Mercado, R. (2018). Financial inclusion, poverty, and income inequality. *The Singapore Economic Review*, *63*(01), 185–206. https://doi.org/10.1142/S0217590818410059

Park, C. Y., & Mercado, R. (2015). *Financial inclusion, poverty, and income inequality in developing Asia* (Working Paper Series No.426). Tokyo, Japan: Asian Development Bank Economics https://www.adb.org/sites/default/files/publication/153143/ewp-426.pdf

Pina, G. (2018). Macro and micro-financial liberalizations, savings, and growth. *Journal of Financial Economic Policy*, *10*(2), 290–309. https://doi.org/10.1108/JFEP-09-2017-0080

Rahman, A., Khan, M. A., & Charfeddine, L. (2021). Regime-specific impact of financial reforms on economic growth in Pakistan. *Journal of Policy Modeling*, *43*(1), 161–182. https://doi.org/10.1016/j.jpolmod.2020.10.006

Ratnawati, K. (2020). The impact of financial inclusion on economic growth, poverty, income inequality, and financial stability in Asia. *The Journal of Asian Finance, Economics, and Business*, *7*(10), 73–85. https://doi.org/10.13106/jafeb.2020.vol7.no10.073

Sargent, T. J., & Sims, C. A. (1977). Business cycle modeling without pretending to have too much a priori economic theory. *New Methods in Business Cycle Research*, *1*, 145–168. https://www.minneapolisfed.org/research/common/pub_detail.cfm?pb_autonum_id=516

Sarma, M. (2008). *Index of financial inclusion* (Working Paper No. 215). New Delhi: Indian Council for Research on International Economic Relations. https://www.icrier.org/pdf/Working_Paper_215.pdf

Sarma, M. (2012). *Index of financial inclusion: A measure of financial sector inclusiveness* (Working Paper No. 07/2012). Berlin: Hochschule für Technik und Wirschaft Berlin University of Applied Sciences https://finance-and-trade.htw-berlin.de/fileadmin/HTW/Forschung/Money_Finance_Trade_Development/working_paper_series/wp_07_2012_Sarma_Index-of-Financial-Inclusion.pdf

Sarma, M. (2015). Measuring financial inclusion. *Economics Bulletin, 35*(1), 604–611. accessecon.com/Pubs/EB/2015/Volume35/EB-15-V35-I1-P64.pdf

Sarma, M. (2016). *Measuring financial inclusion for Asian economies*: *Financial Inclusion in Asia.* UK, London: Palgrave Macmillan.

Sha'ban, M., Girardone, C., & Sarkisyan, A. (2020). Cross-country variation in financial inclusion: a global perspective. *The European Journal of Finance*, *26*(4–5), 319–340. https://doi.org/10.1080/1351847X.2019.1686709

Stock, J. H., & Watson, M. W. (1998). *Diffusion indexes* (Working Paper No. w6702). Cambridge, MA: National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w6702/w6702.pdf

Stock, J. H., & Watson, M. W. (2002). Macroeconomic forecasting using diffusion indexes. *Journal of Business & Economic Statistics*, *20*(2), 147–162. https://www.princeton.edu/~mwatson/papers/Stock_Watson_JBES_2002.pdf

Swaiss, A. (2017). *The World Bank's goal of universal financial access and financial inclusion is achievable by 2020*. Munich, Germany: GRIN Publishing.

World Bank. (2008). *Banking the poor: Measuring banking access in 54 economies.* Washington, DC: World Bank.