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# A comparative study on the financial inclusion status of G20 countries

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**Abstract**

The G20 forum serves as a platform for the convergence of the world's most significant and systemically crucial economies. However, recent occurrences have given rise to a state of economic upheaval on a global scale. It's essential for determining where each country stands economically. Gaining access to economic growth can be facilitated by expanding financial inclusion. This paper aims to fill this gap by thoroughly analysing financial inclusion in the G20 nations. This study creates a financial inclusion index based on three dimensions: banking penetration, disbursement, and services. And distributed countries as per their index score in three levels: high, middle, and low, where 1 indicates complete inclusion and 0 indicates no inclusion. The research reveals that among the 20 countries analysed, 11 exhibited significant advancements in financial inclusion, while six were categorised as moderately progressing, and three were classified as having low levels of progress. Japan obtained a comparatively elevated score on the index, whereas Mexico registered the least score. The present research aims to assist policymakers and regulators in developing a structural framework for countries with low levels of inclusion. The findings indicate that enhancing the accessibility and adoption of official financial services among underprivileged segments of the population could be advantageous in maximizing the overall welfare of society.

Keywords: financial inclusion, financial inclusion index (FII), inverse Euclidean distance, banking, G20.

## 1. Introduction

The economic development of a nation is contingent upon the expansion of the contributions made by its citizens. This means access to financial services is an essential component of an advanced economy. To attain this economy, the government must provide access to previously excluded citizens. The disparity in financial literacy between individuals is an impediment to the expansion of the economy. In contrast, financial inclusion plays a critical role in promoting economic development and financial knowledge that could minimize the gap and create a healthy financial ecosystem.

The G20 consists of 19 member states and the European Union, which together represent the world's leading industrialized and rising economies. The combined GDP, trade, and population of the G20 countries account for 85% of the worldwide GDP and around 65% of the global population (OECD, n.d.). However, in 2020, the global economy took a major hit by the pandemic. The estimate shows a major decline in the global economy due to restrictions and lockdown (International Monetary Fund, 2020a; International Monetary Fund, 2020b; McKibbin and Vines, 2020; Taylan et al., 2022). The ongoing conflict between Russia and Ukraine has resulted in the imposition of economic sanctions by certain G20 nations against Russia, thereby impacting trade and investment activities. Given Russia's role as a major energy exporter, the conflict has also impacted the price of oil and gas around the world, which could have wider repercussions for the global economy (Maurya et al., 2023). So, it is important to know the financial inclusion position of the G 20 nations after this economic event.

The present study aims to examine the existing state of financial inclusion within the G20 countries, encompassing accomplishments, challenges, and efficacious approaches for enhancing the availability of financial services. In this paper, researchers look at how bank availability, banking service, and consumer banking habits play into the bigger picture of financial inclusion.

This study suggests a three-dimensional financial inclusion index (FII) across 19 countries and EU. Using these three variables, the research establishes where a country stands on the Financial Inclusion Index. The majority of states fall into the "high" or "middle" inclusion categories, while only a handful fall into the "low" category. Those in the middle and lower socioeconomic brackets need a structural policy framework to improve their situation.

This paper is structured as follows. Section 2 presents a comprehensive review of the literature, highlighting previous research on financial inclusion indices and global trends. Section 3 describes the methodology employed in constructing the Financial Inclusion Index (FII) for G20 nations. Section 4 discusses the empirical results and findings, while Section 5 provides the conclusions, policy implications, and directions for future research.

## 2. Review of literature

### *2.1 Concept of financial inclusion*

Numerous researches have been done on the building of FII all around the world. The study different from each other on the basis of parameter, time and the region. The concept of financial inclusion explained in a diverse way. As per world bank financial inclusion has been defined as the proportion of households and businesses that utilise financial services (World Bank, 2014). A study refers financial inclusion as an economic condition in which individuals are not excluded from accessing essential financial services, solely on the basis of factors other than efficiency criteria (Amidžić et al., 2014). Financial inclusion refers to the utilisation of formal financial services across diverse demographics, enhancing the well-being of numerous individuals (Demirgüç-Kunt and Klapper, 2013). Financial inclusion refers to providing financial services to underprivileged segments of society at affordable costs, aiming to facilitate their access and usage (Sahay et al., 2015). Sarma's (2008; 2012) study explained financial inclusion, which includes nearly every member of an economy's access, availability, and use of the institutional financial system.

### *2.2 Studies related to global aspects using financial inclusion index*

Honohan (2005) conducted a significant cross-country study that examines the difficulties and possibilities of measuring access to microfinance by utilizing available cross-country data. The research additionally suggested a composite index predicated on diverse facets of microfinance accessibility, encompassing microfinance facilities' presence, cost-effectiveness, and quality (Honohan, 2005).

Sarma (2008) conducted a study wherein a Financial Inclusion Index (FII) was constructed utilizing data from various countries, employing a framework provided by the United Nations Development Programme (UNDP). A

research investigation was conducted using a three-dimensional model for 55 countries and a two-dimensional model for 100 nations. To conclude, Spain received a higher score compared to the other options (Sarma, 2008).

The financial inclusion index proposed by Honohan and Beck (2007) is predicated on the accessibility and utilization of financial services. The index utilizes information sourced from the Global Financial Inclusion (Global Findex) database of the World Bank, encompassing a total of 143 nations. The authors' study demonstrated notable disparities in the extent of financial inclusion among countries, with low-income nations displaying relatively inferior levels of financial inclusion in comparison to high-income nations Honohan and Beck (2007).

A study conducted by Yorulmaz (2013) same as Sarma (2008), he is also employed three dimensions of financial inclusion in Turkey. The study's principal discoveries indicate that Istanbul exhibited the most elevated FII value, whereas Mid-East Anatolia displayed the lowest FII value. Ankara and Izmir exhibited the highest FII values among the cities, while Muş demonstrated the lowest Yorulmaz (2013).

The research carried out by Omar and Inba investigates the impact of financial inclusion upon mitigating poverty and inequality in income. The researchers utilized panel data to analyze 116 developing nations from 2004 to 2016. Using a broad collection of financial sector outreach measures, they found that per capita income, internet users, age dependence ratio, inflation, and inequality in income strongly impact financial inclusion in emerging nations. In order to maximize society's well-being, marginalized groups should have greater access to and use of formal financial services (Omar and Inaba, 2020).

Vo et al. (2021) investigate the relationship between the financial inclusion index and market stability from 2008 to 2017 in the Asian region. The authors have used the generalized method of moments (GMM) approach. In the analysis, the researchers utilized a generalized method of moments (GMM) to achieve their findings. The findings indicate that enhancing access to banking facilities through financial inclusion has a positive and significant impact on the stability of the banking sector, ultimately fostering greater resilience among banks.

Another study creates an Index focus on the payment data from 2014 to 2017 covering 52 developing countries (Khera et al., 2022). Authors have combined the data with the old traditional index related data. Two significant findings emerge: firstly, the adoption of fintech has played a crucial role in advancing financial inclusion. Secondly, significant disparities exist among countries and regions, with the most notable advancements observed in Africa and the Asia-Pacific areas (Khera et al., 2022).

In a study Ben Khelifa et al. (2024), authors create a multi-dimensional index using principal component analysis (PCA) for the Union for the Mediterranean (UfM) from 2010–2018. They also explore the factors that influence the financial inclusion in these countries. While the complete sample of countries analyzed exhibited a declining tendency in the financial inclusion index throughout the time period under consideration, it seems that countries with high or medium incomes did not experience the same pattern when the sample was divided by income bracket (Ben Khelifa et al., 2024).

Khan et al. (2024) examine the impact of financial inclusion on green innovation in Malaysia. The study builds the index based on three parameters: usage, accessibility, and availability. They discovered that each quantile is positively impacted.

Between 2014 and 2020, one study looks at Sub-Saharan Africa (SSA) to see how institutions and governance impacted the link between digital financial inclusion and economic growth. The results indicate that the relationship between digital financial inclusion and economic growth in sub-Saharan Africa is positively impacted by well-governed institutions. The authors also show that inflation dampens economic growth in the area, whereas trade and population expansion have a strongly positive impact on economic growth (Chinoda and Kapingura, 2024).

Examine how digital financial inclusion (DFI) affects household consumption using 2017 and 2019 data from the China Household Finance Survey (CHFS). To examine the impact of DFI on micro and provincial household consumption, the study utilizes the digital financial inclusion index that was developed by Peking University.

Results show that DFI greatly increases household consumption; however, the extent to which this occurs varies by location and by consumption level. The research shows that rural and eastern regions are the ones where DFI has a greater effect on consumption (Jiang et al., 2024).

One research project seeks to answer these questions by exploring the link between environmental sustainability in Pakistan and digital finance, financial inclusion, renewable energy, and institutional quality. The number of automated teller machines (ATMs) is used to measure digital finance, whereas five proxies are used to measure financial inclusion using principal component analysis (PCA). This research looks at the effects of institutional quality and digital finance as an interaction term (DF*INSQ) to see how it affects environmental sustainability. Pakistan and other developing nations can achieve environmental sustainability through digital finance and financial inclusion, according to the research (Ansari et al., 2024).

Within the framework of developing digital financial inclusion (DFI), Bai et al. (2024) investigate how supply chain finance (SCF) impacts firm innovation. According to the results of the fixed effects model that was based on the Shenzhen Stock Exchange sample of A-share listed enterprises from 2011 to 2021, SCF considerably boosts company innovation. The association between SCF and enterprise innovation is positively moderated by the DFI development.

Researchers examined the link among digital transformation and credit risk, and the potential interactive impact of financial inclusion. The study utilized the Generalized Method of Moments (GMM) and data from 116 Chinese banks spanning 2014 to 2021 to examine the issue. The findings indicated that digital transformation markedly and dynamically mitigates bank credit risks, with inclusive finance serving an interactive function (Yang and Masron, 2024).

For emerging countries, Mir et al. (2024) examine the dynamic long-term link between financial inclusion and economic growth. As a methodology, they used the CS-ARDL (cross-sectional augmented autoregressive distributed lags) approach. In certain developing nations, the calculations show that financial inclusion boosts GDP per capita.

A separate study investigates the impact of digital financial inclusion (DFI) on corporate environmental, social, and governance (ESG) greenwashing practices. The results demonstrated that local DFI restricts enterprises' greenwashing practices. These conclusions were substantiated through rigorous research employing a multidimensional fixed-effects model, different metrics, and an instrumental variable methodology (Li et al., 2024).

### *2.3 Objective of the study*

The G-20 countries represent a significant portion of the world's economy, accounting for 85% of the global Gross Domestic Product (GDP) and 75% of international trade. However, recent international events have had an effect on the economies of the participating countries. The degree of financial inclusion can serve as a metric for assessing the impact on the economy. In light of the aforementioned circumstances, the objective of this research is to establish a comprehensive database of G-20 member states based on their financial inclusion index.

## 3. Methodology

The measurement of the depth of the financial system can be achieved by taking into account several dimensions. Furthermore, these dimensions are segmented into diverse indicators that will be employed to formulate the financial inclusion index. The methodology employed by the researchers is analogous to the methodology utilised by the UNDP for computing the development index.

The Financial Inclusion Index (FII) is a metric that ranges from 0 to 1, where 0 represents the most restricted level of financial inclusion or complete financial exclusion, and 1 represents the maximum level of financial inclusion. The present investigation involves the computation of FII subsequent to the calculation of each

dimension utilising the prescribed formula (1). To determine inclusiveness of the system, a weight ($W_i$, where $0 \leq W_i \leq 1$) attached with the $D_i$.

$$D_i = W_i * \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

Where:

- $D_i$ - Dimension index for the *ith* dimension,
- $W_i$ - Weights for the *ith* dimension. $0 \leq W_i \leq 1$,
- $A_i$ - Actual value for the *ith* dimension,
- $M_i$ - Maximum value for the ith dimension and
- $m_i$ - Minimum value for the *ith* dimension.

The first formula (1) denotes that the value of $D_i$ falls within the range of 0 to $W_i$, the higher value of $D_i$ indicating a greater degree of inclusion in the *ith* dimension. In the context of *n*-dimensional Cartesian space, each dimension can be defined as - $D_i = (d_1, d_2, d_3, \ldots, d_n)$, where the point $O = (0, 0, 0, \ldots, 0)$ represents total exclusion and at the point $W = (W_1, W_2, W_3, \ldots, W_n)$ represents ideal situation. This point will give a result high or low the financial inclusion of a country. A good financial inclusion can be achieving index is close to *W* and away from *O*.

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2 + \cdots + d_n^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + \cdots + w_n^2}} \quad (2)$$

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2 + \cdots + (w_n - d_n)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2 + \cdots + w_n^2}} \quad (3)$$

$$FII = \frac{1}{2}(X_1 + X_2) \quad (4)$$

Formula (2) involves the computation of the distance between $D_i$ and *O* by utilizing the normalized Euclidian distance denoted as $X_1$ (Figure 1). On the other hand, formula (3) as $X_2$ entails the calculation of the distance between $D_i$ and *W* by applying the normalized inverse Euclidian distance (Figure 1). In formula (4) researchers use simple average of $X_1$ and $X_2$ to determine FII. Figure 2 shows the flowchart illustrating the methodology for constructing the Financial Inclusion Index.

Nations are divided into three categories based on their FII value, i.e.

1. $0.6 < FII \leq 1$, High financial inclusion;
2. $0.4 < FII \leq 0.6$, Medium financial inclusion
3. $0 < FII \leq 0.4$, Low financial inclusion.

*Source of the data***.** The entirety of the information has been sourced from secondary sources. The researchers collected data from the Financial Access Survey of the International Monetary Fund and the database of the World Bank (International Monetary Fund, 2022; Demirgüç-Kunt et al., 2021).

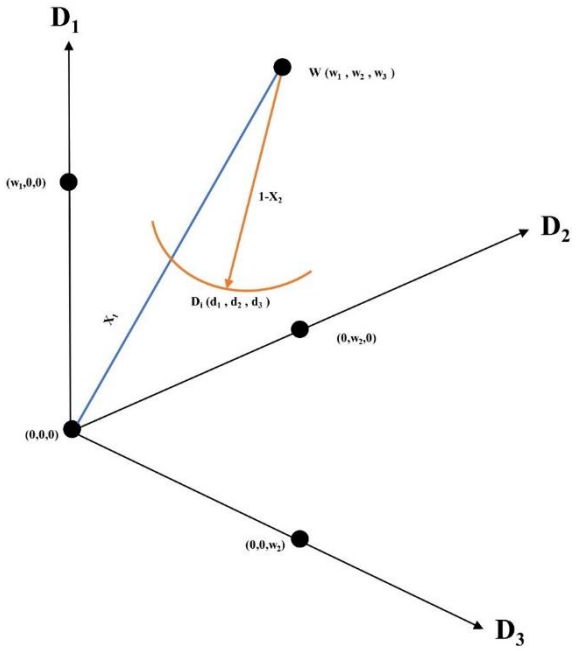


Figure 1. Graphical representation of FII

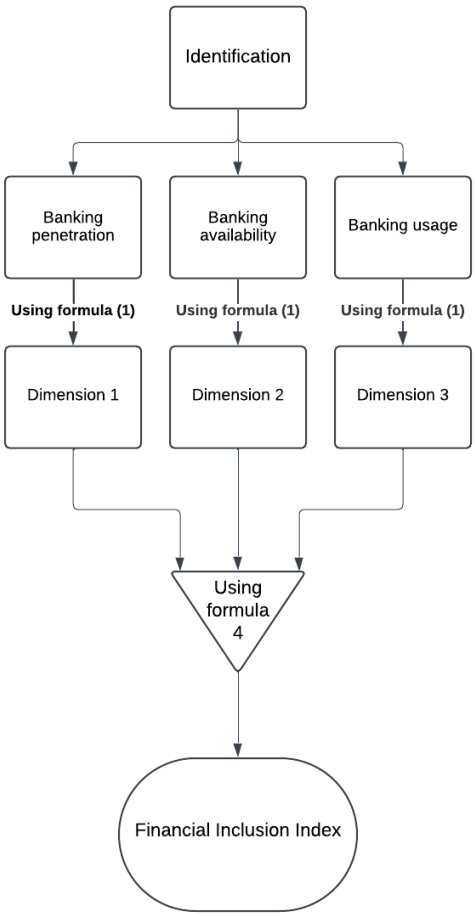


Figure 2. Flowchart illustrating the methodology for constructing the Financial Inclusion Index

## 4. Construction of financial inclusion index

The financial inclusion index for G-20 member countries was constructed by researchers after utilises databases from the International Monetary Fund (2022) and the World Bank (Demirgüç-Kunt et al., 2021). Researchers used three-dimensional model, Banking penetration, Banking availability and Banking usage.

### *4.1 Dimension 1: Banking penetration*

An all-encompassing financial system ought to have extensive reach among its users. The metric of banking penetration within a system can be determined by the percentage of individuals who possess a bank account, also referred to as the "banked" population (Demirguc-Kunt et al., 2007; Cámara and Tuesta, 2015; Park and Mercado, 2015). In this study researcher used 'Account ownership at a financial institution' as a Banking penetration dimension. Upon conducting a thorough analysis of existing literature, researchers have come to the realisation that the level of banking penetration plays a pivotal role in determining the degree of financial inclusion. As a result, researchers have assigned a value of 1 to this particular dimension (Omar and Inaba, 2020; Sarma, 2015).

### *4.2 Dimension 2: Banking service availability*

The accessibility of banking services is a significant aspect in comprehending financial inclusion. The accessibility of banking services across the nation ought to be facilitated by an equitable and reliable system. The number of bank branches per 100,000 people can be used to estimate the amount of service accessibility (Cámara and Tuesta, 2015; Park and Mercado, 2015; Rojas-Suarez and Amado, 2014). Researchers use the 'Number of commercial bank branches per 100,000 adults' as a banking service. Researchers assigned a lesser weight of 0.60 to this particular dimension (Omar and Inaba, 2020).

### *4.3 Dimension 3: Banking usage*

The implementation of an all-encompassing banking system can manifest in various ways, such as credit, deposit, payments, remittances, and transfers. But there is a lack of cross-country comparable data pertaining to payments, remittances, and transfers. Hence, researchers used deposits with commercial banks (% GDP) as the banking usage (Sarma, 2008). Because of difficulty of the indicators, researchers used a lesser weight of 0.5 in the dimension 3.

## 5. Empirical Results and Discussion:

The present chapter presents findings and analysis across various dimensions. The researcher adheres to a methodology aimed at comprehending the outcome, which involves initially identifying the factors that exert an influence on financial inclusion. The second step involves the computation of each dimension (Table 1), followed by the third step of analysing the FII over the study period.

Table 1. Calculation of dimensions

| Country | $D_1$ | $D_2$ | $D_3$ |
|---|---|---|---|
| Argentina | 0.549206 | 0.126689 | 0 |
| Australia | 0.988889 | 0.369435 | 0.244144 |
| Brazil | 0.746032 | 0.215947 | 0.067158 |
| Canada | 0.993651 | 0.294795 | 0.271518 |
| China | 0.820635 | 0.030786 | 0.436558 |
| France | 0.987302 | 0.573422 | 0.092209 |
| Germany* | 1 | 0.044297 | 0.038722 |
| India | 0.642857 | 0.159468 | 0.149081 |

| | | | |
|---|---|---|---|
| Indonesia | 0.234921 | 0.186489 | 0.076183 |
| Italy | 0.957143 | 0.6 | 0.193576 |
| Japan | 0.97619 | 0.587154 | 0.5 |
| Mexico | 0 | 0.101883 | 0.018083 |
| Russia** | 0.836508 | 0.381174 | 0.097485 |
| Saudi Arabia | 0.592063 | 0 | 0.128111 |
| South Africa | 0.768254 | 0.013068 | 0.081956 |
| South Korea | 0.979365 | 0.13887 | 0.230175 |
| Turkey | 0.588889 | 0.168992 | 0.135576 |
| United Kingdom | 0.996825 | 0.178959 | 0.415821 |
| United States | 0.920635 | 0.462458 | 0.18266 |
| EU*** | 0.696667 | 0.045183 | 0.222709 |

*Germany- Banking services data ($D_2$) is not available for the year 2021. So, researchers consider the year 2020.

**Russia- Banking service ($D_2$) and deposits with commercial banks ($D_3$) related data are not available for 2021. So, researchers consider year 2020.

***EU- For European Union, researchers comprise all the 27 member state's data for these three dimensions.

The aforementioned table provides a comprehensive overview of the dimensions of all G20 nations. $D_1$, $D_2$ and $D_3$ are calculated using formula (1). In terms of banking penetration, Germany, the United Kingdom, Canada, and Australia perform well. In banking services, Italy, Japan, and France rank highest, while Saudi Arabia ranks lowest. In dimension 3, Japan ranked first while Argentina ranked last. Figure 3 shows all the dimensions.

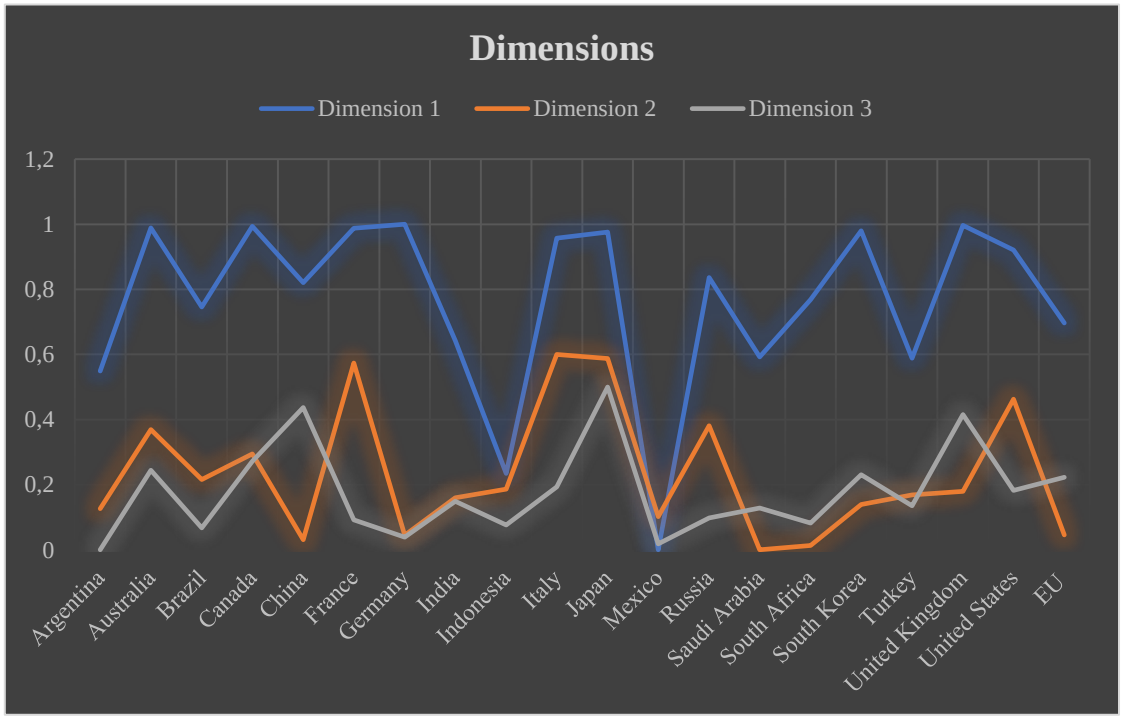


Figure 3. Graphical representation of dimensions

*Findings.* Table 2 presents a comparative analysis of financial inclusion data across G20 countries. The findings indicate that 11 countries exhibit high levels of financial inclusion, while 6 countries fall within the middle range, and 3 countries demonstrate low levels of financial inclusion. According to research findings, Japan exhibits the highest level of financial inclusion with a score of 0.979569524, while Mexico has the lowest level of financial inclusion with a score of 0.061327001.

Table 2. Financial Inclusion Index

| Country | FII | Rank | Range | Category |
|---|---|---|---|---|
| Japan | 0.979569524 | 1 | | |
| Italy | 0.82971192 | 2 | | |
| Australia | 0.791172332 | 3 | | |
| France | 0.790263892 | 4 | | |
| United States | 0.772478729 | 5 | | |
| Canada | 0.771947878 | 6 | 06 < FII ≤1 | HFI |
| United Kingdom | 0.762211356 | 7 | | |
| South Korea | 0.689508664 | 8 | | |
| Russia | 0.672582499 | 9 | | |
| China | 0.629987666 | 10 | | |
| Germany | 0.610147049 | 11 | | |
| Brazil | 0.558168304 | 12 | | |
| European Union | 0.516684658 | 13 | | |
| South Africa | 0.506220061 | 14 | 0.4 < FII ≤ 0.6 | MFI |
| India | 0.504730859 | 15 | | |
| Turkey | 0.472103273 | 16 | | |
| Saudi Arabia | 0.417431795 | 17 | | |
| Argentina | 0.397815207 | 18 | | |
| Indonesia | 0.24071864 | 19 | 0 ≤ FII ≤ 0.4 | LFI |
| Mexico | 0.061327001 | 20 | | |

## 6. Conclusion

Financial inclusion pertains to the expansion of access to traditional financial services for individuals who were previously excluded. The encouragement of financial inclusion is a crucial component in building inclusive economic development within a nation. The integration of all indicators is necessary for the attainment of success in the context of financial inclusion. The Financial Inclusion Index (FII) has the potential to serve as a comparative tool for assessing the level of financial inclusion within any given economy. Furthermore, it enables the monitoring of economic progress in relation to financial inclusion over a period of time.

This study presented FII calculation as illustrative example, utilizing the most current data available. After the computation of FII across the nations, and it is evident that most of the member countries are come under the high financial inclusion as per our indicators. Also, indicate that Mexico has the lowest financial inclusion where Japan has the highest financial inclusion.

Although the FII is unit free, scale invariant and easy to compute but it is highly dependable on availability of the data. The IFI, as defined, has the potential to serve as a tool for assessing financial inclusion across various temporal intervals and economic classes. This indicator will help financial institutions and regulators evaluate their financial inclusion strategy across the nation. The index's indications can be used to build a database with the goal of increasing the availability of banking services for the unbanked.

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