Financial Inclusion Reimagined: A Comprehensive Index for 75 Global Economies

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ABSTRACT

In the last couple of years, there has been a shift in the financial services industry that goes hand in hand with accelerated technological advancement; it, therefore, requires a more encompassing approach to assessing its inclusive nature. This study, therefore, extends the understanding of analyzing cross-sectional data on Financial Inclusion by making a methodological contribution in the form of an improved composite Financial Inclusion Index. To offer a more comprehensive picture of the level of financial inclusion in some selected economies, this index includes the 'mobile money agent' into a range of dimensions. Constructed from data from 75 countries in 2011, 2014, 2017, and 2021, the index provides both capabilities and accessibility of digital financial services. As mentioned above, the index combines physical and digital financial access and usage, making up the overall Financial Inclusion Index. It prioritized the three-stage PCA method with an endogenously stipulated weight to measure financial inclusion. The data was collected from secondary resources, resulting in a comprehensive Financial Inclusion Index. The study shows that Korea, the United States, Australia, Switzerland, and Japan rank high in traditional financial access, while Uganda, the United Kingdom, Trinidad, Kenya, and Ukraine have the highest levels of digital financial access. Overall, the UK, USA, Korea, Uganda, and Trinidad are presented with the highest amount of financial inclusion, combining all the four factors mentioned earlier. On the other hand, low-performing nations include Afghanistan, Madagascar, and Angola, among others, in all three indices, while nations such as China and Mexico can be categorized as middle performers in all the indices. The overall financial inclusion index generated here provides a good benchmark tool for policymakers to comprehensively assess and rank such economies at different times. The aggregate perceived financial inclusion index is constructed to be easy to compute and allows cross-sectional comparison with other economies.

1.   Introduction

Financial inclusion has emerged as one of the major themes in sustainable development discourse in recent years and is acknowledged worldwide. It is vital in poverty reduction and efficient and secure business transactions, hence the need for access to formal financial services. FI assists individuals of an especially low economic endowment to fund education, start-up businesses, and undertake risk management, thus having a pivotal role in poverty alleviation and economic stability (Chaudhry, Ahmed, Shafiullah, & Duc Huynh, 2020; Chaudhry, Chen, Ahmed, & Nasir, 2023; Zulfiqar, Tahir, Ullah, & Ghafoor, 2023). Still, although the benefits of FI are quite evident, the availability of these services is mainly limited to the G7 countries. Thus, while the number of people who serve improperly in developed countries remains relatively low, access to formal financial systems remains limited in developing countries. The Global Findex database (2017) shows that 37 % of adults in developing countries do not have an account. Thus, these areas are encompassing urgent and major policy concerns. Therefore, eradicating FI is an important strategy that policymakers should consider to increase efficiency and reduce disparities in developing countries.

Other authors, such as (Sarma, 2016; Tram, Lai, & Nguyen, 2023), stressed that measurement is the key driver of increased awareness of the issue of FI. It is commonly accepted that FI has considerable value; however, the literature does not describe a universally accepted definition of how to quantify it. The current literature lacks a detailed framework for constructing a comprehensive index of FI that employs a statistically sound weighting approach. Therefore, precise measurement of FI is crucial for assessing the effectiveness of various stakeholders' interventions and informing future policy decisions. This deficiency in the literature has attracted the attention of scholars, policymakers, and government officials, driving the motivation behind this study.

This research contributes to the field by introducing an innovative composite index, which thoroughly evaluates FI across 75 developing and developed nations for 2011, 2014, 2017, and 2018. The study employs a three-stage Principal Component Analysis (PCA) framework to assign appropriate weights to various dimensions and indicators of FI. In the first stage, the study considered both the supply (access) and demand (usage) side aspects; in the second stage, it differentiated between FI through traditional financial institutions (traditional), and that enabled by digital technologies (digital) and in the final stage, it combined all these elements into a comprehensive index. This methodological sequence (estimating sub-indices before constructing the overall index) addresses potential biases arising from high indicator correlations. By avoiding the direct simultaneous estimation of all indicators, this approach ensures a more precise and dependable measurement of FI.

The FI index presented in this study advances the current methodologies by applying a parametric approach, thereby addressing previous critiques of arbitrary weight selection and the lack of methodological rigor in earlier research. Thus, this index can be considered a better understanding of FI since it provides specific dimensions (access and usage) to the given problem. Moreover, the index also comprises elements of 'mobile money agents,' which measure the usual banking services. Further, the index is derived from various indicators from other institutions, including credit unions, credit cooperatives, microfinance, Fintech institutions, and the standard commercial bank indices. This helps provide a broader picture of FI, improving information gathering and analysis.

The organization of this study is as follows: Section 2 comprises the literature review, Section 3 highlights the data sources and methods used, Section 4 offers the analysis of the empirical evidence alongside the discussions, and Section 5 contains the overall conclusions and recommendations of this study.

2. Literature Review
2.1. Financial Inclusion (FI)

FI is a complex phenomenon defined in many ways within scientific works and influenced by the various socioeconomic realities of the different nations (Akileng, Lawino, & Nzibonera, 2018). Thus, some academic perspectives interpret the concept of FI concerning the principles of social exclusion and analyze the factors and constraints that limit sections of the population in terms of formal financial service provision. (Leyshon & Thrift, 1995) were the first to deploy this area and defined financial exclusion as a barrier to people from disadvantaged backgrounds having minimal contact with the financial system. In the same way, (Carbó et al., 2005) defined Financial Exclusion as the experience of particular incompetent groups who can not gain access to financial services.

However, some other studies clearly explain FI in their work. That is, (Demirgüç-Kunt, Klapper, Singer, & Van Oudheusden, 2015) clarify that FI comprises account opening, its active use, and access to and cost of making payments. This definition means that FI has been defined as a process-oriented towards ensuring that the economic sectors have effective access to organized financial services. This definition implies that the concept of FI points towards a process meant to enhance the supply of, demand for, and use of financial services in different sectors of the economy. The World Bank further elaborates that the availability of FI equally concerns the financial services availability, their stability, and their relevance to the client's requirements. According to the author, Financial Inclusion is the ability of citizens and enterprises to access relevant, appropriate, quality, and sustainable financial services. These services should cater to transactions, payment, savings, credit, insurance, etc., and should be done responsibly and sustainably. Even though there is variation in the definition of FI, there is agreement that it has to be defined by the number of people using official financial services that are affordable, reasonable, and sufficient for the entire population group.

It has been accepted globally that FI plays an important role in economic development policies in many countries, thus receiving much attention from scholars and policymakers. This focus underlines its great significance for the formation of economic policy. As noted earlier, substantial empirical literature concerning FI is available (for instance, (Ambarkhane, Singh, & Venkataramani, 2020; Mialou, Amidzic, & Massara, 2017; Nuzzo & Piermattei, 2019; Sarma, 2016; Tram et al., 2023), which discusses possible ways of its measurement as well as the methods for its improvement.

2.2. Measurement of Financial Inclusion

Therefore, there is a lack of a clear and comprehensive methodology used to measure the level of FI, which results in different techniques in the existing literature. Broadly, two main methods are employed: The two major forms of constructing QOL measures include (1) using single indexed measures and (2) the development of indexes nested within indexes. (Beck, Demirguc-Kunt, & Martinez Peria, 2007) was one of the earliest studies to measure financial sector access through deposit, lending, and payment variables, recognized as access and use. This approach is useful for gaining insights about the reality of specific aspects of FIs, but it does not offer an overall evaluation. For example, recommendations for the type of ratio whereby, for example, the Albanian FI is characterized by a relatively high loan-to-income ratio and a low number of bank branches.

However, sources such as the "Financial Access Survey (FAS – IMF) and the Global Findex Survey (Findex – WB)" are available across the globe with key indicators such as Bank branches and ATMs to measure financial inclusion. These databases enable the construction of the 'FI indices' – composite indices, which are calculated based on numerous indicators. Many studies have applied this composite approach, while some have been modeled on the Human

Development Index (HDI) (Prastowo & Putriani, 2019). (Sarma, 2016) build up this method by further developing sub-indices for every dimension of FI and then integrating the obtained sub-indices with the help of composite, which is the normalized inverse of the Euclidean distance from the ideal point. This approach has been followed in subsequent studies (Anwar, Tanzo, & Mostafa, 2017; Huang & Zhang, 2019; Sethi & Sethy, 2019).

This is because, despite advances to move beyond single indexes, the weights' determination solely on the authors 'opinion has been deemed incongruous with scientific standards. To overcome these problems, (Arellano, Cámara, & Tuesta, 2018) used parametric techniques in which weights are properly endogenous by model assumptions. (Mialou et al., 2017) created a composite FI index incorporating outreach, usage, and quality dimensions. They expressed it as a measure of each dimension, calculated the statistical parameters of the dimensions, and used the weighted geometric mean of the measure of each dimension. This approach has been criticized for employing factor analysis (FA) in which the number of factors is reduced, which means that some data may be left unused, and quality measures may be left out due to data unreliability. However, (Arellano et al., 2018) used two strategies to perform PCA, for which they used a two-stage PCA method. PCA method is used over FA because it brings minimal assumptions about the original data and the factors present (Arellano et al., 2018). Therefore, several subsequent studies have used PCA techniques (Ahamed & Mallick, 2019; Gharbi & Kammoun, 2023). From a policy perspective, FI's performance is measured by the dimensions of access, usage, and quality of financial services as identified by (Mialou et al., 2017). Nevertheless, there are some problems arising from comparing service quality between countries, which is why researchers exclude this dimension from FI indices.

The literature review discovers a strong attempt to generate composite indices for FI measurement, but the best approach is still debatable (Park & Mercado, 2018). Different works differ considerably regarding the method and index used to derive an FI index, underlining the absence of normative metrics. The popularity of mobile phones, especially in the developing world, has ensured that the figures above advance their use in financial services. Mobile phone accessibility is now considered as good as measuring mobile banking and is accepted in Fintech Institution evaluation (Chauvet & Jacolin, 2017). These regions have seen mobile money accounts become paramount for providing financial transactions for most households (Mehrotra & Nadhanael, 2016). However, for the current indexes of FI, mobile money has not been included due to limitations in the data available, and this thus calls for the development of the current index with these aspects. More specifically, previous FI indices have concentrated mainly on banking service-related industries. Other developments in the financial industry have also shifted focus to the importance of insurance, pensions, microfinance, and financial technology. The shift in focus in this manner implies that FI measures should now incorporate these other services. Therefore, there is a need to carry out more research to fashion a more satisfactory and encompassing FI index.

3. Methodology
3.1. Data and Variables

This paper contributes to the literature on FI by introducing a more comprehensive index incorporating digital elements. The study develops a composite measure, referred to as the "comprehensive financial inclusion (CFI) index," which integrates both the traditional financial inclusion (TFI) index (via institutions such as banks) and digital financial inclusion (DFI) index (inclusion driven by fintech advancements).

Our research covers selected developed and developing countries around the globe, with a particular emphasis on access to and utilization of payment services along with mobile money agents. The indices are based on data from 75 countries selected for the availability of CFI-related data. Information on different dimensions of FI was gathered from various sources, as detailed in Table 1. Where data were missing, estimates were made using multiple data

sources, also outlined in Table 1. In cases where data on a proxy variable is also unavailable, missing values are imputed by interpolation based on historical trends of the variable. The indices are calculated for 2011, 2014, 2017, and 2021. The focus on payment services highlights their importance as a primary entry point to FI, with mobile money services playing an increasingly critical role. Moreover, the variables used in the study are also depicted in Table 1.

The study utilized a three-stage Principal Component Analysis (PCA) to create this new measure. This method allows capturing various aspects of FI at each stage: in the first stage, we considered both the supply (access) and demand (usage) side aspects; in the second stage, we differentiated between FI through traditional financial institutions (traditional) and that enabled by digital technologies (digital); and in the final stage, we combined all these elements into a comprehensive index (Khera, Ng, Ogawa, & Sahay, 2022). The weights assigned to the underlying indicators through PCA reflect the level of correlation among them. By estimating the sub-indices in separate stages rather than in one step, we reduce the potential bias that might arise from highly correlated indicators (Khera et al., 2022; Tram et al., 2023). Since the traditional, digital, and comprehensive indices are each calculated and normalized separately for 2011, 2014, 2017, and 2021, their levels can be compared over time but not directly across indices. However, they provide insights into a country's relative standing within the sample, such as being highly advanced in digital inclusion but only average in traditional inclusion. Table 1 offers a detailed breakdown of the indicators used and the weights assigned in constructing these indices. The indicators for the digital FI index largely correspond to those used in traditional FI indices in the existing literature.

Table 1
Variables for Financial Inclusion Indices

Overall Financial Inclusion Index			
Traditional Financial Inclusion Index	**Data Source**	**Digital Financial Inclusion Index**	**Data Source**
Access		Access	
Access to Bank Infrastructure	IMF	Access to Digital Infrastructure	ITU
i. Number of ATMs per 100000 Adults	FAS	i. %age of the population who has access to the internet	
ii. Number of Branches per 100000 Adults		ii. Mobile subscription per 100 people	
		Number of Registered Mobile Money Agents per 100000 Adults	IMF, FAS
Usage		Usage	
i. %age of adults who receive wages through a financial institution account	WB Findex	i. %age of adults who use mobiles to receive wages or salary	WB Findex
ii. %age of adults who save at a financial institution		ii. %age of adults who use the internet to pay	
iii. %age of adults with a financial institution account		iii. %age of adults who use mobiles to make utility payments	
iv. %age of adults who use a financial institution account for utility		iv. %age of adults who have a mobile account	
v. %age of adults with debit cards			

3.2. Research Models and Construction of Financial Inclusion Indices
3.2.1. Coverage and Approach

We introduce a comprehensive FI index that emphasizes payment services by integrating fourteen key indicators (shown in Table 1), capturing both traditional and digital forms of FI. These forms are further divided into two crucial dimensions: access and usage, recognizing that mere access does not guarantee FI without active use. The indicators are systematically combined into two sub-indices (traditional and digital) and an overall index, with

weights assigned through PCA. Covering 75 countries across 2011, 2014, 2017, and 2021, this index provides an evolving view of FI over time.

3.2.2. Weighting of Variables

A three-stage PCA is employed to construct the comprehensive FI index for each country. Since FI is not directly observable, it is inferred from the interaction of various related variables, as provided in Table 1. We operate under the assumption that an underlying latent variable, termed "financial inclusion," influences this set of correlated variables. PCA is utilized to quantify the contribution of each variable in explaining the overall variability within the dataset, thereby helping to measure FI quantitatively for each country.

The division of the comprehensive FI index into sub-indices is motivated by two key considerations: firstly, these sub-indices provide granular insights into specific dimensions of FI, which are crucial for informed policy analysis; secondly, given the high degree of inter-correlation among the indicators within each sub-index, it is more methodologically sound to estimate these sub-indices individually before combining them into a final index. This approach is advantageous because PCA disproportionately weighs highly correlated indicators (Arellano et al., 2018). Utilizing a three-stage PCA helps mitigate this potential bias, ensuring a more balanced and accurate construction of the overall index.

3.2.3. Principal Component Analysis (PCA)

The study used a three-stage PCA to create a new FI index. This method allows capturing various aspects of FI at each stage: in the first stage, we considered both access and usage aspects; in the second stage, we differentiated between traditional FI and digital FI; and in the final stage, we combined all these elements into a comprehensive index.

a. First-Stage PCA

In the initial stage, sub-indices for the access and usage dimensions are developed for both the traditional. (FI_T^a, FI_T^u) and digital components (FI_D^a, FI_D^u). These sub-indices are constructed using specific variables identified in Table 1.

The access factor of (FI_T^a) traditional FI is examined by No. of ATMs (p_1) and bank branches (p_2). The usage aspects (FI_T^u) is analyzed by financial institution accounts (FINs) for wages (q_1), savings at FINs (q_2), FINs accounts (q_3) FINs account for utility (q_4) And debit cards (q_5).

$$(FI_T^a)it = \gamma_1(p_1)it + \gamma_2(p_2)it + b_{it} \tag{1}$$

$$(FI_T^u)it = \partial_1(q_1)it + \partial_2(q_2)it + \partial_3(q_3)it + \partial_4(q_4)it + \partial_5(q_5)it + m_{it} \tag{2}$$

Here, i denotes the country, and t refers to the years under consideration: 2011, 2014, 2017, and 2021. The total variations in the access and usage aspects are decomposed into two orthogonal components: variations attributable to the predictors and variations due to the error, represented by $b(i)$ and $m(i)$. In a well-specified model, both $E(\mu)$ and $E(e)$ indicate that the mean error is zero. Additionally, the variance of the error term should be relatively small compared to the variance of the latent variables, which in this context are the access and usage of traditional payment services.

Similarly, the access factor of (FI_D^a) Internet users examine digital FI (g_1) and mobile subscriptions (g_2). The usage aspects (FI_D^u) is analyzed by mobile for wages (j_1), use the internet to pay (j_2), mobile for utility (j_3), and mobile account (j_4).

$$(FI_D^a)it = \delta_1(g_1)it + \delta_2(g_2)it + r_{it} \tag{3}$$
$$(FI_D^u)it = \vartheta_1(j_1)it + \vartheta_2(j_2)it + \vartheta_3(j_3)it + \vartheta_4(j_4)it + s_{it} \tag{4}$$

PCA creates linear combinations of the original variables for each factor-specific sub-index to produce principal components. These components are arranged based on how much they explain the differences in the predictors. The first PC (PC_1) is particularly important because it captures the most variance, accounting for over 70% of the total variation in the predictors (refer to Table 2).

To compute the sub-indices for each country and year, it is essential to use standardized predictors. (x) and their corresponding loadings (L). This calculation standardizes the predictors to ensure a mean of 0 and a standard deviation of 1. The loadings $(L)$are derived from $(PC_1$, as shown in Table 3, column 3. Consequently, the index (PC_{score}) is determined as follows:

$$PC_{score} = \sum_{i=t}^{n} L_i x_i \tag{5}$$

The index score (PC_{score}) is calculated as the weighted sum of all standardized predictors (x), where each variable is weighted by its respective loading. Here, $'n'$ represents the total number of predictors within each category. These index scores are subsequently normalized on a scale from 0 to 1 for all countries and across years (2011, 2014, 2017, and 2021) using a global min-max normalization process within each category:

$$x_{normalized} = \frac{x - x_{minimum}}{(x_{maximum} - x_{minimum})} \tag{6}$$

To determine the relative significance of each predictor within the sub-indices, we derived their weightings, which represent the percentage contribution of each variable to the sub-indices, based on the loading results from (PC_1). These weightings, which quantify the influence of each variable, are illustrated in Figure 1.

Table 2
First Stage PCA: Cumulative Variance

Access (Traditional)		Access (Digital)	
PC_1	0.716	PC_1	0.809
PC_2	1.000	PC_2	1.000
Usage (Traditional)		**Usage (Digital)**	
PC_1	0.830	PC_1	0.546
PC_2	0.915	PC_2	0.850
PC_3	0.960	PC_3	0.937
PC_4	0.984	PC_4	1.000
PC_5	1.000		

b.   Second-Stage PCA

In the second stage, PCA integrates the access and usage sub-indices generated in the initial stage, combining them separately to construct indices for traditional and digital FI.

$$(FI_T)it = \varphi_1(FI_T^a)it + \varphi_2(FI_T^u)it + e_{it} \tag{7}$$
$$(FI_D)it = \emptyset_1(FI_D^a)it + \emptyset_2(FI_D^u)it + u_{it} \tag{8}$$

Where φ and $\emptyset$ are the weights designated to the sub-indices, as shown in Figure 2. The loading scores of second-stage PCA are presented in Table 4.

Table 3
First Stage PCA Loadings

Access (Traditional) Variable	Sign	PC_1	PC_2			
No. of ATMs	p_1	0.847	0.532			
Bank Branches	p_2	0.847	-0.532			
Usage (Traditional) Variable	Sign	PC_1	PC_2	PC_3	PC_4	PC_5
FINs Account for Wages	q_1	0.918	0.259	-0.176	-0.246	0.011
Savings at FINs	q_2	0.909	0.003	0.411	-0.060	-0.041
FINs Accounts	q_3	0.919	-0.337	-0.042	0.029	0.198
FINs Account for Utility	q_4	0.890	0.393	-0.040	0.229	0.019
Debit Cards	q_5	0.921	-0.304	-0.150	0.054	-0.186
Access (Digital) Variable	Sign	PC_1	PC_2			
Internet Users	g_1	0.899	0.436			
Mobile Subscriptions	g_2	0.899	-0.436			
Usage (Digital) Variable	Sign	PC_1	PC_2	PC_3	PC_4	
Mobile for Wages	j_1	0.768	-0.531	-0.106	0.341	
Use the Internet to Pay	j_2	0.474	0.818	0.259	0.197	
Mobile for Utility	j_3	0.816	0.381	-0.397	-0.177	
Mobile Account	j_4	0.838	-0.347	0.337	-0.252	

It is important to note that in constructing the digital FI index, the variable for digital access, specifically "mobile money agents," is incorporated at the second stage of PCA rather than in the first stage alongside other digital access variables. This approach is taken because mobile money agent density negatively correlates with internet access and mobile subscriptions (Table 5). This negative correlation reflects the role of mobile money agents in providing access to digital payment services for individuals lacking direct access to digital infrastructure. Including this variable in the first stage of PCA would result in a negative weight being assigned to mobile money agents, suggesting that greater access to these agents would correspond to lower access to digital financial services, which is counterintuitive.

Table 4
Second and Third Stage PCA: Cumulative Variance

Traditional Financial Inclusion Index		Digital Financial Inclusion Index	
PC_1	0.807	PC_1	0.367
PC_2	1.000	PC_2	0.731
		PC_3	1.000
Composite Financial Inclusion Index			
PC_1			0.602
PC_2			1.000

c. Third-Stage PCA

In the final stage, the composite FI index (FI) is calculated by performing PCA on the traditional and digital FI indices. In this step, Ω represents the weights allocated (see Figure 2) to these two subcomponents.

$$(FI)it = \Omega_1 (FI_T)it + \Omega_2 (FI_D)it + \Omega_{it} - - - - (9)$$

Like the sub-indices, the composite FI index is scaled between 0 and 1 to ensure consistency across all measurements.
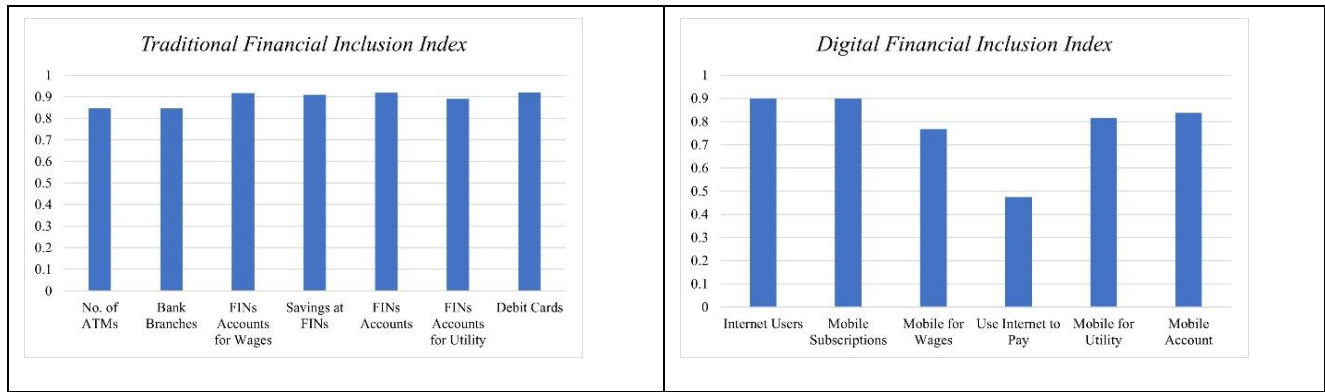
Figure 1: First Stage PCA Weights
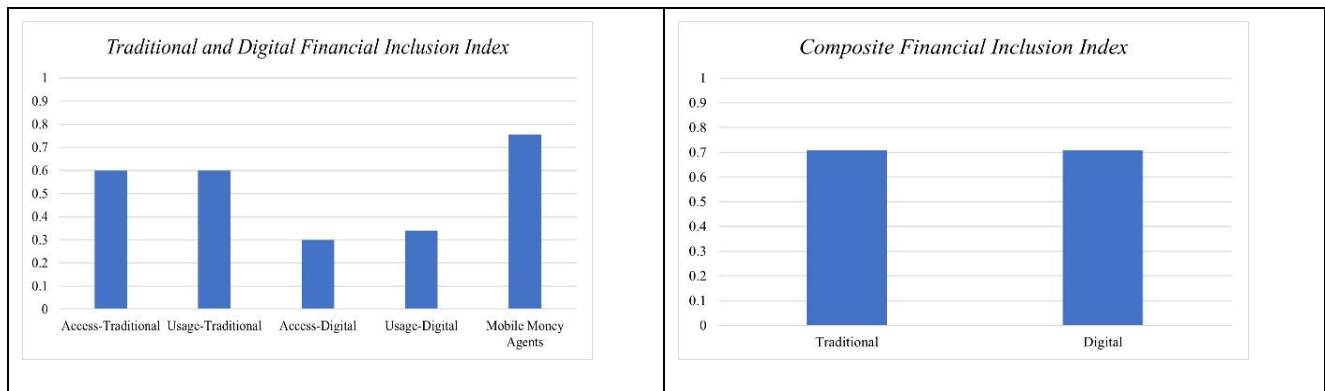
Figure 2: Second and Third Stage PCA Weights

4. Results and Discussion
4.1. Correlation and Descriptive Statistics

Table 5 provides the correlation matrix, which details the strengths and directions of relationships among the study variables. Table 6 offers descriptive statistics for the indicators employed to assess FI. Specifically, the study calculates three indices (traditional, digital, and overall financial inclusion) alongside their sub-indices (access and usage). These indices are derived through PCA, which treats the predictors as linear functions following each dimension's definition. The indicators are normalized for each dimension to ensure comparability across different scales. After normalization, the range alters to 0 and 1, with the low end, which is 0, indicating the population's exclusion level from financial services and the upper end represented by 1 as the level of FI.

4.2. Traditional Financial Inclusion Index

The findings (as shown in Table 7) suggest that Korea (Rep.), the USA, Australia, Switzerland, and Japan are the most developed in traditional FI, and all these countries have excellent access and/or usage of traditional financial services. These countries' high level of performance is in line with their high GDP per capita, which clearly indicates that a virtuous circle exists between economic development and FI. In these countries, financial systems, including but not limited to an expansive network of banking systems, well-developed regulatory systems, and high levels of financial literacy, are other reasons these countries are at the top (Lyons & Kass-Hanna, 2019). The high level of FI in these nations is probably a consequence of long, fast economic development, technological progress, and beneficial financial policies that promote financial inclusion for everybody.

On the other hand, the countries that belong to the bottom quartile (Madagascar, Afghanistan, Malawi, Tanzania, and Haiti) list below-average traditional FI. These countries experience structural issues, including political factors, low GDP per capita, and weak institutional backgrounds that greatly hinder financial accessibility to people in developing countries (Cui, Yang, & Dai, 2023). It thus becomes quite clear that economic underdevelopment and low FI in these countries go hand in hand; economic resources for building the necessary financial infrastructure remain scarce, while lack of access to financial services continues to hinder both economic inclusion and economic progress (Khan, Weili, & Khan, 2023). This results in the creation of a self-fulfilling prophecy where low FI and economic development fuel each other, which hampers the progress of development in such countries and improves their financial systems.

For an intermediate level of traditional FI, countries including Belarus, Armenia, Lebanon, Mexico, and Indonesia can be characterized as countries with intermediate levels of FI. Despite tremendous advancements in deepening financial access, these nations remain confronted with constraints that hinder them from achieving levels seen in developed countries (Gopalan & Khalid, 2022). The improvement in these nations may be well explained by adopting appropriate financial reform endeavors to enhance financial understanding and access to concrete financial services for the hitherto excluded groups (Jana, Sinha, & Gupta, 2024). Nevertheless, challenges to the development of mobile money include Political Instability, Economic Volatility, and gaps in the financial infrastructure. Thus, the results of this work emphasize the need for continued policy action and fund intensification to reduce the gap separating the nations with mid-range and high FI rates while stressing the role of striving for higher parameters in stabilizing and developing these countries' economies. Furthermore, table 8 gives the traditional FI index for 75 countries for the years 2011, 2014, 2017 and 2021.

4.3. Digital Financial Inclusion Index

The analysis shown in Table 7 indicates that Uganda, UK, Trinidad, Kenya and Ukraine have a very high score in digital FI, meaning that many people in these countries have access to and are actively using digital financial services. This success is a result of several factors, such as a sound regulatory environment that supports financial technology, high mobile phone penetration, and the design of innovative financial products that meet the pressing needs of different population groups (Oluwafunmilola, Mutiu Alade, Rosita Ebere, Oluwabosoye, & Chibuike, 2023). For instance, the M-Pesa in Kenya and Uganda has improved the financial inclusion levels, especially for the unbanked population, because of secure and effective mobile transactional platforms despite the geographical location. On the other hand, the United Kingdom and Ukraine have inherited a strong technology system that has reliably incorporated Fintech services into people's lives, enhancing FI.

The following countries are in the bottom quartile for digital FI: Afghanistan, Angola, Romania, Israel, and Jordan, where the digital FI shows constraints to access financial services. These are political instabilities, economic challenges, low electronic connectivity, and low digital literacy in the concluded nations (Inakefe et al., 2023; Ullah, Tahir, Shahzadi, & Kamran, 2023). For instance, Afghanistan and Angola, both countries experiencing war and economic difficulties, are problematic cases for building the necessary infrastructure for the digital financial services that would support the PFM vision. In countries like Romania, Israel, and Jordan, digital development is supposedly advanced; however, there are other challenges involving regulations, limited competition in the market, and social problems with the adoption of new technologies that affect the implementation of digital FI. These challenges point out the fact that both technology and socioeconomic factors need to be given much consideration to improve digital financial inclusion.

Malawi, Croatia, West Bank, Gaza, Costa Rica, and Bulgaria can be classified as countries between digital FI's mid-range scores, which simultaneously indicates some

advancement and issues. These nations have made great progress in increasing financial access through digital means, but they are limited by hurdles that hinder them from acquiring even greater financial access. In some instances, such as Costa Rica and Croatia, government interventions and internet prevalence have been instrumental in advancing digital financial services. However, the adoption rate is hampered due to the economic digital divide, policies, and regulatory issues (Ghosh & Chaudhury, 2022; Shahzadi, Ullah, Akram, Irshad, & Ahmad, 2023). Political and economic volatility makes enhancing digital FI even more challenging in places like the West Bank or Gaza. These results affirm the requirement for ongoing investment in infrastructure and policy and the implementation of activities aimed at intensifying actual and potential users' digital competencies to ensure the further development of digital FI in those areas. In addition, Table 9 reveals the dynamics in the digital FI index by 75 countries in 2011, 2014, 2017, and 2021.

4.4. Composite Financial Inclusion Index

As indicated in Table 7, the research findings show that countries with high composite FI include the United Kingdom, United States, South Korea, Uganda, and Trinidad Tobago, which prides itself on the FI sector, integrating the current traditional and 'new age' digital financial services. This could result from sound financial development together with the early adopters of digital financial innovations, as mentioned by (Misati, Osoro, Odongo, & Abdul, 2022).

Table 5
Correlation Matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	FINs Account for Wages	1													
2	Savings at FINs	0.677	1												
3	FINs Accounts	0.658	0.507	1											
4	FINs Account for Utility	0.569	0.679	0.697	1										
5	Debit Cards	0.677	0.478	0.719	0.714	1									
6	Mobile for Wages	-0.079	0.017	0.035	-0.062	-0.007	1								
7	Use the Internet to Pay	0.552	0.622	0.602	0.719	0.616	-0.031	1							
8	Mobile for Utility	0.563	0.453	0.447	0.594	0.455	0.406	0.561	1						
9	Mobile Account	0.104	0.193	0.192	0.135	0.175	0.706	0.151	0.462	1					
10	Registered Mobile Agents	0.098	0.048	0.076	0.079	0.128	0.021	0.123	0.055	0.229	1				
11	No. of ATMs	0.562	0.561	0.687	0.583	0.644	-0.120	0.498	0.277	0.114	0.136	1			
12	Bank Branches	0.316	0.245	0.427	0.291	0.425	-0.200	0.239	0.022	-0.124	-0.061	0.433	1		
13	Internet Users	0.630	0.580	0.441	0.577	0.713	-0.148	0.413	0.298	0.026	-0.102	0.647	0.356	1	
14	Mobile Subscriptions	0.343	0.293	0.524	0.253	0.499	-0.041	0.315	0.116	0.040	-0.066	0.490	0.336	0.619	1

Currently, the integration of the financial sector in developed economies like the United Kingdom, the United States, and South Korea is high owing to factors like a sound legal framework that regards the aspect of financial inclusion, availability of approved financial institutions in the respective regions and regionally developed and developed digital systems (Telukdarie & Mungar, 2023). All these elements, taken together, help provide hassle-free access to traditional banking facilities and innovative, advanced techniques of financial inclusion for a substantial population, as will be seen in Uganda and Trinidad, more so for the

unbanked and underbanked where the mobile banking and digital payment system have grown rapidly enhancing FI (Oluwafunmilola et al., 2023).

Comparatively, countries such as Afghanistan, Pakistan, Haiti, Algeria, and Angola are located on the negative end of composite FI, implying that they have a lot of difficulties in attaining both physical and online financial services. Such challenges as political vulnerability, economic issues, low financial sector development, and weak information technology make it difficult for these nations to access financial services (Inakefe et al., 2023).

Table 6
Descriptive Statistics

Category	Mean	Median	Max.	Min.	Std. Dev.	N
Traditional FI Index						
Access	0.2947	0.2378	1.0000	0.0000	0.2513	300
Usage	0.3097	0.2399	1.0000	0.0000	0.2322	300
Traditional	0.3449	0.2803	1.0000	0.0000	0.2484	300
Digital FI Index						
Access	0.5535	0.5824	1.0000	0.0000	0.2363	300
Usage	0.1915	0.1346	1.0000	0.0000	0.1674	300
Digital	0.1896	0.1583	1.0000	0.0000	0.1648	300
Composite FI Index						
Overall	0.3156	0.2859	1.0000	0.0000	0.1863	300

Table 7A
Ranking: Financial Inclusion Indices

Country Name	Traditional	Rank	Digital	Rank	Composite	Rank
Afghanistan	0.0161	74	0.0170	75	0.0041	75
Albania	0.2664	41	0.0401	67	0.1549	63
Algeria	0.1358	59	0.0511	63	0.0946	71
Angola	0.1565	54	0.0226	74	0.0829	72
Armenia	0.2922	37	0.0970	55	0.2139	53
Australia	0.9017	3	0.1076	52	0.5446	6
Bangladesh	0.1380	58	0.1969	33	0.2120	54
Belarus	0.3089	36	0.2688	19	0.3597	27
Bolivia	0.4413	22	0.1372	45	0.3247	34
Botswana	0.2349	45	0.2772	17	0.3272	32
Brazil	0.4973	16	0.2011	30	0.4053	21
Bulgaria	0.7209	8	0.1536	40	0.4857	13
Burundi	0.1210	61	0.0693	58	0.1013	68
Chile	0.3982	29	0.1023	53	0.2741	41
China	0.4165	26	0.1161	49	0.2948	36
Colombia	0.2634	43	0.0984	54	0.1998	56
Comoros	0.0815	69	0.1901	34	0.1767	59
Costa Rica	0.4145	27	0.1571	39	0.3264	33
Croatia	0.7044	9	0.1752	37	0.4941	11
Dominican Republic	0.2660	42	0.2179	27	0.2964	35
Egypt, Arab Rep.	0.0877	67	0.2449	24	0.2236	51
Georgia	0.4084	28	0.2089	29	0.3645	24
Guatemala	0.3284	32	0.1104	51	0.2437	47
Haiti	0.0651	71	0.0700	57	0.0723	73
Honduras	0.2234	48	0.0686	59	0.1549	64
Hungary	0.4893	17	0.0309	70	0.2654	42
India	0.2313	46	0.0416	65	0.1375	66
Indonesia	0.2682	40	0.0564	62	0.1689	60
Iran, Islamic Rep.	0.5513	15	0.0860	56	0.3421	30
Israel	0.6623	10	0.0297	72	0.3559	28
Jamaica	0.3148	34	0.0392	68	0.1798	58
Japan	0.8395	5	0.0371	69	0.4555	16
Jordan	0.2239	47	0.0308	71	0.1250	67

Kenya	0.1906	50	0.4406	4	0.4340	19
Korea, Rep.	0.9541	1	0.3252	10	0.7457	3
Kyrgyz Republic	0.1641	52	0.2242	26	0.2475	45
Lebanon	0.2859	38	0.1804	35	0.2770	39
Lesotho	0.1085	63	0.3137	11	0.2895	38

Table 7B
Ranking: Financial Inclusion Indices

Country Name	Traditional	Rank	Digital	Rank	Composite	Rank
Liberia	0.0671	70	0.3949	7	0.3323	31
Madagascar	0.0113	75	0.2526	22	0.1894	57
Malawi	0.0467	73	0.1797	36	0.1499	65
Malaysia	0.4198	25	0.1992	32	0.3628	25
Mali	0.0837	68	0.3135	12	0.2762	40
Mauritius	0.4488	20	0.2816	16	0.4438	17
Mexico	0.2690	39	0.2103	28	0.2919	37
Moldova	0.5830	14	0.1396	43	0.4016	22
Mongolia	0.6300	12	0.2624	20	0.5243	8
Mozambique	0.1922	49	0.3285	9	0.3455	29
Namibia	0.3686	31	0.2729	18	0.3944	23
New Zealand	0.7743	7	0.1335	46	0.4979	10
Nicaragua	0.1427	57	0.0485	64	0.0962	70
Norway	0.6205	13	0.0659	60	0.3627	26
Pakistan	0.1051	64	0.0408	66	0.0702	74
Paraguay	0.1472	56	0.1992	31	0.2186	52
Peru	0.2631	44	0.1481	41	0.2393	48
Philippines	0.1773	51	0.1125	50	0.1655	61
Qatar	0.3122	35	0.1238	47	0.2458	46
Romania	0.4425	21	0.0251	73	0.2360	49
Russian Federation	0.6578	11	0.1380	44	0.4398	18
Rwanda	0.1243	60	0.1423	42	0.1612	62
Serbia	0.4805	19	0.2877	15	0.4654	15
South Africa	0.3802	30	0.4103	6	0.5101	9
Switzerland	0.8586	4	0.1204	48	0.5320	7
Tajikistan	0.1189	62	0.0657	61	0.0973	69
Tanzania	0.0597	72	0.3101	13	0.2608	43
Thailand	0.4850	18	0.2889	14	0.4688	14
Trinidad and Tobago	0.4305	23	0.4825	3	0.5942	5
Uganda	0.0968	66	0.8277	1	0.6929	4
Ukraine	0.3264	33	0.4218	5	0.4908	12
United Kingdom	0.8123	6	0.4868	2	0.7995	1
United States	0.9119	2	0.3677	8	0.7573	2
Uruguay	0.4289	24	0.2536	21	0.4110	20
Vietnam	0.1629	53	0.2295	25	0.2511	44
West Bank and Gaza	0.1542	55	0.1748	38	0.2029	55
Zambia	0.1033	65	0.2451	23	0.2320	50

Table 8A
Estimates of Traditional Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Afghanistan	0.0132	0.0133	0.0250	0.0129	0.0161	74
Albania	0.2589	0.2617	0.2700	0.2750	0.2664	41
Algeria	0.1059	0.1470	0.1333	0.1571	0.1358	59
Angola	0.1818	0.1770	0.1536	0.1138	0.1565	54
Armenia	0.1991	0.2389	0.3551	0.3756	0.2922	37
Australia	0.8667	0.9332	0.9257	0.8811	0.9017	3
Bangladesh	0.2085	0.0829	0.1268	0.1340	0.1380	58
Belarus	0.2286	0.2735	0.4193	0.3141	0.3089	36
Bolivia	0.2895	0.3503	0.4338	0.6915	0.4413	22
Botswana	0.2035	0.2613	0.2300	0.2447	0.2349	45

Brazil	0.4513	0.5049	0.5030	0.5301	0.4973	16
Bulgaria	0.6665	0.6734	0.7287	0.8152	0.7209	8
Burundi	0.1151	0.1091	0.1230	0.1368	0.1210	61
Chile	0.3350	0.3663	0.4051	0.4862	0.3982	29
China	0.3272	0.3658	0.4551	0.5178	0.4165	26
Colombia	0.2486	0.2500	0.2707	0.2845	0.2634	43
Comoros	0.0929	0.0838	0.0745	0.0748	0.0815	69
Costa Rica	0.3560	0.4469	0.4376	0.4176	0.4145	27
Croatia	0.6468	0.6771	0.7602	0.7335	0.7044	9
Dominican Republic	0.2715	0.2600	0.2845	0.2479	0.2660	42
Egypt, Arab Rep.	0.0532	0.0527	0.1195	0.1253	0.0877	67
Georgia	0.2687	0.3782	0.4680	0.5185	0.4084	28
Guatemala	0.3270	0.3557	0.3587	0.2723	0.3284	32
Haiti	0.0730	0.0508	0.0623	0.0743	0.0651	71
Honduras	0.1891	0.2271	0.2652	0.2124	0.2234	48
Hungary	0.4173	0.4517	0.4801	0.6080	0.4893	17
India	0.2055	0.1945	0.2721	0.2531	0.2313	46
Indonesia	0.1649	0.2869	0.3203	0.3007	0.2682	40
Iran, Islamic Rep.	0.4396	0.5571	0.5903	0.6183	0.5513	15
Israel	0.5758	0.6893	0.6992	0.6847	0.6623	10
Jamaica	0.3528	0.3134	0.2882	0.3048	0.3148	34
Japan	0.7082	0.8730	0.8942	0.8824	0.8395	5
Jordan	0.2770	0.1713	0.2263	0.2209	0.2239	47
Kenya	0.1652	0.2051	0.2198	0.1723	0.1906	50
Korea, Rep.	0.8808	0.9502	0.9854	1.0000	0.9541	1
Kyrgyz Republic	0.1601	0.1046	0.1893	0.2022	0.1641	52
Lebanon	0.3077	0.3211	0.3219	0.1929	0.2859	38
Lesotho	0.0701	0.0913	0.1128	0.1599	0.1085	63

Table 8B
Estimates of Traditional Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Liberia	0.0760	0.0665	0.0534	0.0726	0.0671	70
Madagascar	0.0000	0.0015	0.0124	0.0315	0.0113	75
Malawi	0.0343	0.0489	0.0581	0.0454	0.0467	73
Malaysia	0.3319	0.3977	0.4475	0.5021	0.4198	25
Mali	0.1038	0.0821	0.0610	0.0877	0.0837	68
Mauritius	0.4085	0.4612	0.4550	0.4704	0.4488	20
Mexico	0.2595	0.2637	0.2544	0.2986	0.2690	39
Moldova	0.4791	0.5397	0.6727	0.6404	0.5830	14
Mongolia	0.6075	0.6573	0.6068	0.6485	0.6300	12
Mozambique	0.3138	0.2160	0.1150	0.1239	0.1922	49
Namibia	0.2913	0.3485	0.4425	0.3921	0.3686	31
New Zealand	0.7562	0.8220	0.7884	0.7306	0.7743	7
Nicaragua	0.1875	0.1012	0.1562	0.1259	0.1427	57
Norway	0.4600	0.7023	0.6736	0.6460	0.6205	13
Pakistan	0.1660	0.0579	0.1030	0.0937	0.1051	64
Paraguay	0.1290	0.1428	0.1707	0.1461	0.1472	56
Peru	0.1403	0.2101	0.3217	0.3805	0.2631	44
Philippines	0.1507	0.1515	0.1714	0.2357	0.1773	51
Qatar	0.3416	0.3403	0.2983	0.2686	0.3122	35
Romania	0.4277	0.4462	0.4422	0.4540	0.4425	21
Russian Federation	0.5474	0.6668	0.6836	0.7334	0.6578	11
Rwanda	0.1638	0.1223	0.1180	0.0932	0.1243	60
Serbia	0.4461	0.4632	0.4745	0.5380	0.4805	19
South Africa	0.3670	0.4007	0.3485	0.4046	0.3802	30
Switzerland	0.8353	0.9009	0.8764	0.8219	0.8586	4
Tajikistan	0.1202	0.0610	0.1666	0.1277	0.1189	62
Tanzania	0.0676	0.0541	0.0541	0.0630	0.0597	72
Thailand	0.3995	0.4654	0.5050	0.5703	0.4850	18
Trinidad and Tobago	0.4357	0.4392	0.4290	0.4179	0.4305	23

Uganda	0.1055	0.0909	0.0873	0.1034	0.0968	66
Ukraine	0.2338	0.2725	0.3582	0.4409	0.3264	33
United Kingdom	0.7648	0.8473	0.8636	0.7735	0.8123	6
United States	0.9022	0.9070	0.9172	0.9212	0.9119	2
Uruguay	0.2835	0.2745	0.4068	0.7510	0.4289	24
Vietnam	0.1327	0.1341	0.1380	0.2468	0.1629	53
West Bank and Gaza	0.1445	0.1372	0.1576	0.1774	0.1542	55
Zambia	0.0875	0.1179	0.1348	0.0731	0.1033	65

Table 9 A
Estimates of Digital Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Afghanistan	0.0137	0.0146	0.0219	0.0177	0.0170	75
Albania	0.0276	0.0325	0.0447	0.0557	0.0401	67
Algeria	0.0529	0.0575	0.0494	0.0445	0.0511	63
Angola	0.0285	0.0240	0.0186	0.0192	0.0226	74
Armenia	0.0220	0.0226	0.1308	0.2127	0.0970	55
Australia	0.1625	0.1144	0.1044	0.0489	0.1076	52
Bangladesh	0.0070	0.1071	0.2534	0.4202	0.1969	33
Belarus	0.3433	0.2685	0.2548	0.2088	0.2688	19
Bolivia	0.1531	0.1072	0.1133	0.1751	0.1372	45
Botswana	0.1710	0.1727	0.2573	0.5078	0.2772	17
Brazil	0.2927	0.0854	0.0955	0.3307	0.2011	30
Bulgaria	0.2318	0.1326	0.1248	0.1254	0.1536	40
Burundi	0.0886	0.0663	0.0632	0.0592	0.0693	58
Chile	0.0633	0.0595	0.1435	0.1428	0.1023	53
China	0.1002	0.0694	0.2545	0.0402	0.1161	49
Colombia	0.0416	0.0496	0.0824	0.2198	0.0984	54
Comoros	0.1982	0.1926	0.1861	0.1836	0.1901	34
Costa Rica	0.1575	0.1369	0.1714	0.1625	0.1571	39
Croatia	0.1514	0.1452	0.2057	0.1984	0.1752	37
Dominican Republic	0.1873	0.1820	0.2163	0.2860	0.2179	27
Egypt, Arab Rep.	0.2539	0.2278	0.2390	0.2590	0.2449	24
Georgia	0.2228	0.1915	0.1814	0.2399	0.2089	29
Guatemala	0.1655	0.0969	0.0775	0.1017	0.1104	51
Haiti	0.0624	0.0576	0.0722	0.0876	0.0700	57
Honduras	0.0638	0.0395	0.0656	0.1055	0.0686	59
Hungary	0.0674	0.0249	0.0078	0.0234	0.0309	70
India	0.0091	0.0048	0.0206	0.1317	0.0416	65
Indonesia	0.0721	0.0163	0.0415	0.0957	0.0564	62
Iran, Islamic Rep.	0.0587	0.0328	0.1629	0.0896	0.0860	56
Israel	0.0497	0.0134	0.0260	0.0297	0.0297	72
Jamaica	0.0160	0.0097	0.0045	0.1266	0.0392	68
Japan	0.0801	0.0364	0.0204	0.0115	0.0371	69
Jordan	0.0016	0.0029	0.0214	0.0971	0.0308	71
Kenya	0.2363	0.3831	0.5081	0.6349	0.4406	4
Korea, Rep.	0.4464	0.2715	0.2828	0.3000	0.3252	10
Kyrgyz Republic	0.2459	0.2031	0.1858	0.2619	0.2242	26
Lebanon	0.2067	0.1604	0.1715	0.1829	0.1804	35
Lesotho	0.2076	0.2448	0.2794	0.5231	0.3137	11

Table 9 B
Estimates of Digital Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Liberia	0.4027	0.2905	0.2692	0.6171	0.3949	7
Madagascar	0.3236	0.0325	0.1214	0.5331	0.2526	22
Malawi	0.1256	0.0630	0.1647	0.3653	0.1797	36
Malaysia	0.2405	0.1095	0.1821	0.2646	0.1992	32
Mali	0.2446	0.2440	0.3088	0.4566	0.3135	12
Mauritius	0.2811	0.1092	0.1592	0.5770	0.2816	16

Mexico	0.3731	0.1781	0.0405	0.2494	0.2103	28
Moldova	0.1828	0.1215	0.1318	0.1221	0.1396	43
Mongolia	0.0892	0.0668	0.2931	0.6006	0.2624	20
Mozambique	0.4633	0.3410	0.2137	0.2960	0.3285	9
Namibia	0.1944	0.0901	0.3265	0.4805	0.2729	18
New Zealand	0.2326	0.1036	0.1165	0.0815	0.1335	46
Nicaragua	0.0374	0.0061	0.0523	0.0981	0.0485	64
Norway	0.0723	0.0420	0.1128	0.0365	0.0659	60
Pakistan	0.0123	0.0010	0.0558	0.0940	0.0408	66
Paraguay	0.1162	0.1713	0.2262	0.2831	0.1992	31
Peru	0.1819	0.0848	0.0990	0.2269	0.1481	41
Philippines	0.1371	0.0547	0.0557	0.2024	0.1125	50
Qatar	0.1619	0.1375	0.1124	0.0833	0.1238	47
Romania	0.0297	0.0000	0.0125	0.0580	0.0251	73
Russian Federation	0.0584	0.0612	0.1182	0.3140	0.1380	44
Rwanda	0.1803	0.0655	0.1293	0.1941	0.1423	42
Serbia	0.1472	0.1865	0.3744	0.4429	0.2877	15
South Africa	0.3907	0.3456	0.4139	0.4910	0.4103	6
Switzerland	0.2835	0.0789	0.0703	0.0488	0.1204	48
Tajikistan	0.0254	0.0138	0.1402	0.0836	0.0657	61
Tanzania	0.1771	0.2780	0.3658	0.4194	0.3101	13
Thailand	0.2477	0.1873	0.2222	0.4985	0.2889	14
Trinidad and Tobago	0.4009	0.3102	0.2190	1.0000	0.4825	3
Uganda	0.8932	0.7994	0.8363	0.7820	0.8277	1
Ukraine	0.5214	0.2581	0.3242	0.5835	0.4218	5
United Kingdom	0.5390	0.4954	0.4895	0.4231	0.4868	2
United States	0.3912	0.3642	0.3938	0.3216	0.3677	8
Uruguay	0.2810	0.2435	0.2360	0.2541	0.2536	21
Vietnam	0.2180	0.1870	0.1959	0.3170	0.2295	25
West Bank and Gaza	0.2364	0.1653	0.1532	0.1443	0.1748	38
Zambia	0.1426	0.1499	0.3312	0.3566	0.2451	23

Table 10 A
Estimates of Composite Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Afghanistan	0.0000	0.0008	0.0128	0.0030	0.0041	75
Albania	0.1410	0.1463	0.1605	0.1719	0.1549	63
Algeria	0.0802	0.1057	0.0920	0.1007	0.0946	71
Angola	0.1009	0.0948	0.0781	0.0575	0.0829	72
Armenia	0.1049	0.1264	0.2741	0.3502	0.2139	53
Australia	0.5699	0.5667	0.5547	0.4869	0.5446	6
Bangladesh	0.0980	0.1113	0.2511	0.3878	0.2120	54
Belarus	0.3766	0.3407	0.4069	0.3145	0.3597	27
Bolivia	0.2572	0.2528	0.3018	0.4873	0.3247	34
Botswana	0.2260	0.2579	0.3088	0.5161	0.3272	32
Brazil	0.4539	0.3171	0.3242	0.5260	0.4053	21
Bulgaria	0.5192	0.4438	0.4668	0.5130	0.4857	13
Burundi	0.1136	0.0926	0.0974	0.1016	0.1013	68
Chile	0.2097	0.2232	0.3106	0.3530	0.2741	41
China	0.2350	0.2308	0.4255	0.2879	0.2948	36
Colombia	0.1467	0.1538	0.1909	0.3077	0.1998	56
Comoros	0.1892	0.1799	0.1698	0.1680	0.1767	59
Costa Rica	0.2958	0.3275	0.3500	0.3324	0.3264	33
Croatia	0.4448	0.4558	0.5479	0.5280	0.4941	11
Dominican Republic	0.2750	0.2647	0.3049	0.3411	0.2964	35
Egypt, Arab Rep.	0.2125	0.1915	0.2357	0.2548	0.2236	51
Georgia	0.3017	0.3347	0.3741	0.4474	0.3645	24
Guatemala	0.2869	0.2474	0.2335	0.2071	0.2437	47
Haiti	0.0704	0.0549	0.0726	0.0912	0.0723	73
Honduras	0.1329	0.1337	0.1746	0.1784	0.1549	64

Hungary	0.2564	0.2408	0.2421	0.3222	0.2654	42
India	0.0981	0.0888	0.1423	0.2209	0.1375	66
Indonesia	0.1268	0.1468	0.1845	0.2174	0.1689	60
Iran, Islamic Rep.	0.2613	0.3028	0.4240	0.3804	0.3421	30
Israel	0.3262	0.3572	0.3725	0.3678	0.3559	28
Jamaica	0.1814	0.1555	0.1381	0.2441	0.1798	58
Japan	0.4204	0.4727	0.4711	0.4578	0.4555	16
Jordan	0.1299	0.0749	0.1187	0.1763	0.1250	67
Kenya	0.2577	0.3959	0.5032	0.5792	0.4340	19
Korea, Rep.	0.8035	0.7009	0.7285	0.7499	0.7457	3
Kyrgyz Republic	0.2627	0.1993	0.2303	0.2977	0.2475	45
Lebanon	0.3095	0.2797	0.2889	0.2299	0.2770	39
Lesotho	0.1846	0.2254	0.2644	0.4835	0.2895	38

Table 10 B
Estimates of Composite Financial Inclusion Index across Years

Country Name	2011	2014	2017	2021	Mean	Rank
Liberia	0.3432	0.2488	0.2248	0.5123	0.3323	31
Madagascar	0.2400	0.0088	0.0854	0.4236	0.1894	57
Malawi	0.1003	0.0582	0.1441	0.2972	0.1499	65
Malaysia	0.3492	0.2796	0.3638	0.4584	0.3628	25
Mali	0.2319	0.2200	0.2604	0.3923	0.2762	40
Mauritius	0.4221	0.3130	0.3495	0.6906	0.4438	17
Mexico	0.4167	0.2634	0.1489	0.3387	0.2919	37
Moldova	0.3811	0.3643	0.4428	0.4180	0.4016	22
Mongolia	0.3744	0.3829	0.5365	0.8036	0.5243	8
Mozambique	0.5172	0.3681	0.2132	0.2835	0.3455	29
Namibia	0.2910	0.2381	0.4762	0.5723	0.3944	23
New Zealand	0.5673	0.4993	0.4918	0.4333	0.4979	10
Nicaragua	0.1110	0.0405	0.1064	0.1268	0.0962	70
Norway	0.2830	0.3869	0.4281	0.3528	0.3627	26
Pakistan	0.0796	0.0135	0.0810	0.1066	0.0702	74
Paraguay	0.1429	0.1941	0.2526	0.2850	0.2186	52
Peru	0.2012	0.1608	0.2310	0.3641	0.2393	48
Philippines	0.1711	0.1058	0.1171	0.2680	0.1655	61
Qatar	0.2918	0.2717	0.2294	0.1905	0.2458	46
Romania	0.2319	0.2180	0.2259	0.2684	0.2360	49
Russian Federation	0.3181	0.3834	0.4377	0.6201	0.4398	18
Rwanda	0.2124	0.0989	0.1475	0.1861	0.1612	62
Serbia	0.3353	0.3756	0.5313	0.6196	0.4654	15
South Africa	0.4875	0.4694	0.4962	0.5873	0.5101	9
Switzerland	0.6496	0.5213	0.5015	0.4555	0.5320	7
Tajikistan	0.0659	0.0253	0.1819	0.1162	0.0973	69
Tanzania	0.1590	0.2322	0.3022	0.3496	0.2608	43
Thailand	0.3907	0.3774	0.4262	0.6809	0.4688	14
Trinidad and Tobago	0.5319	0.4615	0.3834	1.0000	0.5942	5
Uganda	0.7497	0.6672	0.6947	0.6600	0.6929	4
Ukraine	0.5212	0.3319	0.4299	0.6802	0.4908	12
United Kingdom	0.8160	0.8249	0.8288	0.7282	0.7995	1
United States	0.7709	0.7519	0.7809	0.7254	0.7573	2
Uruguay	0.3559	0.3212	0.3853	0.5816	0.4110	20
Vietnam	0.2260	0.2020	0.2112	0.3652	0.2511	44
West Bank and Gaza	0.2469	0.1864	0.1875	0.1909	0.2029	55
Zambia	0.1420	0.1639	0.3173	0.3049	0.2320	50

For instance, Afghanistan and Angola, the nations that continue an armed conflict and suffer from an economic crisis, cannot create the proper financial environment and integrate IT. In Pakistan and Algeria, areas of financial development are limited while challenges such as regulatory constraints, low financial literacy and socioeconomic inequalities persist affecting

broader FI as showcased by (Huo, Ullah, Zulfiqar, Parveen, & Kibria, 2022; Kousar, Bhutta, Ullah, & Shabbir, 2023; Panakaje, Rahiman, Parvin, Kulal, & Siddiq, 2023). As such, these findings underscore the need for integrated policy solutions that involve securing political and economic stability, expanding the people's understanding of finances, and contributing to developing both conventional and new forms of financial access to eliminate the gap in financial inclusion.

Some of these countries include China, Mexico, Lesotho, Lebanon, and Mali, which have moderate levels of composite FI and show both achievements and weaknesses in their respective countries' financial services sectors. Each of these countries has substantially enhanced FI; however, key challenges persist that preclude these nations from raising the financial inclusion rate. For example, China has, in recent years, grown to be among the most developed countries regarding digital financial services due to the development of fintech firms; that being said, the digital divide between the urban and the rural population is well-noted (Ferilli, Palmieri, Miani, & Stefanelli, 2024). Mexico and Lebanon, in particular, have highly developed traditional FS environments but reveal issues concerning DFI development, which could be attributed to the overcomplicated regulation and different levels of info-tech implementation. The major challenges to FI in Lesotho and Mali are economic and inadequate infrastructure to extend formal financial services.

In contrast, the availability of mobile money services is looking forward to mitigating these challenges to some extent. These insights indicate that it is crucial to undertake barrier-specific interventions and use both conventional and digital media to involve a range of linkages for more effective FI. Besides, Table 10 shows the temporal trends analysis of the composite FI index for 75 countries for 2011, 2014, 2017, and 2021.

5.   Conclusion and Policy Implications
5.1. Policy Implications

The results highlight the significant variations in FI across the countries, stressing the importance of policy interventions. Specifically, for the countries from the group where both traditional and digital FI are high – the United Kingdom, the United States, South Korea, Uganda, and Trinidad – it is important not to trajectories this inclusion but to enhance it. This can be achieved by developing a more progressive set of rules, policies, and standards that support innovation in the financial markets. They should be able to offer examples of how some of the world's best practices can be emulated to bring on board solid financial systems and progressive-acting digital methods to create a balanced and all-encompassing financial platform. The policymakers of these regions should focus on sustaining the achieved results in digital financial services by guaranteeing the population the availability of technologies. In the same respect, they should also focus on rising concerns such as cybercrime and the lack of sufficient digital proficiency to maintain high forms of FI.

On the other hand, the countries with the lowest values of FI, including Afghanistan, Pakistan, Haiti, Algeria, and Angola, have many barriers to surmount that entail a comprehensive policy solution. These nations face diverse problems, such as political vulnerability, economic issues, and weak institutional and digital frameworks, making financial access a problem. To overcome these challenges, there is a need for the stabilization of the economic and political environment coupled with large expenditures in the required financial and digital structures. The other essential task is using educational measures to develop changes in the population's financial literacy, which is also necessary. Moreover, another reason for international cooperation and support might be required for these countries to develop their respective capacities to improve FI. Particularly for the countries with the mid-level FI, including China, Mexico, and Lebanon, it is crucial to implement national policies that will fill the gaps in both the conventional and digital financial sectors. In this sense, by

concentrating on these areas, these countries can improve their financial systems to higher levels, thus increasing the possibility of improved economic growth and social justice.

5.2. Conclusion

This paper offers an extensive assessment of FI via the development of the 'FI index' that considers both the physical and online financial products in diverse countries. The findings reveal huge gaps in FI, with countries such as the United Kingdom and the United States, South Korea, Uganda, and Trinidad among those that have adopted both traditional and digital FI at very high levels. These countries are examples of countries where the sound institutional foundation and spending on sound technology can propel them to an inclusive financial environment. On the other hand, countries such as Afghanistan, Pakistan, Haiti, Algeria, and Angola have had to tackle numerous challenges in terms of political stability, economic problems, and lack of appropriate facilities, which has limited their advancement in FI to a great extent. Hence, the study underlines a highly timely call for targeted policy interventions that adequately capture these countries' profiles. Those in government must continue to push for the provision of Fintech and digital financial services by addressing new issues of Cybersecurity and Digital literacy. As for the nations that rank low on the FI, efficient and long-term policies must be designed and implemented by emphasizing political and economic stabilization, infrastructural achievements, and increasing the population's financial literacy levels. The study also highlights the need for cooperation, particularly with international partners, to help these countries acquire capabilities to enhance FI. Concerning countries in the mid-level FI, such as China, Mexico, and Lebanon, the study indicates that policies can revolutionize society and the economy by addressing certain areas that have always been lacking in digital services and traditional banking systems. Furthermore, the newly developed composite FI index is a highly effective research tool for assessing the level of FI and comparing the results between countries, which is critically important for policymakers working on improving the financial inclusion situation in the world.

5.3. Limitations and Future Directions

As mentioned before, it is also clear that policymakers have a relative consensus that quality has to be a part of FI. However, quantifying this aspect is partly challenging because of the current data limitations. Nonetheless, we have endeavored to create a multidimensional composite FI index to build an objective FI based on several criteria. Therefore, we argue that policy recommendations can be more accurate, if not for the evaluation of FI, because of the availability of a more comprehensive dataset that comprises quality-related factors. Future research could follow up on this by assessing financial inclusion within digital financial markets, especially by looking at the impacts of Cryptocurrency and its effect on the financial market or focusing on the Forex market. Moreover, exploring the functionality of asymmetric information and the presence of trade wars and considering the impact of COVID-19 pandemic are also worthwhile. The following topics can be considered promising for developing new insights about FI in the context of growing sophistication and further immateriality of financial markets.

Author's Contribution:
Hina Shahzadi: Led the research design and methodology. Conducted the data collection and analysis, and was responsible for the overall synthesis of the findings.
Sofia Anwar: Developed the comprehensive index framework used in the study. Contributed significantly to the literature review and theoretical grounding of the research.
Muhammad Faraz Riaz: Performed data validation and ensured the robustness of the index metrics. Contributed to the statistical analysis and graphical representation of the results.
Muhammad Sohail Amjad Makhdum: Assisted in the development of the index framework and data collection processes.
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