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Measuring Financial Inclusion in the MENA Region: Comparative Analysis

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A B S T R A C T

Purpose: The purpose of this paper is to develop a new multidimensional financial inclusion index to measure the financial inclusion level for each of the 13 selected countries of the Middle East and North Africa region for the period 2004-2020. In addition, the comparative analysis approach encompasses the evolvement of financial inclusion for each country in the time period studied.
Design/methodology/approach: This study builds onto Sarma's (2012) approach for measuring financial inclusion by forming a new and improved model including the depth dimension and new variables. The computed values are based on data on financial inclusion extracted from the World Bank and the International Monetary Fund, the Financial Access Survey database.
Findings: The values of the new financial inclusion index reveal the inadequate efforts made by these countries to enhance financial inclusion as a way to improve the economic /income growth in the region.
Research limitations/implications: This study has two limitations. The unavailability of data for some financial indicators made it inevitable to be included in the study, such as the digital banking. Such data is considered crucial for future studies on financial inclusion indexes. The other limitation is that some countries in the Middle East and North Africa region were excluded from this research due to the lack of data on some of the variables included in constructing and measuring the new index. Despite these limitation, policy-makers and central banks can benefit from this study to enhance financial inclusion practices in pursuit of economic /income growth.
Originality/value: This study attempts to develop a new multidimensional index to measuring financial inclusion by including a new dimension/variables and analyzing the values.

Keywords: Financial depth dimension, Financial inclusion, Financial inclusion index, Middle East and North Africa

I. Introduction

Sound and effective financial services provided by organized financial intermediaries are essential to finance projects. They encourage savings, thus strengthening the financial system of the economy (McKinnon, 1973). According to the International Monetary Fund (IMF), greater financial inclusion can create jobs, promote business activities and provide resilience in economic shocks. Hence, promoting financial inclusion in financially low-income communities leads to a steady increase in household income and furthers assets accumulation (IMF, 2019). Financial inclusion is a broad concept which can be defined in many ways. For the purpose of this study, financial

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inclusion is defined as the access to useful and affordable financial products and services that meet consumers' and businesses' needs being delivered in a responsible and sustainable way (World Bank)[1].

Advancement of financial inclusion level has been a policy challenge for developing countries and MENA countries in particular, where 33% of adults in the MENA region have an account in a formal financial system, compared to 51% worldwide (World Bank, 2011). This proportion has increased in 2017 to 43.5% of adults in the MENA region having a bank account compared to 68.5% globally. This indicates that the MENA region is falling behind from the worldwide improvement in including adults in the financial system. There has been an unresolved theoretical debate about the financial inclusiveness of the Middle East and North Africa (MENA) countries that is attributed to the inadequacy of empirical studies especially in emerging economies because of the scarcity of empirical data. This issue has emerged from the lack of data available relating to financial inclusion as this concept has only been studied recently. There is a severe lack of supporting statistics preceding the year of 2004 due to the recent nature of the concept, and the data involves great gaps in information concerning the MENA countries.

Measurement of financial inclusion of an economy is crucial for governments and policymakers as a first step toward awareness of financial inclusion. However, despite the considerable attention to the importance of financial inclusion worldwide, there is no formal consensus on how to measure it. Therefore, this study contributes to the literature by presenting a new measurement of financial inclusion (FINCI) by attempting to fill this gap through formulating a new and improved Financial Inclusion Index. It utilizes a multidimensional approach that covers new dimensions and new variables, depending on the availability of data and the recommendation of the World Bank Group, in order to better capture the dimensions of financial inclusion ignored in previous studies, which tried to use a single indicator methodology to evaluate a country's financial inclusion level which can be misleading (Sarma, 2015).

This index follows the same approach used by Sarma (2012) and the United Nations Development Program (UNDP) such as the Human Development Index (HDI) and the Gender Development Index (GDI).The new proposed Financial Inclusion Index (FINCI) is then used to measure the financial inclusion degree of each of the 13 selected MENA countries (Algeria, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and United Arab Emirates) for the period 2004-2020. The MENA region is characterized by large differences among its countries regarding economic structures, natural resources, income levels, and labor market dynamic forces. It is worth mentioning that choosing these countries was solely based on their data availability. Finally, the comparative analysis approach encompasses the evolvement of financial inclusion for each country in the time period studied.

This study explores the different financial inclusion indices and utilizes them to develop a new composite one. To the best of my knowledge, this subject has not been studied in any recent panel analysis using the chosen variables in this model. Also, the selection of the countries is based on similar economies in terms of culture, language, politics and geographic locations, the availability of appropriate literature to support the arguments, and data availability. The main research questions of the current paper is to construct a comprehensive financial inclusion index (FINCI) to measure the financial inclusiveness of selected MENA countries, and verify its strength and relevance through the measures used in other studies.

The remainder of the study is laid out as follows: Section 1 presents the literature review. Section 2 provides the research methodology. Section 3 analyzes the empirical results. The last section exhibits the limitations, conclusion and recommendations.

1) Financial Inclusion Overview (worldbank.org) visited on 12/15/2023

II. Literature Review

Measuring financial inclusion depends on the way it is defined, some studies found in literature have attempted to measure financial inclusion by simply measuring the proportion of adults having a bank account, which is considered misleading due to ignoring other aspect such as the availability of bank services, utilization of bank account and the country's financial system openness to international banking system. As mentioned in the introduction, the current study will utilize the definition of the World Bank. Shihadeh (2018) measures financial inclusion in the MENA region using different indicators but not an index. Similarly, Mustafa & Rahman (2015) test the impact of financial inclusion on Gross State Product growth using different indicators. Also, Musembi and Chun (2020) uses mobile money as a proxy for financial inclusion to explore its effect on economic growth in Kenya. Gupte et al. (2012) estimates the financial inclusion index for India for 2008-2009 as a geometric mean of four dimensions: "outreach, usage, ease and cost of transactions from the perspective of banking institutions."

Pearce (2011) highlights the importance of financial inclusion in the MENA region for the competitiveness, employment creation, and for poverty reduction. He recommends prioritizing it as an objective and encourages policy focus for financial regulators across the region, mentioning that some of the MENA countries have made noticeable improvement in financial inclusion while others are still behind. Financial inclusion significantly impact monetary policy through an increase in financial access of firms and consumers. This may also lead to financial stability depending on the quality of enhancements in financial access (Mehrotra and Yetman, 2015). Hence, financial inclusion development is a vital issue which must be investigated and approached by researchers in the coming years and must supported by policymakers, specifically the central banks, through initiatives and economic development. Moreover, the geographical saturation of banks and credit accessibility are crucial strategy goals for financial inclusion development (Chakravarty and Pal, 2013).

Pearce (2011) indicates that the MENA region has registered the second highest increase in ATM networks in 2009 globally. Lebanon, Iran, UAE, and Oman reported the highest levels of branch density per population while Lebanon had the highest density per geographic area. However, unsuitable regulations and insufficient institutional models have hindered financial inclusion enhancement in the MENA region. The Global Findex database reveals the improvement in financial inclusion globally; however, increases have occurred unevenly in different countries. Data reveals that 69% of adults worldwide own a bank account in 2017, which has increased from 62% in 2014 as indicated in Table 1. This shows the improvement in financial inclusion worldwide and in the MENA region over time, represented by the number of adults having a bank account. It also reveals the lack of information regarding the proportion of adults having a bank account in 2014 and the absence of interest in collecting the data from the financial and statistical institutions in the MENA countries during that period.

Many researchers have followed Sarma (2008 and 2012) by using the Index of Financial Inclusion to examine the relationship between financial inclusion and growth or calculating the Index of Financial Inclusion for various countries. Her method was also used by Arora (2010) to measure "Financial Inclusion" emphasizing the role of banking institutions. Moreover, many scholars have built a financial inclusion index to measure the inclusiveness of a country using one of two methods: Principal Component Analysis (PCA) and Sarma (2012). Although many researchers have supported the use of the PCA approach to avoid the subjectivity in assigning weights and ensuring

Table 1. Evolution of banked adults

	Percentages of adults having a bank account		
Year	2011	2014	2017
Worldwide	51%	62%	69%
MENA region	33%	..	44%

Source: World Bank (2017)

multidimensionality, Sarma (2015) criticizes the use of this approach to construct an index for measuring financial inclusion, claiming that such index is not as efficient since "we are concerned about capturing the levels (i.e., the first moments) of the achievements in various dimensions and not in the variance covariance of the dimensions that measures second moments." Moreover, the PCA method may not necessarily fulfill the desired properties of HDI.

Sarma (2012) has developed a multidimensional index based on three dimensions: penetration, availability, and usage. She has calculated the index based on a "distance-based approach" computing an average distance from an ideal and a worst-case outcome. A higher value of the index indicates a higher level of the country's financial inclusiveness system. Park and Mercado (2015) follow Sarma's approach; they aggregate five elements to build the financial inclusion index: number of ATMs, number of commercial bank branches, number of borrowers, number of depositors, and credit as a percentage of GDP.

Sarma (2012) calculates IFI values for the countries under study during the years 2004-2010. Nevertheless, due to the scarcity of data on the different dimensions' determinants of the Financial Inclusion Index, she has not been able to find IFI values for some of the countries in certain years, as shown in Table 2. The computed financial inclusion values vary across years and countries.

Considering the findings in the literature and the inadequacy of studies regarding the measure of financial inclusion in the MENA region, this study proposes an index that develops Sarma's (2012) approach to include the depth dimension to explore the results of each country over the years and compare them across countries.

III. Research Methodology

The design of the new Index of Financial Inclusion follows a similar approach to the one created by Sarma (2012) and the UNDP, such as the HDI and the GDI. To address the first research objective, calculating Financial Inclusion Index (FINCI) values follow two steps:

A. Step 1- Creating Dimension Indices

The proposed FINCI is computed based on assigning a dimensional index for each of the financial inclusion dimensions, $0 \leq FINCI \leq 1$. Thus, a higher value of the index refers to a higher rating for the country's financial inclusiveness system, d_i denotes the dimension index that measures the country's financial inclusion in the i^{th} dimension and is computed using the following formula under the condition that

Table 2. Financial inclusion values by country Sarma (2012) author's work

Financial Inclusion Values for MENA Countries (Sarma, 2012)							
Country/year	2004	2005	2006	2007	2008	2009	2010
Algeria	0.252	0.248	0.261	0.275	0.286	0.305	0.316
Djibouti		0.146	0.147	0.153	0.160	0.245	
Iraq					0.040	0.059	
Jordan		0.397		0.405	0.398	0.403	
Lebanon		0.447	0.452	0.458	0.471	0.483	0.497
Oman						0.373	
Qatar	0.278	0.293	0.302	0.315	0.314	0.332	0.354
Saudi Arabia	0.185	0.202	0.231	0.253	0.279	0.318	
Yemen					0.049	0.056	

$0 \leq d_i \leq w_i$.

$$di = wi\frac{Ai}{Mi} \quad (1)$$

A_i denotes the real value of a dimension i; whereas, w_i denotes the weight of dimension i showing the degree of inclusiveness of the country's financial system, $0 \leq w_i \leq 1$. M_i indicates an upper limit for dimension I, its calculated using the empirically observed 90th percentile of the distribution of dimension i. The maximum value of a variable of a country whose actual value is greater than the upper limit (90th percentile) is set equal to the maximum value of that variable obtained from all the observations of said variable. However, Sarma (2012) choses the maximum value based on literature review where she sets the upper limit using the logical method and 90th percentile combined.

In regards to choosing w_i, all three dimensions of FINCI are of considerable importance for financial inclusion in any economy; thus, each should be given an equal weight of 1. However, there is a severe lack of data on some of the important dimensions, such as the usage of digital financial services which includes mobile money services, payment cards, insurance product and other financial technology. Thus, the dimensions of the usage of financial products and financial depth are quantified only partially. For example, data on debit cards and credit cards, which partially represent the usage of electronic payments is available only for a few countries and a few years; thus, the developed FINCI inevitably excludes the digital services due to insufficient data.

Sarma (2008 and 2012) assigns dimensional weights as follows: 1 for the access dimension, 0.5 for the availability dimension and 0.5 for the usage dimension. Dabbous and Nassereddine (2018) consider all dimensions of financial inclusion to be of equal importance, as modeled by other studies found in literature. This technique is criticized by many researchers including Trabold- Nubler, (1991).

Therefore, taking the above into account in assigning the relative weights for the three dimensions of FINCI, the weights are distributed as follows: 1 for the access dimension, 0.5 for the usage of financial products dimension, and 0.5 for the depth dimension.

B. Step 2- Aggregating Dimensional Indices

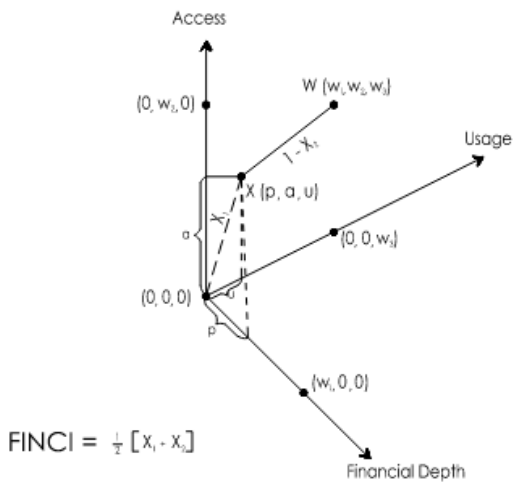
Given that d_i measures the country's financial inclusiveness in dimension i, the country's inclusiveness degree depends on its achievement in all the other n dimensions. Let X represent the country's inclusiveness measure in all dimensions, where X = (d_1, d_2, d_3 ... d_n). In order to calculate FINCI, the first step is to calculate the distance between X and O (X_1), and the inverse distance between X and W (X_2). Then, find the average of X_1 and X_2. O denotes the lowest level of achievement in all dimensions of financial inclusion and W denotes the ideal (highest) achievement in all the dimensions of financial inclusion in each country. Thus, O = (0, 0, 0... 0) and W = (w_1, w_2... w_n).

$$X1 = \frac{\sqrt{d1^2 + d2^2 + .. + dn^2}}{\sqrt{w1^2 + w2^2 + .. + wn^2}} \quad (2)$$

Formula (2) computes a simple average of the Euclidean distance of X from the lowest point O. To allow for X_1 to take the value $0 \leq X_1 \leq 1$, Formula (2) normalizes the distance between the lowest point O and the ideal point W. Thus, the numerator of X_1 in Formula (2) is the Euclidean distance of X from the worst point O, normalized by the denominator. Higher financial inclusion is reflected in a higher value of X_1. To compute the inverse normalized Euclidean distance of X from the highest (ideal) point W, the following formula is developed to make sure that less distance means high Financial Inclusion.

$$X2 = 1 - \frac{\sqrt{(w1-d1)^2 + (w2-d2)^2 + .. + (wn-dn)^2}}{\sqrt{(w1^2 + w2^2 + .. + wn^2)}} \quad (3)$$

X_2 is the inverse normalized distance, $0 \leq X_2 \leq 1$, X_2 is normalized by the distance between the lowest



Source: Sarma (2012).

Figure 1. Graphical explanation of FINCI

point O and the ideal point W. A higher value of this inverse distance indicates higher financial inclusion. Figure 1 illustrates formulating FINCI.

The FINCI is computed using the simple average formula of X_1 and X_2, thus, including both distances from the lowest point and the ideal point.

$$FINCI = \frac{1}{2}\ [X1 + X2] \tag{4}$$

Consequently, for the ideal case w_i =1 for all i, then W= (1, 1, 1... 1) and the formula for the index FINCI becomes:

$$FINCI = \frac{1}{2}\left[\frac{\sqrt{d1^2 + d2^2 + .. + dn^2}}{\sqrt{n}} + \left\{1 - \frac{\sqrt{(1-d1)^2 + (1-d2)^2 + .. + (1-dn)^2}}{\sqrt{n}}\right\}\right] \tag{5}$$

As mentioned earlier, the construction of FINCI in this study is similar to the Sarma's (2012) approach; thus it is a new and improved method modeled by that used by Sarma (2008) and Sarma and Pais (2011). Hence, FINCI follows a similar methodology by taking into consideration the distance from the worst and most ideal situations - a concept ignored by other methodologies of building indices. In addition to the flexibility and simplicity of FINCI as defined above, this approach involves information on several significant dimensions of financial inclusion. Also, it satisfies significant mathematical properties, such as: boundedness (being between 0 and 1), a unit-free measure, a homogeneity of degree 0, and monotony (the higher the values of the index, the higher the level of financial inclusion). Therefore, FINCI is useful for any measurement of financial inclusion, whether micro or macro, and it is comparable across different countries over time. Therefore, the proposed FINCI captures data on several aspects of financial inclusion and ensures that it is a number between 0 and 1, where a higher index value indicates a higher level of financial inclusion, and a lower index value denotes a lesser level of financial inclusion in an economy.

Based on the reviewed literature and following main studies like Beck et al. (2007), Nardo et al. (2005) and Sarma (2012), this study uses a combination of interrelated financial inclusion indicators to form a composite indicator FINCI of three dimensions, using the availability of data classified by the World Bank's Global Financial Development Database and the Financial Access Survey (FAS)[2] database of International Monetary Funds (IMF). However, due to the scarcity of data in the MENA countries, proxies for the chosen dimensions will be required.

The Financial Inclusion Index (FINCI) built for this study is constructed of three dimensions: financial access, the usage of financial products and financial depth. Taking the above limitation into consideration, the current developed index contribution includes the financial depth dimension containing remittance inflows and other crucial depth variables, such as financial system deposits to GDP (%). Receiving remittances requires dealing with the bank, thus having a bank account and being aware of financial services and related banking fees. Said dimension is used with the purpose of covering the gap found

2) The FAS provides data on 65 indicators on access and usage of financial services by households covering 189 countries. The questionnaire includes time series for financial institutions.

in literature which excludes such indicators and other financial technology variables.

Kodan and Kuldip (2013) find that the depth dimension (penetration) is a primary contributor in the value of financial inclusion index, along with two other dimensions: global availability and usage. The process of conducting surveys nationally is time-consuming and requires significant costs. Also, such surveys may lack the consistencies in dates and methodologies used across countries. Therefore, in pursuit of better results, this study will make use of the available data obtained on financial inclusion access to measure the financial sector inclusiveness using the new measure of financial inclusion (FINCI) explored for this study.

The data is collected on various dimensions of financial inclusion through secondary resources for the period 2004-2020, and it is extracted from the World Bank and the International Monetary Fund (IMF) using the Financial Access Survey (FAS) database.

As the reviewed literature reveals the significance of banking institutions for financial inclusion, the current study proposes a new Index of Financial Inclusion (FINCI) that is characterized by several important indicators of financial services. Consequently, it proves to be superior to other indices by giving a time-varying measurement of financial inclusion. Therefore, this study measures financial inclusion by focusing on three main dimensions:

(1) Access (geographic and demographic) of banking institutions also utilized by Beck et al. (2007), Kendall et al. (2010), and Ghosh (2011) includes the indicators: number of bank branches per 1,000 km^2, number of automated teller machines (ATMs) per 1,000 km^2, number of bank branches per 100,000 adults, and number of ATMs per 100,000 adults

Including the number of active mobile money agent outlets is not possible due to insufficient data, as the only information available on mobile banking penetration found is for Jordan, Qatar and Iraq. Same reason for excluding the number of insurance companies.

(2) Usage of financial services, also used by Sarma (2012). Customers in the MENA region tend to avoid payments and transactions through electronic channels, and most prefer to visit brick and mortar branches instead of virtual branches to perform their banking services. Some variables such as the number of loan accounts per 1000 adults with commercial banks and the number of deposit accounts per 1000 adults with commercial banks are excluded from this study due to the insufficient data for various countries in the MENA region during the period studied. Therefore, the variables: outstanding deposit (%) of GDP and outstanding loan (%) of GDP are considered sufficient in representing the usage dimension.

(3) Financial depth, a new dimension includes the indicators: Financial system deposits to GDP (%) is defined as "demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP," Private credit by deposit money banks and other financial institutions to GDP and Remittance inflows to GDP (%). In the case of "Remittance inflows to GDP (%)" no data has been found concerning this variable for the United Arab Emirates. Thus, it is assumed that its values are identical to the respective values of the gulf countries such as Saudi Arabia and Qatar. This measure has been taken to avoid excluding the UAE from the current study due to its crucial role in the MENA region's growth and because it enjoys the same cultural and financial characteristics in regards to remittances as other gulf countries. These countries are oil-producing countries; thus, they attract workers from other regions, making it unlikely that these values would be higher.

IV. Results and Discussion

In this section, the estimated FINCI values are presented and analyzed to validate the strength of the new index and its relevance and answer the second research objective.

The table below (Table 3) presents FINCI's computed values for the respective countries in the period

Table 3. FINCI's estimates; Author's work

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Algeria	0.1	0.09	0.09	0.1	0.1	0.11	0.11	0.1	0.1	0.11	0.13	0.14	0.14	0.15	0.15	0.15	
Djibouti	0.11	0.11	0.11	0.12	0.12	0.14	0.16	0.14	0.14	0.12	0.13	0.13	0.13	0.15	0.15	0.16	0.17
Egypt	0.21	0.22	0.21	0.2	0.19	0.17	0.18	0.17	0.17	0.17	0.18	0.19	0.23	0.25	0.24	0.23	0.25
Jordan				0.38	0.37	0.36	0.36	0.36	0.36	0.37	0.37	0.36	0.4	0.4	0.4	0.39	0.41
Kuwait	0.28	0.29	0.31	0.35	0.36	0.41	0.4	0.38	0.39	0.4	0.43	0.43	0.39	0.42	0.42		
Lebanon	0.54	0.53	0.5	0.51	0.52	0.51	0.53	0.54	0.54	0.53	0.54	0.55	0.52	0.53			
Libya	0.09	0.08	0.09	0.09	0.1	0.12	0.12	0.2	0.13								
Morocco	0.23	0.25	0.27	0.3	0.32	0.35	0.35	0.37	0.38	0.38	0.39	0.4	0.41	0.41	0.41	0.41	0.41
Oman							0.26	0.25	0.25	0.26	0.25	0.29	0.31	0.31	0.29	0.31	0.26
Qatar	0.28	0.31	0.31	0.32	0.32	0.37	0.38	0.35	0.39	0.35	0.38	0.36	0.39	0.41	0.38	0.4	0.46
Saudi Arabia	0.17	0.17	0.18	0.2	0.21	0.24	0.23	0.2	0.2	0.21	0.23	0.26	0.27	0.26			
Tunisia	0.22	0.22	0.23	0.24	0.25	0.27	0.29	0.3	0.31	0.32	0.33	0.33	0.34	0.34	0.33	0.33	0.36
UAE	0.22	0.28	0.28	0.31	0.34	0.42	0.4	0.39	0.39	0.38	0.4	0.4	0.41	0.4	0.39	0.38	0.37

2004-2020. The different values of the financial inclusion indices among the 13 MENA countries included in the sample reflect the inclusiveness degree of each country. Lower values correspond to less financial inclusion whereas higher values correspond to more financial inclusion. The table also depicts the variation of the financial inclusion over the years among each country, which contributes to the comparative analysis.

Table 3 shows that the level of financial inclusion varies from the lowest value (0.076) for Libya in 2005 to the highest value (0.547) for Lebanon in 2015. Moreover, in 2020, among the 13 countries for which FINCI was calculated, the highest level of financial inclusion calculated was Qatar's, with a value of 0.46, followed by Jordan's and Morocco's (0.41 each) while Djibouti attained the lowest rank with a value of 0.17. The values presented in this table reveal that Algeria, Djibouti, and Libya stand way below the other countries in terms of financial inclusiveness. However, Morocco, the United Arab Emirates (UAE), Tunisia, and Qatar have made remarkable improvement in financial inclusion, as their inclusiveness have increased from 0.23, 0.22, 0.22, and 0.28 to 0.41, 0.37, 0.36, and 0.46 respectively over the years studied. Such improvement is clearly revealed in the Figure below (Figure 2).

Using Sarma's (2012) methodology to develop the new composite index FINCI while also exploring depth as a new sub-dimension has revealed important results compared to the other indices found in literature. Including the depth dimension measured by the variables: "private credit by deposit money banks and other financial institutions to GDP (%), financial system deposits to GDP (%), and remittance inflows to GDP (%)" has provided values which show that these indicators have a significant effect on the results. For instance, Table 4 compares the financial inclusion values calculated in this study and those computed by Sarma (2012) for the year 2009. It is important to reiterate that Sarma uses three dimensions to measure financial inclusion: banking penetration, availability of financial services, and usage for the period 2004-2010. Similar results are revealed in Figure 3.

The differences in the financial inclusion values are referred to the dimension chosen and their corresponding indicators. Adding the depth dimension with its chosen variables to measure FINCI reveals its significant impact on the inclusiveness value of each country which must not be ignored. For instance, Lebanon enjoys a higher FINCI value than Sarma's (2012) IFI value. This can be explained by the high remittance inflows and exceptional levels in the access dimension. Qatar shows a high level in the access dimension and a low level in the depth dimension.

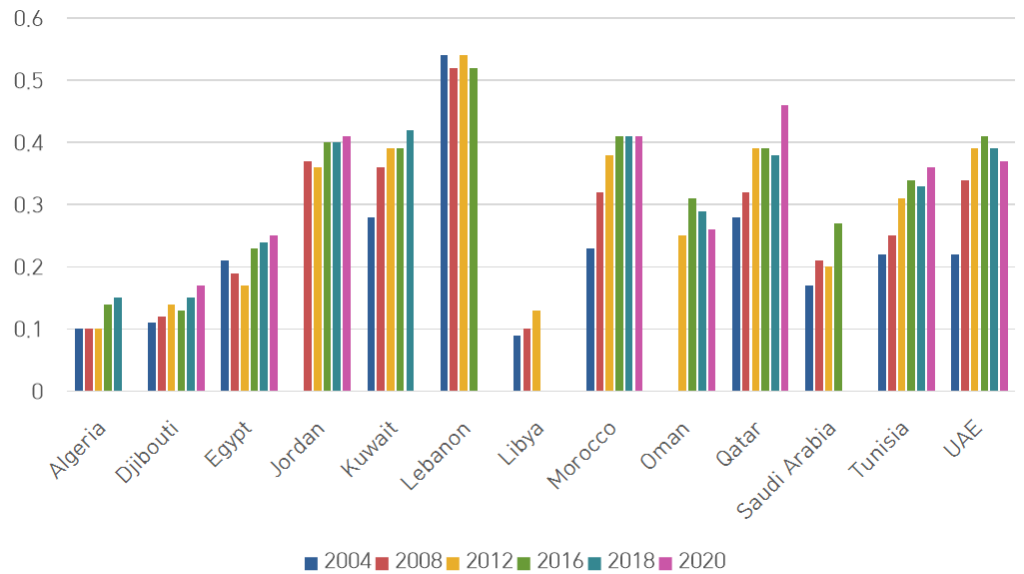


Figure 2. FINCI values evolution over the years

Table 4. Comparative table: FINCI and Sarma (2012) IFI 2009 values

	Algeria	Djibouti	Egypt	Jordan	Kuwait	Lebanon	Libya	Morocco	Oman	Qatar	Saudi Arabia	Tunisia	UAE
FINCI	0.11	0.14	0.17	0.36	0.41	0.51	0.12	0.35		0.37	0.24	0.27	0.42
Sarma (2012)	0.30	0.24		0.4		0.48			0.37	0.33	0.32		

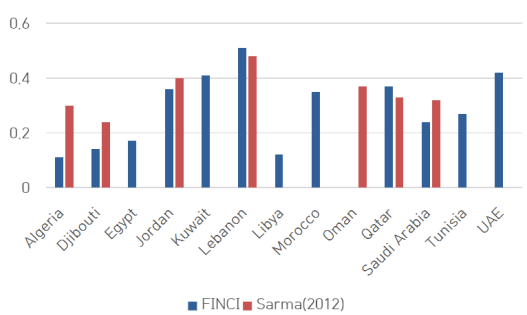


Figure 3. Comparison between FINCI values and Sarma (2012) values for the year 2009

Similarly, Saudi Arabia is shown to have a medium level in the access dimension and a low level in the depth dimension. These countries attract workers and do not receive a significantly high volume of remittances. Therefore, choosing the right dimensions/ variables is crucial for measuring financial inclusion for countries.

Table 5. Estimation of financial inclusion index calculated using PCA method

Country	2012	2014	2016	2018
Mauritius	0.9727	0.9879	0.9545	0.8605
Malaysia	0.941	0.953	0.9198	0.9056
Pakistan	0.4327	0.4248	0.4145	0.4069
India	0.7099	0.7556	0.767	0.7307
Afghanistan	0.3443	0.3451	0.3523	0.3492
Indonesia	0.5636	0.6035	0.6132	0.5766

Source: Nguyen (2012).

By using the two-stage PCA method, Nguyen (2012) measured the financial inclusion level of 41 developing countries including three dimensions (penetration, availability and usage). Although claimed to be superior to Sarma's method, the values calculated reveals the opposite. For instance, examining some values (Table 5) for some countries shows that these values are close to 1, which is the highest value a country can

achieve. Resulting in questioning the method and the dimensions Nguyen considered in his study. At the same time, it is considered a proof of the superiority of the current technique and dimensions considered in this research.

The below table (Table 6) is a summary of descriptive statistics for the three dimensions and FINCI (2004-2020). In taking all three dimensions into account in calculating the index value for a country in a certain year, only 195 observations are used to estimate FINCI due to inadequate data on a few indicators for some countries in some years constituting each dimension.

In regard to comparing FINCI values with the classification of each country by the income level set by the World Bank, the below table (Table 7) exhibits this comparison using FINCI values for the years 2019 and 2020. It also categorizes each country according to its FINCI level as classified by Sarma (2012). She categorizes countries into three levels according to their financial inclusion values - low for values less than 0.3, medium for values between 0.3 and 0.6, and high for values above 0.6.

Table 7 reveals that none of the studied countries exhibit a high level of financial inclusion, including high-income countries such as Qatar and UAE. Although Oman is classified as a high income country, it has a low financial inclusion level. For the Lower-Middle-income group, FINCI values are low for Algeria, Djibouti, and Egypt over the course of the

Table 6. Summary of descriptive statistics, 2004-2020; Author's estimate

	#of Observations	Mean	Standard Deviation	Minimum	Maximum
Access d1	203	0.39	0.23	0.03	0.877
Usage d2	218	0.27	0.10	0.06	0.488
Depth d3	213	0.21	0.097	0.0007	0.429
FINCI	195	0.289	0.122	0.076	0.547

Table 7. World Bank 2020 and Sarma (2012) country classification; Author's work

Country	Income level[3]	FINCI Category[4]	FINCI 2019	FINCI 2020
Algeria	Lower-Middle-income	Low	0.15	
Djibouti	Lower-Middle-income	Low	0.16	0.17
Egypt	Lower-Middle-income	Low	0.23	0.25
Morocco	Lower-Middle-income	Medium	0.41	0.43
Tunisia	Lower-Middle-income	Medium	0.35	0.38
Jordan	Lower-Middle-income	Medium	0.39	0.41
Lebanon	Lower-Middle-income	NA[5]		
Libya	Upper-Middle-income	NA		
Kuwait	High-income	NA		
Oman	High-income	Low	0.31	0.26
Qatar	High-income	Medium	0.52	0.61
Saudi Arabia	High-income	NA		
United Arab Emirates	High-income	Medium	0.45	0.44

3) World Bank classification 2020. New World Bank country classifications by income level: 2020-2021
4) According to Sarma (2012) classification.
5) NA means Not Applicable

studied data. Morocco and Tunisia also belong to this group, yet they have made remarkable improvement throughout the years 2004-2020. As shown in Table 3, the FINCI values for these two countries have increased consistently from 0.23 and 0.22 in 2004 to reach 0.41 and 0.36 in 2020 respectively. Investigating Morocco's case, the improvement is mainly noticed in the access dimension. Similarly, Tunisia's achievement in the access dimension is behind progressing in FINCIs values over the years.

Jordan and Lebanon have been moved from the Upper-Middle-income group to the Lower-Middle-income group in 2020 by the World Bank. However, Jordan's FINCI values are steady over the years of this study, showing no improvement or deterioration in financial inclusion. As for Lebanon, during the years of study, it enjoyed high FINCI values, but the lack of data for the last 3 years 2018-2020 do not contribute to the examination of the country's achievement in these years due to the banking/economic crisis it has been suffering from.

As for the Upper-Middle-income group, figures on important indicators required to measure Libya's financial inclusiveness have not been reported since 2013, and FINCI values computed for the years 2004-2012 range from 0.09 to 0.13 respectively (Table 3). This is due to the collapsed Libyan economy since 2011 due to the war which has dramatically affected its oil production and its economy.

Regarding the High-income group, Qatar, Kuwait and the United Arab Emirates show that FINCIs values reveal significant improvement over the years of this study. For instance, these values have increased from 0.28 and 0.22 in 2004 to 0.46 and 0.37 in 2020 for Qatar and the United Arab Emirates respectively (Table 3). The high values reflect the countries' high income status. However, Oman and Saudi Arabia exhibit exceptional behavior, as their FINCI values remain steady over the years with miniscule improvement in Saudi Arabia's financial inclusiveness values.

For simplicity reasons and to shorten the discussion, Table 8 shown below reveals the descriptive statistics for FINCI for all countries in the years 2004, 2009, and 2015-2020.

The values in Table 8 reveal consistent enhancement in the financial inclusion level from 2004 to 2020, although slow when referring to High-income countries. The average FINCI exhibits an improvement from 0.22 in 2004 to 0.32 in 2015 and 0.34 in 2020 compared to 0.373 in 2004 to 0.478 in 2010 for the average financial inclusion index calculated by Sarma (2012) on countries around the world. The proportion of low FINCI countries decreases from 90.9% in 2004 to 37.5% in 2020. The remarkable decline in the coefficient of variation (CV) from 0.54 in 2004 to 0.34 in 2020 indicates convergence in FINCI values.

Table 8. Descriptive statistic for FINCI for all countries by years. Author's estimates.

	2004	2009	2015	2016	2017	2018	2019	2020
Minimum	0.09	0.08	0.13	0.13	0.15	0.15	0.15	0.17
Maximum	0.54	0.53	0.55	0.52	0.53	0.42	0.41	0.46
Mean	0.22	0.23	0.32	0.33	0.34	0.32	0.31	0.34
Standard Deviation	0.12	0.13	0.12	0.12	0.11	0.10	0.10	0.10
CV(SD/Mean)	0.54	0.55	0.39	0.36	0.34	0.33	0.33	0.34
#of countries	11	11	12	12	12	10	9	8
High FINCI countries	0	0	0	0	0	0	0	0
Medium FINCI countries	1	1	7	8	8	6	6	5
Low FINCI countries	10	10	5	4	4	4	3	3
Proportion of low FINCI countries (%)	90.9	90.9	41.7	33.3	33.3	67	33.3	37.5

V. Limitations of the Study

There are some limitations in the current research. The insufficiency of data for some financial indicators have made it inevitable for them to be excluded from the study. Such indicators are the number of debit cards and credit cards, the number of insurance policies, the number and value of mobile banking transactions, and so on. Such data is considered crucial for future studies on financial inclusion indices. Same limitation is encountered by Jehangir et al (2020) when considering the variables that impact economic growth. Another limitation is the exclusion of some countries in the MENA region from this research due to the lack of data, as some countries do not report the needed information for some of the variables included in constructing and measuring the FINCI index.

It is noted from the computed FINCI values that there are omitted values for some countries due to the missing data on some indicators on those countries. Thus, FINCI estimates for some countries such as Lebanon and Libya are unable to be measured for the last few years of the study for the same reason. This is unfortunate as these estimates could have been of valuable evidence for countries experiencing financial and economic crises. Sarma (2012) and Amidic et al. (2014) have also faced similar limitations when collecting the data required for the indicators included in their financial inclusion indices.

VI. Conclusion and Recommendation

There has been an unresolved debate surrounding the measurement of financial inclusion. The financial inclusion indices found in the reviewed literature have not yet captured the full variations which lead to different results across countries. The new proposed index, FINCI, developed for this study is modeled by Sarma's (2012) approach and other indices such as HDI. FINCI has been found to be useful in exploring the financial inclusion evolvement of each country over the years. It is also beneficial due to its comparability across countries. For instance, FINCI values are computed annually for each country and indicate that countries of the MENA region are at different levels of financial inclusiveness. Moreover, when compared with other studies, the developed FINCI shows that it not only corroborates with them, but is also superior to other studies using the PCA method like Nguyen (2012). Nevertheless, FINCI measures for the studied countries indicate remarkable improvement over the years 2004- 2020 in the level of financial inclusion.

According to Table 8, the average FINCI exhibits an improvement from 0.22 in 2004 to 0.32 in 2015 and 0.34 in 2020. As is the case with Sarma (2012), these results reveal that financial inclusion is affected by the income level of each country with some exceptions, where Lower-Middle-income countries have low and medium FINCI values while High-income countries dominate the highest FINCI levels although they fall short of the value (0.60) set by Sarma (2012) with some exceptions, as discussed in the study. This could be due to a religion factor, as is the case with Saudi Arabia where a large proportion of the country's population consists of practicing Muslims who choose to be financially excluded to conform to Islamic religious rules "Shari'a".

Furthermore, digital transformation in financial services has led to considerable transformations in conventional banking, as people nowadays shift towards mobile and online banking. As noted earlier, digital banking must be included in measuring financial inclusion when such data is made available, allowing appropriate measures and weights to be considered when structuring the FINCI. Despite the above limitations, this study has crucial implications on constructing a composite index for measuring the degree of financial inclusion and for policy-making to monitor the progress of financial inclusion initiatives and look forward to these findings to keep a sustainable inclusive financial system in developed economies, the data provide useful insights for designing and

prioritizing government reforms. Also, it can be used by academics to study the relationship between financial inclusion and other variables such as income, inequality and so on (Sarma, 2015). It is worth mentioning that good FINCI scores would attract investors and business, therefore benefitting the local community

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