The Causality between Financial Inclusion & Inclusive Growth:

Evidence from a Newly Constructed Index in Egypt

Hanan Abouelfarag
and Noha Nagy Elboghdadly

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Abstract

Financial inclusion is one of the key enablers of economic growth, poverty alleviation, and consequently achieving inclusive growth. Although the relationship between financial inclusion and economic growth has been widely investigated, its relationship with inclusive growth remains unexplored. This paper examines the causality between financial inclusion and inclusive growth in Egypt during the period (2004-2022). The novelty of this study resides in constructing two composite indices using Principal Components Analysis, one for financial inclusion and the other is a new multidimensional index for inclusive growth. The results reveal that the inclusive growth index experienced an upward trend over the study period while the financial inclusion index has started to increase since 2018. The results of the Toda-Yamamoto causality test show a bidirectional causality between financial inclusion and three of the sub-indices of inclusive growth as well as the overall inclusive growth index. The empirical evidence highlights that financial inclusion efforts will not achieve their targeted outcome unless a simultaneous inclusive growth strategy is conducted. Moreover, improving governance indicators is crucial to promoting inclusive growth.

1. Introduction

Fast economic growth is a crucial development aspect but is not always evenly distributed among all citizens. Hence, it is not merely a matter of achieving rapid growth, but also considering the growth pattern is important in reducing poverty and achieving sustainable growth (Ianchovichina et al., 2012). Economic growth that includes multiple sectors in the economy, creates new employment opportunities, and promotes equality is essential for a sustainable growth strategy. This is where the concept of inclusive growth (IG) comes into play. IG emphasizes the importance of having an equitable distribution of economic gains across the population, ensuring that everyone has access to opportunities and resources to improve their living standards.

There is no agreement on the definition of IG. In 2007, the Asian Development Bank (ADB) first proposed the new concept of "Inclusive Growth" which focuses on creating opportunities and making them accessible to all. Ianchovichina et al. (2012) stated that IG is "raising the pace of growth and enlarging the size of the economy, while leveling the playing field for investment and increasing productive employment opportunities". The OECD and UNEP defined IG as "growth which reduces poverty and inequality and benefits marginalized populations". Some definitions of IG distinguish it from pro-poor growth by incorporating non-income dimensions, such as health and educational status, employment conditions, and other aspects of life that can have a greater impact on well-being than income. The significance of non-income dimensions stems from their potential to offer opportunities and choices that are consequential for people's participation in economic life and society. Given its multidimensional nature, there is also no widely accepted measurement of IG. For instance, the ADB uses 35 indicators to measure four dimensions of IG: 1) economic growth and employment opportunities, 2) social inclusion, 3) social safety nets, and 4) good governance (ADB, 2012). Similarly, Cerra et al. (2021) measure IG through four pillars, namely, benefit sharing, opportunity, participation, and empowerment. The UNCTAD has developed an IG index which includes 27 indicators to measure four pillars: 1) economy, 2) living conditions, 3) equality, and 4) environment (UNCTAD, 2023).

As an emerging country, achieving IG is a critical imperative for Egypt, not just as an economic objective but also from social and political perspectives. According to the World Bank data, the annual GDP growth rate has increased in Egypt since 2011 and reached 6.6% in 2022. However, the unemployment rates are still far above the world average. In addition, although Egypt's score in the Human Development Index (HDI) has recently improved, it lost

around 29% of its score in 2021 when considering income inequality. Compared to some Middle East North African (MENA) countries, Egypt's inequality-adjusted HDI score in 2021 was below that of Oman, Algerie, Jordan and Tunisia. Therefore, as Egypt embarks on its ambitious development journey, ensuring that everyone benefits from economic progress is essential for sustainable growth.

Given the importance of IG, it is crucial to understand and investigate the factors that enhance its achievement. One of the key enablers of economic growth, poverty alleviation, and consequently achieving IG is financial inclusion (FI). The concept of FI has become one of the most important and widespread financial concepts since the global financial crisis in 2008. The World Bank defines FI as "individuals and businesses having access to useful and affordable financial products and services that meet their needs for transactions, payments, savings, credit, and insurance and are delivered in a responsible and sustainable way". FI can play a role in achieving IG by facilitating savings, efficient allocation of capital, and diversification of risks (Dabla-Norris et al., 2015; M. R. Sahay et al., 2015). In addition, the development of an inclusive financial sector can contribute to the non-income dimension of IG by promoting individuals' investments in their health, education, and businesses.

Several studies in the literature define FI in terms of several dimensions (Cámara & Tuesta, 2014; Ismael & Ali, 2021; Kebede et al., 2021; Sarma, 2008). For instance, Sarma (2008) proposed a multidimensional approach to compare the levels of FI across economies, incorporating information on the ease of access, availability, and usage of the formal financial system for all members of the economy. Access reflects the depth of outreach of financial services, such as the penetration of bank branches, while usage includes indicators such as the number of transactions per account and the number of borrowers. In capturing the essence of FI, the World Bank (2012) added the quality dimension which describes clients' awareness and understanding of financial products, and whether these products match clients' needs. In its new version of the financial access survey, the IMF added other aspects such as affordability, awareness of financial services and financial access gender gap (IMF, 2020).

The performance of Egypt in FI measures such as banking penetration is below the average when compared to the world regions and to some MENA countries, such as Jordan, Lebanon, Qatar, and Saudi Arabia (Bibolov et al., 2022).[1] However, FI has become a priority in Egypt's Sustainable Development Strategy (SDS): Vision 2030. The SDS aims to establish

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[1] Banking penetration shows the penetration of financial system among population, this includes the number of borrowers, depositors, and bank accounts.

an inclusive financial system that covers the needs of all segments of society, expand microfinance services, and promote digital financial services. In addition, digital banking has been gaining momentum in recent years. Between 2012 and 2021, the Middle Eastern digital banking market experienced sustained growth, rising at a 43% compound annual growth rate. According to the 'Digital Banking in the Middle East' report, the United Arab Emirates currently stands as the region's largest digital banking hub (BPC Group/Fincog, 2022). Egypt is also trying to keep pace with financial technology, where the number of fintech companies in Egypt increased by 5.5 times between 2017 and 2022 (CBE, 2023).

Although the relationship between FI and economic growth has been widely investigated, analyzing the relationship between FI and IG has not developed yet. Thus, this paper aims to explore the causal relationship between FI and IG in Egypt. The contribution of the present paper is threefold. First, we construct a new inclusive growth index (IGI) for Egypt that incorporates four dimensions (economy, living conditions, equality, and governance) based on 34 indicators during the period (2004-2022). Second, we construct a financial inclusion index (FII) based on 9 indicators covering traditional and digital access, and usage of financial services during the period (2004-2022). Third, we examine the causality between the constructed indices: the FII and the sub-indices as well as the overall index of IG.

The remainder of the paper is organized as follows: Section 2 presents the literature review. Section 3 discusses the methodological approach adopted in the construction of indices and testing causality between them. Sections 4 and 5 provide the FII and the IGI, respectively. Section 6 reports the causality results and discussion. Finally, Section 7 is the conclusion and policy implications.

2. Literature Review

The role of an efficient financial sector in enhancing economic growth goes back to Bagehot (1873) who suggested the basis of finance-led growth, highlighting the importance of the presence of an efficient financial sector to enhance economic growth through pooling together resources and allocating them to the most profitable enterprises. Similarly, Schumpeter (1911) argued that the financial system plays a positive role in enhancing economic growth, where the provision of sufficient financing facilities permits the economy to rise.

Several empirical studies have recently investigated the relationship between FI and economic growth. For instance, Lenka and Sharma (2017) constructed a FII for India using Principal Component Analysis (PCA) and found that FI has a positive effect on economic

growth both in the long run and short run. For a panel set of developed and developing countries, Sethi and Acharya (2018) concluded that there is a bi-directional causality between FI and economic growth. Similarly, Azimi (2022) reached the same conclusion that FI affects economic growth positively and there is bidirectional causality between the two variables. The studies that analyzed the effect of FI on economic growth in Egypt reached inconclusive results. On the one hand, Wafik and Omar (2022) concluded that FI (measured by total deposits and loans) had a positive effect on economic growth during the period 1980-2019. On the other hand, Mansour and Abdalla (2023) found that FI (measured by number of ATMs) had no significant impact on economic growth for the period 2004-2019. By examining the effect of sub-dimensions of FI on economic growth, Ifediora et al. (2022) used a composite index of FI and discovered that the availability dimension of FI has a positive significant impact on economic growth in sub-Sahara Africa while the effect of the usage dimension is not significant.

It is important to note that a prerequisite for the positive effect of FI on economic growth is the presence of a certain level of financial development beforehand. In the case of the presence of a fragile financial system, the effect of inclusion on growth is not significant (Silue, 2021). At the same time, the level of financial development is beneficial for economic growth up to a certain threshold. The benefits of FI to economic growth decrease as financial depth increases.[2] Financing a greater share of investment with bank credit, increasing the number of households with bank accounts and credit cards, and using accounts to receive wages have a strong link to long-term economic growth and poverty reduction. Mobile money services act as a reliable driver of digital FI that increases long-term consumption and helped reduce extreme poverty in Kenya (Suri & Jack, 2016). However, a large increase in financial depth is not necessarily a good thing, when financial sectors deepen too fast, it often leads to crises and instability, especially without adequate regulation and supervision (R. Sahay et al., 2015). Countries with high ratios of private sector credit to GDP such as Spain, Netherlands, Portugal, United Kingdom, Luxembourg, and Switzerland had a major crisis episode since 2008.

Most of the previous literature has presented evidence that high levels of FI are associated with high levels of economic growth. However, the relationship between FI and IG is not well understood. The transmission of FI to IG can be illustrated in three steps: (i) An inclusive financial system makes it easier for individuals to access financial services, it also

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[2] According to the World Bank (2016), financial depth is "the size of banks, other financial institutions, and financial markets in a country, taken together and compared to a measure of economic output".

helps in mobilizing the savings of the ageing population for investment and thus, promoting the effective allocation of productive resources (Aghion & Bolton, 1997). (ii) FI increases access to credit which enables existing businesses to expand, enhances entrepreneurial possibilities, and helps in creating jobs (Audi et al., 2019). (iii) When the poor who are unemployed are given the opportunity, they become successful economic agents in the growth process of the country. This eventually raises the income and consumption of individuals (Liu et al., 2022; Sahu, 2013), hence reducing both poverty and inequality, in addition to promoting IG (Chandran, 2011).

Few studies examined the relationship between FI and indicators of IG. For instance, Neaime and Gaysset (2018) studied the effect of FI (measured by number of banks) on income inequality (measured by the Gini index) and poverty (measured by growth rate of poverty) in a sample of MENA countries. They found a negative significant effect of FI on income inequality but no significant effect on poverty. A similar conclusion regarding the positive contribution of FI in reducing income inequality was shown by Turegano and Herrero (2018). Wang et al. (2023) constructed three indices: FI, 'information and communication technology' (ICT), and IG using PCA for a sample of 10 African countries and found that both ICT and FI have a positive significant impact on IG.

Our paper contributes to the above literature by investigating the causal relationship between FI and IG in Egypt. We examine the causality between these two variables using newly constructed indices, and more importantly, we try to identify the direction of causality not only between FI and the overall IGI, but also between FI and the sub-indices of IG to gain a better understanding of the role of FI in all aspects of IG.

3. Data and Methodology

In this section, we first identify the most important indicators and the methodology used to construct the FII and the IGI in Egypt during the period 2004-2021. Second, we explain the method of testing the causality between the two indices.

3.1. Construction of the Financial Inclusion index
3.1.1. Indicators

FI is a complex concept that is determined by the interplay of several variables. Access and usage are the most commonly used concepts to monitor the progress made in deepening the FII (Beck et al., 2007; Cámara & Tuesta, 2014; Kebede et al., 2021; Sarma, 2008). The FII constructed in this paper includes 9 variables which can be grouped into two dimensions as

shown below in Table (1). The first is traditional and digital access dimension. The indicators widely used in this regard refer to the number of ATMs available, in addition to the number of bank branches (Roa et al., 2014). The first indicator works better since the use of financial services greatly depends on geographic availability which is easier and more economical to achieve through ATMs or electronic banking. Some recent studies have begun to incorporate digital indicators to measure FI (Cámara & Tuesta, 2014; Ismael & Ali, 2021; Khera et al., 2022; Maino et al., 2019; Sahay et al., 2020). These indicators include accessing financial services through mobile phones and using mobile accounts to make or receive payments. For instance, Ismael and Ali (2021), for Egypt, and Khera et al. (2022), for some developing countries, constructed both traditional and digital FII. The incorporation of digital indicators provides a more comprehensive understanding of FI, enabling the evaluation of how technology supports FI. In this paper, we include digital indicators such as mobile subscriptions and using the internet to access financial services (Khera et al., 2022). The second is the usage dimension. To assess the extent of usage of formal financial services, three indicators were utilized: outstanding deposits with commercial banks, outstanding loans from commercial banks, and number of borrowers from commercial banks. Practically, the major challenge that affects the choice of indicators is the data availability. Due to the lack of data for the whole period of our study, we could not include digital indicators for the usage dimension.

Table (1): Variables Included in Egypt Financial Inclusion Index

Dimension	Variable	Source
Access	**Traditional Access** 1. Number of commercial bank branches per 1000 km2	Financial Access Survey (FAS), IMF
	2. Number of commercial bank branches per 100, 000 adults	
	3. Number of ATMs per 1,000 km2	
	4. Number of ATMs per 100,000 adults **Digital Access** 5. Mobile cellular subscriptions (per 100 people) 6. Individuals using the Internet (% of population)	World Development Indicators (WDI)
Usage	7. Number of borrowers from commercial banks per 1,000 adults	(FAS), IMF
	8. Outstanding deposits from commercial banks (% of GDP)	
	9. Outstanding loans from commercial banks (% of GDP)	

3.1.2. Methodology

To compute a measure of the FI in Egypt, we use the principal component analysis (PCA). The PCA is a statistical technique which is widely used to reduce the number of variables in a dataset into a smaller set of uncorrelated factors, called principal components, where each component is a linear weighted combination of the initial variables (Jolliffe & Cadima, 2016; Krishnan, 2010). Unlike the non-parametric approaches which typically assign ad hoc weights on variables in creating an index, PCA, as a parametric method, determines the weights of variables and dimensions endogenously (Tram et al., 2021), resulting in a more robust and accurate assessment.

To create a single FII, the methodological steps proceed as follows. First, we test for the suitability of data to conduct PCA using two measures: the Kaiser-Meyer-Olkin (KMO) test, which measures the sampling adequacy, and Barlett's test of sphericity which tests whether variables are orthogonal. The KMO measure takes values from 0 to 1, where the minimum acceptable value for factor analysis is 0.5 (Cerny & Kaiser, 1977; Field, 2013).

Second, upon satisfaction of the above two tests, the factor or component score coefficients are estimated using the regression method as follows:

$$PC_1 = \beta_1 X_{1t} + \beta_2 X_{2t} + .. + \beta_3 X_{3t} + e_t \qquad (1)$$

where PC_i is the estimated component /factor score, X_1, X_2, … X_n are the indicators of FI as explained in Table 1, and e is the error term.

The order of the components is determined by the amount of variation in the original variables explained by each component such that the first component explains the largest amount of variation. Therefore, the nine variables mentioned above can be reduced into one index explaining most of the variation of the data. The choice of the number of principal components to be retained depends on the explained percentage of total variation in the data and the eigenvalue. The eigenvalue represents the variance of each principal component, where according to Kaiser rule, components of eigenvalue larger than 1 are extracted (Kaiser, 1960). In addition, it is generally recommended that the cutoff percentage of variation explained by components be at least 70-75% (Jolliffe, 2002). Some other studies recommend that the components extracted should explain more than 60% of the variance (Chadha & Chadda, 2020).

Third, a non-standardized financial inclusion index (NSFII) is constructed by summing the extracted factor scores weighted by their proportion of percentages explaining the total variation (Chadha & Chadda, 2020; Krishnan, 2010; Sekhar et al., 1991), as follows:

$$NSFII_t = \frac{\sum_j^p \gamma_j PC_j}{\sum_j^p \gamma_j} \qquad\qquad (2)$$

Where γ_j is the proportion of the variation of the jth principal component.

Fourth, to facilitate interpretation, a standardized FII taking values between 0 and 1 is calculated as follows:

$$FII_t = \frac{NSFII_t - Min\ (NSFII)}{Max\ (NSFII) - Min\ (NSFII)} \qquad\qquad (3)$$

3.2. Construction of the Inclusive Growth Index

3.2.1. Indicators

There is no agreement on the dimensions and indicators used to measure IG. In our paper, we mainly rely on three references. First, the IGI developed by the UNCTAD and EEC which considers three main pillars: Economy, living conditions and equality (UNCTAD and EEC, 2019). Each pillar includes several indicators. The economy pillar includes variables such as GDP per capita, labor productivity, employment rate and exports of goods and services. Living conditions pillar includes, among others, school enrollment and coverage of essential financial services. Gini index, the ratio of female to male employment rate and poverty headcount ratio are some of the indicators used to account for inequality. Second, the Asian Development Bank IG indicators (ADB, 2012; McKinley, 2010), which are grouped into four dimensions: growth and expansion of economic opportunities, social inclusion, social safety nets, and governance indicators. Third, we use some indicators used in the IGI constructed by Bibolov et al. (2022), where eight sub-indices "1) income inequality, 2) access to education, 3) access to health services, 4) financial inclusion, 5) labor market inclusion, 6) private sector inclusion, 7) gender inclusion, and 8) quality of governance" are underlying the overall index.

Our IGI is composed of four dimensions: **1) Economy**, which includes indicators measuring economic growth, employment, and labor productivity. Besides, to gain insights into the underlying drivers of economic growth, we also include the value added of different sectors of the economy (McKinley, 2010). **2) Living conditions** include indicators of infrastructure, health, and education. **3) Equality**, including income inequality and gender equality. **4) Governance**. All details of variables and sources of data used are presented in Table (2).

Table (2): Variables included in Egypt Inclusive Growth Index

Dimension	Economy	Living Conditions
Indicators	1. GDP per capita (constant 2015 US$) 2. Adjusted net national income per capita (constant 2015 US$) 3. Agriculture, forestry, and fishing, value added (constant 2015 US$) 4. Industry (including construction), value added (constant 2015 US$) 5. Services, value added (constant 2015 US$) 6. GDP per person employed (constant 2017 PPP $) 7. Employment to population ratio, 15+, total (%) (modeled ILO estimate) 8. Self-employed, total (% of total employment) (modeled ILO estimate) 9. Exports of goods and services (% of GDP) 10. Electricity Consumption Per Capita MWH/Capita	1. Fixed broadband subscriptions (per 100 people) 2. People using safely managed sanitation services (% of population) 3. Life expectancy at birth, total (years) 4. Mortality rate, under 5 (per 1,000 live births) 5. Immunization, DPT (% of children ages 12-23 months) 6. Percentage of expenditures on health to public expenditure of the state 7. School enrollment, primary (% gross) 8. Expected Years of Schooling (years) 9. Percentage of expenditures on education to public expenditure of the state
Sources	All variables are from the World Development Indicators (WDI), World Bank, except: (10) from International Energy Agency (IEA)	All variables are from the World Development Indicators (WDI), World Bank, except: (6, 9) from Central Agency P (8) Human Development report data (HDI)

Dimension	Equality	Governance
Indicators	1. Gini Index 2. Employment to population ratio, 15+, female (%) (modeled ILO estimate) 3. Employment in services, female (% of female employment) (modeled ILO estimate) 4. Ratio of female to male youth unemployment rate (% ages 15-24) 5. Employment, youth total (% of total labor force ages 15-24) 6. Ratio of female to male labor force participation rate (%) (modeled ILO estimate) 7. Share of seats in parliament, female (% held by women) 8. Ratio of female to male mean years of schooling 9. Ratio of Gross National Income Per Capita (2017 PPP$) of female to male	1. Control of Corruption 2. Government Effectiveness 3. Political Stability and Absence of Violence 4. Regulatory Quality 5. Rule of Law 6. Voice and Accountability
Sources	(1) World Income Inequality Database (2,3,4,5) World Development Indicators (WDI) (6, 7) UN Women https://data.unwomen.org/ (8,9) Calculated by the authors based on data from Human Development Report	All variables are from Worldwide Governance Indicators (WGI), World Bank.

3.2.2. Methodology

The IGI will be constructed using the PCA, thus the same steps explained in subsection (3.1.2) will be followed. However, in constructing the IGI we use a two-stage PCA (Cámara & Tuesta, 2014; Nagar & Basu, 2002). In the first stage, PCA is applied to create four sub-indices: economy, living conditions, equality, and governance (ECO, LIVING, EQU and GOV). In the second stage, PCA is applied again, where we use the previously constructed sub-indices as indicators to construct the overall IGI. Two advantages stem from this approach. First, given a large number of indicators (in our case 34 indicators), it is not preferred to estimate the overall index directly to avoid biases that might occur due to highly correlated variables (Chadha & Chadda, 2020; Mishra, 2007). Second, analyzing the trend of the four dimensions separately is more informative for policymaking in assessing IG.

Estimating the four sub-indices: ECO, LIVING, EQU and GOV will follow the same steps as in equations (1) to (3). Then, the overall IGI will be similarly estimated with the four sub-indices as explanatory variables as follows:

$$IGI_t = \omega_1 ECO_t + \omega_2 LIVING_t + \omega_3 EQU_t + \omega_4 GOV_t + \varepsilon_t \qquad (4)$$

where t is year, ε is the error term.

3.3. Causality

Testing the causality between FI and IG proceeds through the following steps. As a preliminary step, the stationarity properties of the data are investigated using the Augmented Dickey–Fuller (ADF) test in addition to the Phillips-Perron unit root tests which uses a nonparametric method to consider the probability of serial correlation in the residuals. However, Perron (1989) showed that failure to allow for an existing break leads to a bias that reduces the ability to reject a false unit root null hypothesis. To overcome this, Perron proposed allowing for a known or exogenous structural break in the Augmented Dickey-Fuller (ADF) tests. Therefore, a modified Dickey-Fuller test which allows for levels and trends that differ across a single break date is utilized. The testing framework follows the work of Perron (1989), (Banerjee et al., 1992), and Vogelsang and Perron (1998).

If the variables were found stationary at level, the traditional Granger non-causality test is utilized, however, if some variables were stationary at first difference, the modified procedure of Toda and Yamamoto (1995) will be used. The non-Granger causality test of Toda and Yamamoto (1995) avoids the problems associated with the ordinary Granger causality test when the series are non-stationary. The basic idea of the Toda and Yamamoto approach is

to augment the correct VAR order (p) by the maximal order of integration of the variables (m), and then estimate the augmented VAR that guarantees the asymptotic distribution of the Wald statistic. Three stages are involved in implementing those procedures. The first stage is to determine the maximum order of integration (m) of the variables in the system. The second stage involves estimating a Vector Auto Regressive (VAR) model of the variables in their levels with optimal lag length determined based on any of the information criteria, such as the Akaike Information Criterion (AIC), or the Schwarz Information Criterion (SIC). Subsequently, making sure that the VAR is well-specified.[3] In the third stage, the favored VAR model is constructed, and additional m lags of each variable are inserted into each equation. The modified Wald procedure has been used to test the VAR (k) model for causality where k = (p + m).

Dummy variables representing the structural breaks in variables taking the value of 1 on the break date and 0 otherwise are added to the causality test equation. Following Yamada and Toda (1998), the Toda-Yamamoto causality test can be used in a bivariate setting by fitting the following augmented VAR (p+m) model:

$$\log(FI)_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \log(FI)_{t-i} + \sum_{i=p+1}^{p+m} \alpha_{2i} \log(FI)_{t-i} + \sum_{i=1}^{p} \beta_{1i} \log(X)_{t-i} + \epsilon_{1i} \sum_{i=p+1}^{p+m} \beta_{2i} \log(X)_{t-i} + \epsilon_{1i}$$

(5)

$$\log(X)_t = \theta_0 + \sum_{i=1}^{p} \theta_{1i} \log(X)_{t-i} + \sum_{i=p+1}^{p+m} \theta_{2i} \log(X)_{t-i} + \sum_{i=1}^{p} \omega_{1i} \log(FI)_{t-i} + \epsilon_{1i} \sum_{i=p+1}^{p+m} \omega_{2i} \log(FI)_{t-i} + \epsilon_{1i}$$

(6)

4. Financial Inclusion Index

### 4.1. Analysis of Financial Inclusion Indicators in Egypt

Before analyzing the constructed FII, it is imperative to first examine the trend of the FI indicators, which are explained in the previous section in Table 1, to gain a better understanding of the overall index. The banking density, measured by bank branches per 100,000 adults, was considered at low levels till 2018, where residents in most of rural Egypt have no access to

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[3] The VAR residual LM test is used to check for autocorrelation and the estimated model is checked for the stability conditions by finding the inverse root.

bank branches or even ATMs. According to the World Bank data, the share of population in rural areas was 57% on average and in its rural areas in Upper Egypt, the poverty rate reached nearly 43%. The situation has improved thereafter through increasing the number of branches and expanding the reach of ATM networks. The number of commercial bank branches per 100, 000 adults increased by 33% (from 4.71 in 2018 to 6.27 in 2019), while the number of commercial bank branches per 1000 km2 increased by 36% (from 3.26 in 2018 to 4.43 in 2019) as shown in Figure (1). To increase the number of ATMs in line with the global average, in 2020, the CBE launched an initiative to set up an additional 6500 ATMs across the country's smaller towns and rural areas by December 2021. Moreover, the launch of Meeza cards in November 2021 aimed at fostering FI and facilitating the transition to a cashless society. The government distributed 21 million of these Meeza cards and supplied the market with 700,000 ATMs where Meeza cardholders can withdraw money. Therefore, the Number of ATMs per 100,000 adults increased by 56% from 18.9 in 2019 to 29.5 in 2022.

Figure (1): Traditional access indicators of FI in Egypt during (2004-2022)
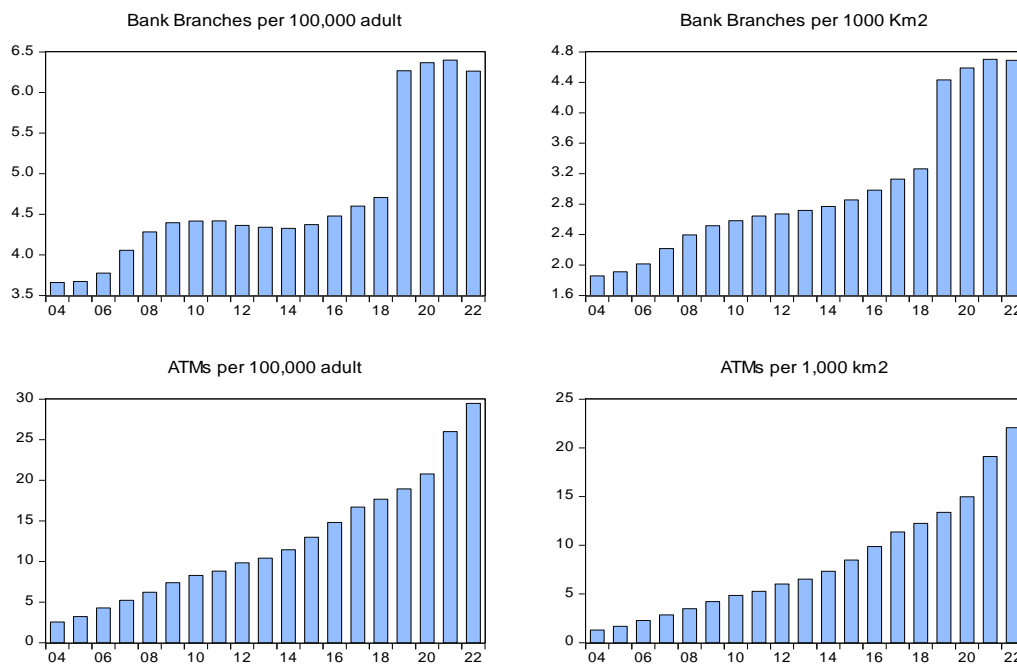
Regarding digital FI access, Egypt made significant progress in terms of regulatory policies promoting technology in retail banking, making banking services more accessible to unbanked consumers, small and medium enterprises and people living in remote areas. Furthermore, the high percentage of the youth population has driven consumer demand for digital banking up. There were a reported 90.27 mobile subscriptions per 100 inhabitants in Egypt in 2019, up from 9.86 in 2004 as shown in Figure 2. The COVID-19 pandemic rapidly

transformed Egypt's banking landscape; before the pandemic, only about half of the country's banks offered mobile banking services to their customers due to regulatory concerns over poor security practices. With customers kept away by lockdowns, local banks invested heavily in their infrastructure, accelerating digitalization, and providing a wide range of mobile services. By the end of 2020, 32 out of 38 banks offered internet banking services and 28 had been granted mobile banking licenses. The number of mobile wallet users reached 16.3 million and mobile subscriptions reached 94.68 in 2021. Figure (2) shows the dramatic increase in the number of individuals using the Internet (from 12% in 2012 to 72% in 2022). However, the Oxford Business Review (2021) highlighted the heavy reliance of the Egyptian economy on cash as the informal sector represents about 50% of the economic activities and cash payments constitute almost 55% of online purchases.

Figure (2): Digital access indicators of FI in Egypt during (2004-2022)
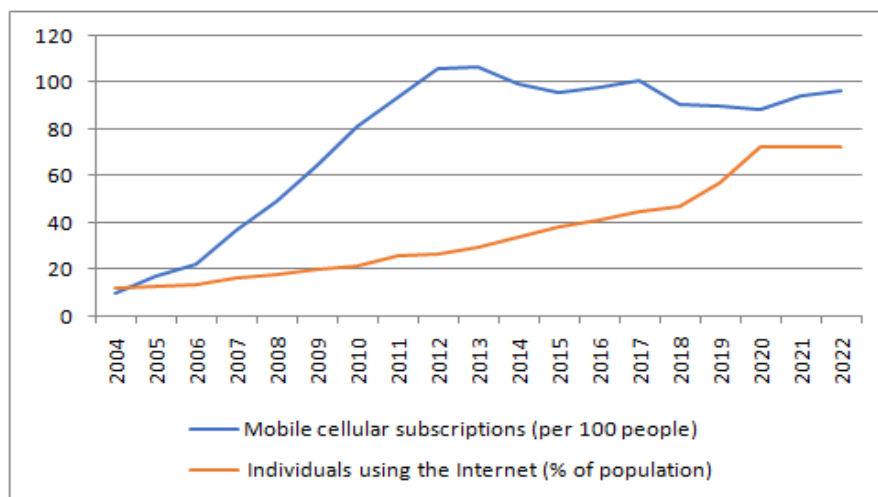
Usage of financial services, represented by outstanding deposits with commercial banks (% of GDP) and outstanding loans from commercial banks (% of GDP), experienced a downward trend from 2004 to 2014, then increased thereafter. The latest data from 2022 indicates that outstanding loans from commercial banks (% of GDP) nearly doubled over the last decade, increasing from 26.6 % in 2013 to 52.2 % in 2022. The third indicator used in this regard is the number of borrowers from commercial banks per 1,000 adults which experienced an upward trend throughout the study period, where it increased from 29.07 in 2004 to 110.6 in 2022.

Figure (3): Usage indicators of Financial Inclusion in Egypt during (2004-2022)
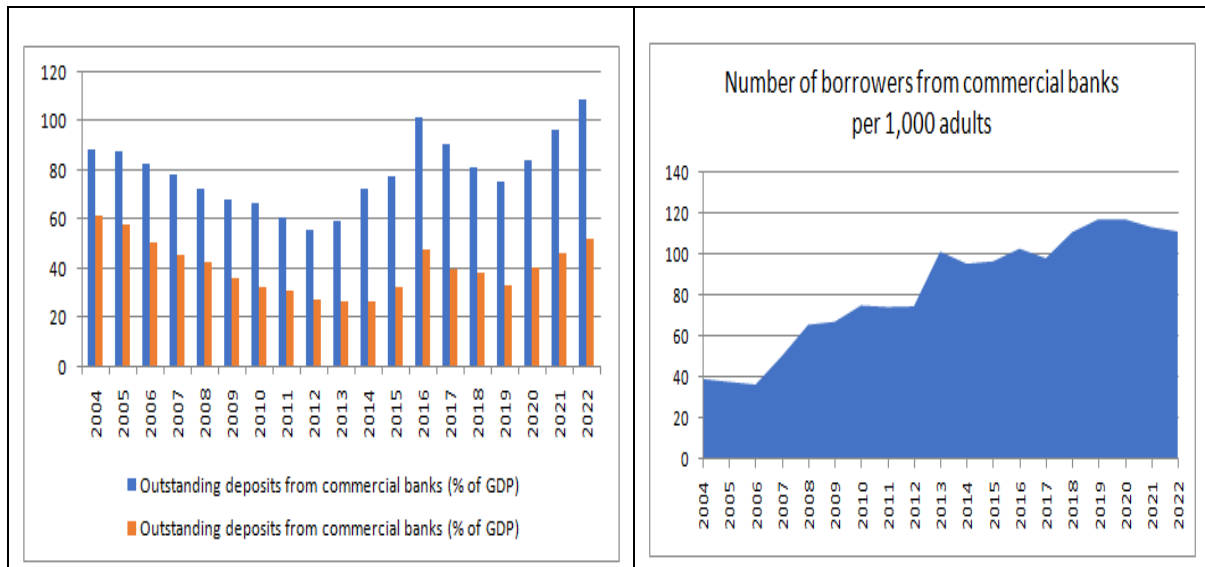
4.2.　Constructed Financial Inclusion Index

As mentioned in Section 2, we start by checking the suitability of data to conduct PCA. We use IBM SPSS Statistics 29 software in all steps for constructing the indices.[4] Results regarding the KMO test and Bartlett's test are reported in Table 3, where the value of KMO is 0.740 (>0.5) and the significance of Barlett's test is less than 0.001 (i.e. less than the critical value of 0.05), indicating that correlation matrix is not identity and hence there is a relationship between variables allowing for factor analysis to be conducted.

Table (3): KMO and Bartlett's test for Financial Inclusion

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.740
Bartlett's Test of Sphericity	**Approx. Chi Square**	414.663
	df	36
	Sig.	<0.001

Source: Compiled by the authors using SPSS.

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[4] One of the limitations with dealing with many variables either when constructing the FI or inclusive growth index is that we find few data are missing. Hence, to deal with this we replace missing data using SPSS either by linear interpolation (if missing data is in the middle of the time series) or linear trend at point (if missing data is in the last year of the time series).

The results of the eigenvalues and factor loadings are presented in Table 4.[5] According to the results, only the first two components show an eigenvalue larger than 1, with the first principal component accounting for 70% of the variance of the data, followed by 24% by the second component. Hence, these two components account for 92% of the total variance in our FII. Based on the reported factor loadings in Table 4, all 'access' indicators showed high positive factor loadings for the first component with the highest factor loadings corresponding to the usage of the internet and the number of ATMs per 100,000 adults. For the second component, two indicators of 'usage' showed high factor loadings, where the factor loading of outstanding loans is higher than outstanding deposits. Generally, a large absolute value of factor loading implies a larger weight of this variable in influencing the component. Hence, we can interpret the first component as a measure of access, while the second component as a measure of usage since the first component is dominated by the access indicators.

Table (4): Rotated Component Matrix of Financial Inclusion Index

Indicators	PC1	PC2
Use Internet	**0.992**	0.051
ATM/adult	**0.991**	0.048
ATM/Km	**0.987**	0.092
Branches/ Km	**0.977**	0.016
Branches/ adult	**0.934**	0.030
Borrowers	**0.907**	-0.330
Mobile sub.	**0.684**	-0.651
Outstanding loans	-0.126	**0.984**
Outstanding Deposits	0.464	**0.823**
Initial Eigenvalues **Total**	6.305	2.718
% of variance	70.055	24.195
Cumulative %	70.055	**94.251**

Source: Compiled by the authors using SPSS
  *Extraction Method: Principal Component Analysis
 * Rotation Method: Varimax with Kaiser Normalization
  *Rotation converged in 3 iterations

Given the results in Table 4, eq. (2) can be written as NSFII= $\frac{70.005}{94.251}(PC_1\ score) + \frac{24.195}{94.251}(PC_2\ score)$. After standardization, the constructed FII illustrated in Figure 4 indicates

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[5] Since variables are not standardized, we use the correlation matrix in conducting PCA.

that Egypt had a low level of FI ($0 \leq FII \leq 0.5$) during the period 2004-2016. This was mainly due to the relatively low levels of all access indicators considered, mainly the geographic access (number of ATMs and number of commercial bank branches per 1000 Km2). Besides, the percentage of outstanding deposits and loans declined during this period. However, there has been great improvement since 2018, when the FII increased by around 140% from 2018-2022.

Figure (4): Financial Inclusion Index in Egypt (2004-2022)
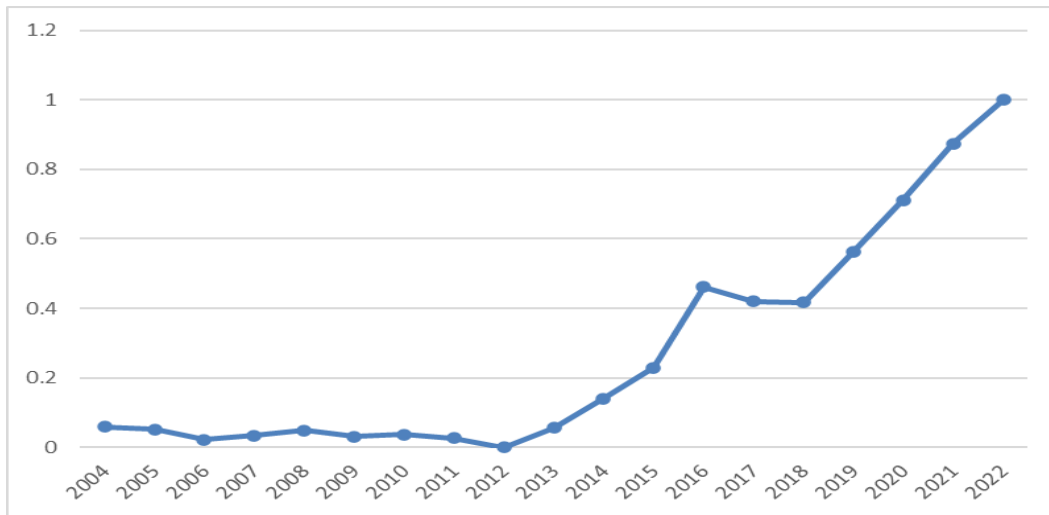
Source: Authors' calculations.

5. Inclusive Growth Index

In this section, we construct the four sub-indices of IG, after which the overall IGI will be estimated. We start by checking the suitability of data for conducting PCA for all indices. Based on Table 5, the KMO and Bartlett's test of sphericity are satisfied.

Table (5): KMO and Bartlett's test for Inclusive Growth Index

		Economy	Living Conditions	Equality	Governance	Overall IGI
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.824	0.779	0.733	0.549	0.749
Bartlett's Test of Sphericity	**Approx. Chi Square**	495.349	266.966	162.327	70.132	93.601
	df	45	36	36	15	6
	Sig.	<0.001	<0.001	<0.001	<0.001	<0.001

Source: Compiled by the authors using SPSS.

5.1. Economy Dimension

Table 6 shows that the first PC explains around 83% of the variation of the data with an eigenvalue larger than 8. The factor loadings of the first two PCs with eigenvalue larger than 1 show that PC2 has only one variable with large factor loading (electricity consumption with 0.73), while most of the other variables are captured by PC1. Given that PC1 explains a large satisfactory percentage of the variation of the data, we extract the first PC only as the economy index.

PC1 shows that the highest factor loading is associated with the agricultural and service sector value added (0.995 each), followed by industry value added, GDP per capita and labour productivity. Most of the variables have very close factor loading implying that there is no specific indicator that dominates this index. However, the lowest factor loading is for electricity consumption with 0.651, indicating a smaller weight for this indicator in the index.

Table (6): Component Matrix of Economy sub-index

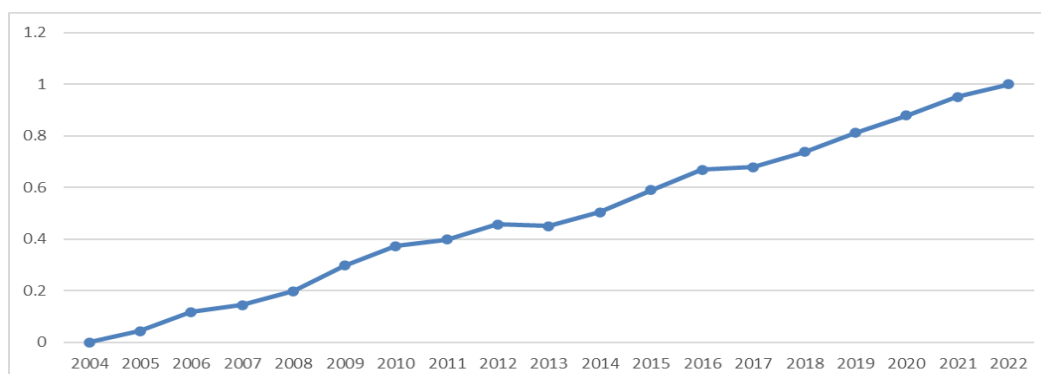| Indicators	PC1
Agriculture VA	0.995
Service VA	0.995
Industry VA	0.980
GDP per Capita	0.979
GDP per person employed	0.976
Adj NNI per capita	0.965
Self-employment	-0.926
Exports of G&S	-0.865
Employment	-0.694
Electricity consumption	0.651
Initial Eigenvalues Total	8.298
% of variance	82.979
Cumulative %	**82.979**

Source: Compiled by the authors using SPSS
*Extraction Method: Principal Component Analysis
* 1 component is extracted

The economy sub-index illustrated in Figure (5) has an increasing trend over the study period. This was mainly driven by the increasing trend of the sectoral value added, GDP per capita and labour productivity. On the other hand, the employment ratio, percentage of self-

employed and exports of goods and services were all declining during this period, and hence negatively correlated with the economy index.

Figure (5): Economy sub-index in Egypt (2004-2022)

Source: Authors' Calculations.

5.2. Living Conditions

The results of constructing the living condition sub-index are reported in Table 7 and Figure 6.

Table (7): Component Matrix of Economy Sub-index

Indicators	PC1
People using safely managed sanitation	0.993
Expected years of schooling	0.986
Under 5 Mortality rate	-0.986
Life expectancy at birth	0.942
Fixed broadband subscription	0.940
Public exp. on education	-0.871
Children Immunization DPT	-0.768
School enrollment, primary (gross)	-0.730
Public exp. on health	0.351
Electricity consumption	0.651
Initial Eigenvalues Total	6.705
% of variance	74.504
Cumulative %	**74.504**

Source: Compiled by the authors using SPSS
 *Extraction Method: Principal Component Analysis
  * 1 component is extracted

According to the extracted results, only the first two PCs have an eigenvalue larger than 1. However, similar to the previous index, we extract the first PC only since all variables' factor

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loadings under PC2 are less than 0.4 except for the public expenditures on health. Hence, given the satisfactory percentage of variation explained by PC1 (which is 74.5%), only PC1 will be used to determine the living conditions sub-index.

The living condition sub-index has an increasing trend in Egypt during the period (2004-2022). This was mainly driven by an increasing trend of the two infrastructure indicators (safely managed sanitation with 0.993, and fixed broadband subscription with 0.94), and life expectancy. In addition, the mortality rate of those under 5 has been declining during the study period by around 50% which improves living conditions. Although public expenditures on health have slightly increased during this period, its factor loading is the smallest (only 0.351). Regarding the education indicators, expected years of schooling have the largest factor loading and it shows an increasing trend during this period. However, public expenditure on education has been decreasing and hence affects living conditions negatively during this period.

Figure (6): Living condition sub-index in Egypt (2004-2022)
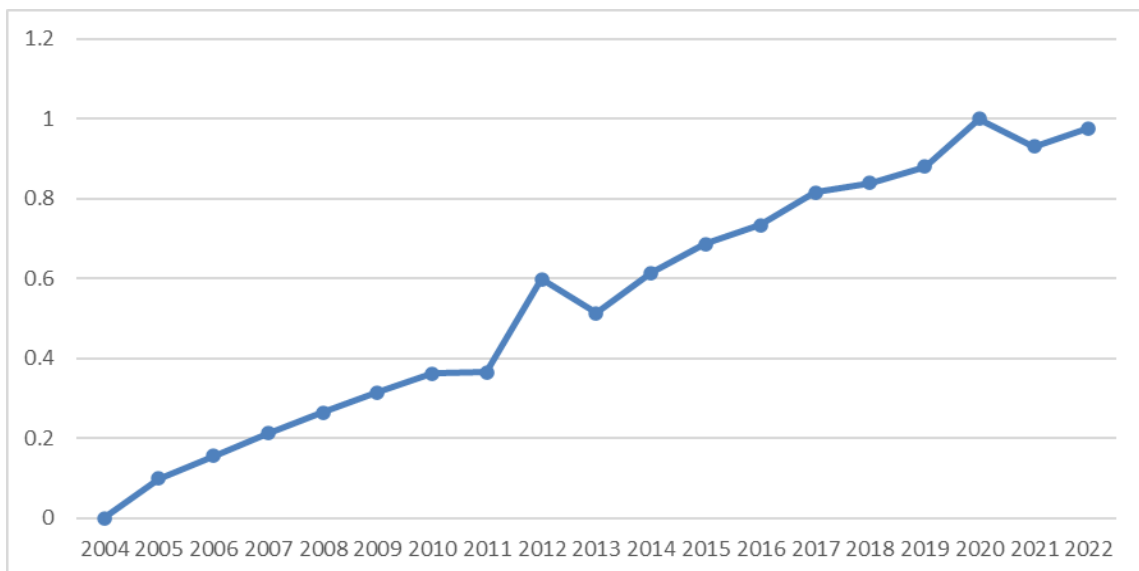
Source: Authors' Calculations.

5.3. Equality Sub-index

Based on the results in Table 8, two principal components have eigenvalues larger than 1. The percentage of variance explained by the first and the second components is 57% and 22%, respectively. The two components will be retained to construct the equality index. The first component is dominated by the female status in the labor market, the gender gap in education and income inequality. The female employment in service sector (as % of female employment), the ratio of female to male mean years of schooling, and the share of parliament seats held by

women capture the largest weights in the equality dimension, where the factor loadings of the three indicators are 0.916, 0.903, and 0.892, respectively. The factor loading corresponding to income inequality is 0.527. The second component, which contributes by a smaller share to the equality index, is dominated by the gender gap in youth unemployment (measured by ratio of female to male youth unemployment), followed by gender gap in income (measured by ratio of female to male gross national income per capita), with factor loading 0.934 and 0.865, respectively. This is followed by the percentage of employed youth and the gender gap in labor force participation.

Table (8): Rotated Component Matrix of Equality sub-index

| Indicators	PC1	PC2
Female employment (services)	**0.916**	0.254
Female/Male mean years of schooling	**0.903**	-0.010
Shares of seats in Parliament by women	**0.892**	0.299
Female employment (% of pop)	**-0.765**	-0.504
Gini Index	**0.527**	-0.102
Female/Male youth unemployment	0.091	**0.934**
Female/Male gross national income	0.161	**-0.865**
Employment youth	0.402	**0.853**
Female/Male labor force participation	-0.624	**-0.688**
Initial Eigenvalues		
Total	5.145	1.993
% of variance	57.162	22.149
Cumulative %	57.162	**79.311**

Source: Compiled by the authors using SPSS
 *Extraction Method: Principal Component Analysis
 * Rotation Method: Varimax with Kaiser Normalization
 *Rotation converged in 3 iterations

The trend of the constructed equality sub-index in Figure 7 is increasing during the period (2004- 2022). This is mainly driven by gender equality and improvement in opportunities for women, where the three main indicators: female employment in the service sector, female to male means year of schooling and share of female in parliament seats have experienced an increase during this period. For instance, women are currently enjoying the highest level of political participation in the history of Egypt (OECD, 2018), where the share of parliament seats held by women increased from 2.18% in 2014 and 2015 to around 22.8% in 2021.

Figure (7): Equality sub-index in Egypt (2004-2022)
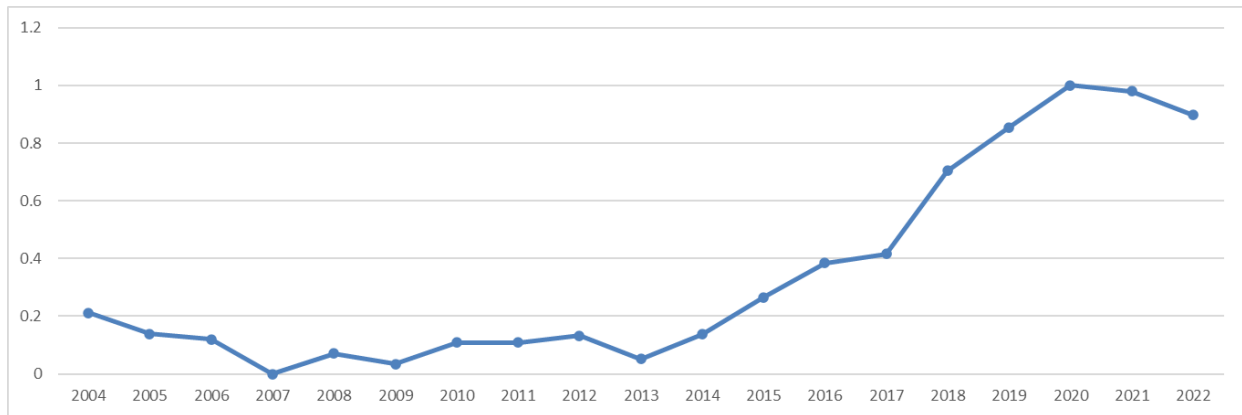
Source: Authors' Calculations.

5.4. Governance Sub-index

According to the results reported in Table 9, we take the weighted average of the first two PCs. The first component which has a larger weight is dominated by political stability, followed by the rule of law, government effectiveness and regulatory quality. However, the second component with lower weight is dominated by voice and accountability followed by control of corruption. Both components explain around 75% of the total variation of the data.

Table (9): Rotated Component Matrix of Governance sub-index

Indicators	PC1	PC2
Political Stability and Absence of Violence	**0.950**	-0.113
Rule of Law	**0.934**	-0.088
Government effectiveness	**0.863**	-0.226
Regulatory quality	**0.682**	0.276
Voice and Accountability	0.058	**0.924**
Control of Corruption	-0.132	**0.700**
Initial Eigenvalues		
Total	3.041	1.456
% of variance	50.691	24.271
Cumulative %	50.691	**74.962**

Source: Compiled by the authors using SPSS
 *Extraction Method: Principal Component Analysis
  * Rotation Method: Varimax with Kaiser Normalization
   *Rotation converged in 3 iterations

The governance sub-index fluctuated with a declining trend during the period 2004-2022. The index dropped significantly since 2009 and reached its minimum in 2014. This is mainly due to the dominant effect of political stability, which also declined since 2009 and

continued to decrease during and after the 2011 revolution till it reached its minimum level in 2014, after which it started to increase. In addition, rule of law and government effectiveness, the indicators with the second and third highest factor loadings, showed a declining trend since 2004 and then reached the minimum in 2012, after which both indicators began to increase. Both voice and accountability and control of corruption, which are the dominant indicators of PC2, showed a declining trend during the period of study. However, control of corruption has also started to increase since its minimum level in 2020.

Figure (8): Governance sub-index in Egypt (2004-2022)
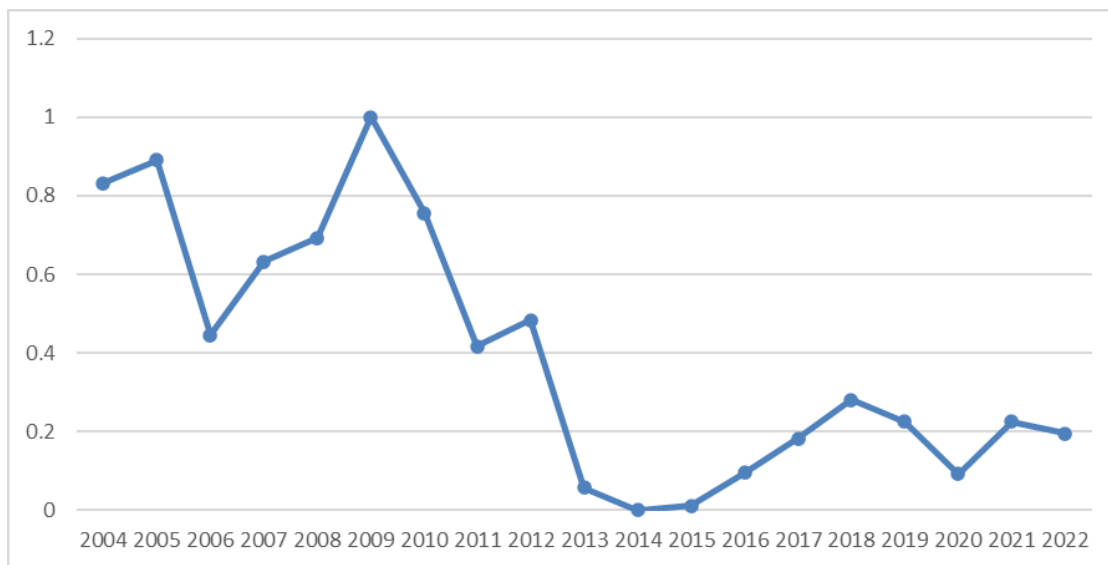
Source: Authors' Calculations.

5.5. The Overall Inclusive Growth Index

As mentioned in Section 3, the second stage of constructing the IGI will use the four-constructed sub-indices as explanatory variables. The results are reported in Table 10, where only the first principal component has an eigenvalue larger than 1 and hence is extracted. The first principal component explains 83.5% of the percentage of variance.

The overall IG in Egypt has shown an increasing trend since 2009. Based on the factor loadings reported in Table 10, both living condition and economy indices have the largest factor loadings with 0.983 and 0.981, respectively, indicating that the two dimensions are nearly equally weighted and the most important in constructing the IGI in Egypt. The increasing trend of equality, which was dominated by gender equality, also contributed to the rising trend of the IGI, however with a lower factor loading (0.870). On the other hand, governance contributed

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negatively to the IGI with the lowest factor loading (0.809). The results of our IGI reveal that the four dimensions are important in determining the inclusiveness of the economy.

**Table (10): Component Matrix of Economy sub-index**

Indicators	PC1
Living Conditions	0.983
Economy	0.981
Equality	0.871
Governance	-0.809
Initial Eigenvalues	
Total	3.341
% of variance	83.535
Cumulative %	**83.535**

Source: Compiled by the authors using SPSS
  *Extraction Method: Principal Component Analysis
  * 1 component is extracted

Figure (9): The Inclusive Growth Index in Egypt (2004-2022)
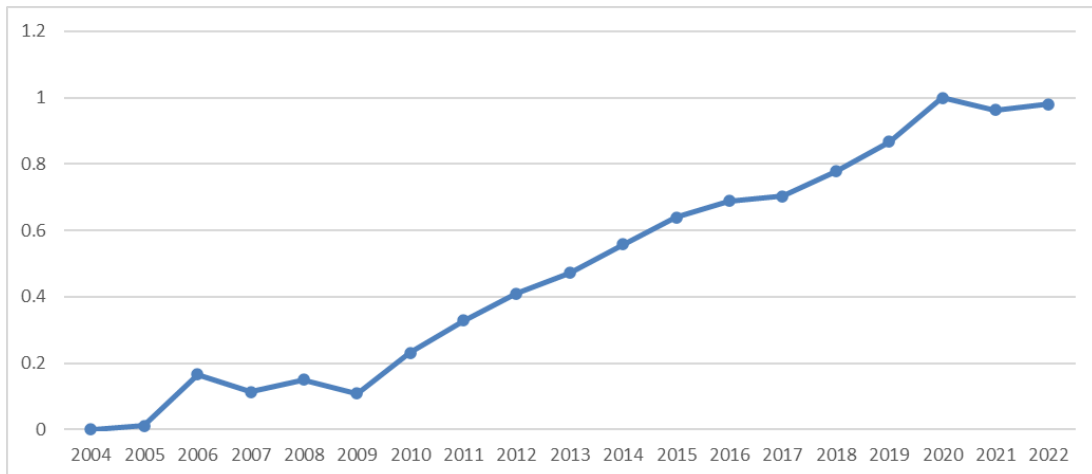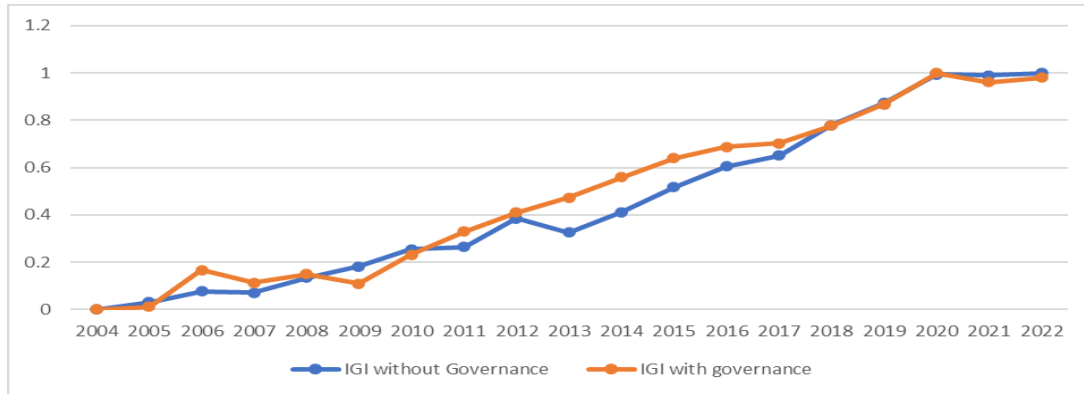

Source: Authors' Calculations.

5.6. Alternative Versions of the Inclusive Growth Index

In this subsection, we tried alternative versions of the IGI to check to which extent adding or removing one of the dimensions affects the constructed index.

First, if the governance sub-index is removed, the factor loadings of the three remaining dimensions are Economy (0.985), Living conditions (0.975), and Equality (0.924) which are nearly equally weighted. Compared to Table 8, factor loadings of the three dimensions are very

close.[6] Referring to figure10, there is a slight difference between the two indices, however, they both show the same trend.

Figure (10): The IGI in Egypt with vs without Governance

Source: Authors' Calculations.

Second, since income inequality has a lower weight in the equality index constructed in subsection 5.3, we checked whether a change might occur if we added the gender equality index and income inequality (Gini index) as separate dimensions in estimating the overall IG index.[7] Under this version of the IGI, we find that the ranking of factor loadings is as follows: 0.976 (living conditions), 0.974 (economy), 0.867 (gender equality), -0.793 (governance), and 0.383 (income inequality measured by Gini index). Hence, all the dimensions have very close factor loadings to those presented in Table 8. Moreover, we find that the Gini index was also allocated very low factor loading compared to other dimensions. Hence, as supported by Figure 11, this IGI version is nearly the same as the one constructed in section 5.5.

Figure (11): IGI with Gini index separated vs IGI
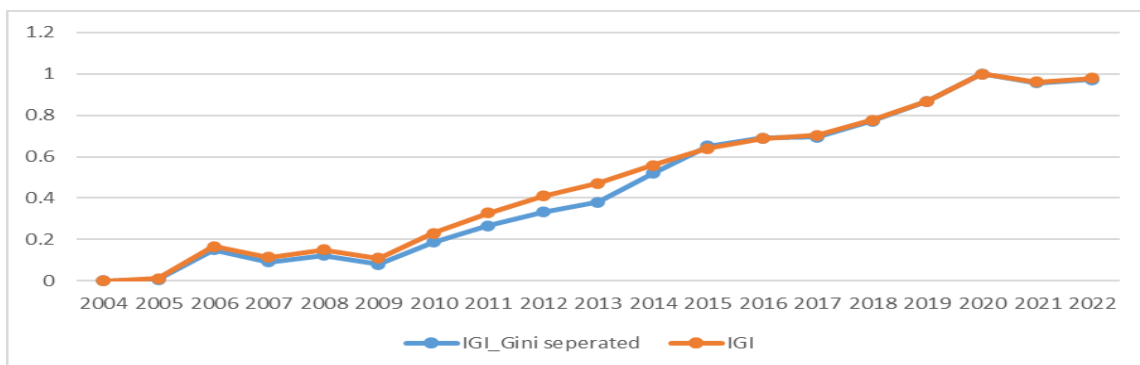
Source: Authors' Calculations

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[6] Note that under the IGI without the governance dimension: the KMO test is 0.676 and the Bartlett's test of Sphericity is significance. In addition, only PC1 is extracted and explains 92.431 of the total variances.
[7] Under this version of the IGI: the KMO test is 0.722 and the Bartlett's test of Sphericity is significance. In addition, only PC1 is extracted and explains 68.559 of the total variances.

6. Results of Causality and Discussion

6.1. Causality

The steps of conducting the causality tests start with the unit root tests. The ADF and the Phillips-Perron unit root tests confirm that log FII is stationary only at first difference, however, the logarithmic form of all other variables are either stationary at level or at first difference as shown in Table 11. Therefore, the Toda Yamamoto test is used to identify the direction of causality between the FII & the different pillars of IG as well as the overall IGI. For each model, the related structural break dummy variables are considered.

Examining the causal relationship using the logarithmic form of the variables, the null hypothesis of no causality is rejected at the 1% significance level, i.e. there is two-way Granger-causality between log (FII) and log (IGI). The results of the Toda-Yamamoto Granger non-causality test are presented in Table 12. Our findings elaborate that bi-directional causality exists between the FII and each of the economic, equality and governance pillars of the IGI as well as the overall IGI. Also, there is a bidirectional causality between the FII and IGI without governance.

Table (11): Unit Root Tests

	Augmented Dickey–Fuller test statistic		Phillips–Perron test statistic		Breakpoint test statistic	Year of break
	intercept	trend	intercept	trend	trend& intercept	
Log(FI)	-1.364	-2.746	-1.257	-2.716	-9.743***	2012
D(Log(FI))	-5.196***	-5.145***	-5.704***	-6.314***		
Log_ECO	-11.848***	-4.992***	-9.068***	-21.011***		
Log_lIVING	-3.442**	-1.305	-8.733***	-21.134***	-27.750***	2008
D(Log_lIVING)		-7.949***				
Log(EQU)	-1.03	-4.219**	-2.149	-5.873***	-9.152***	
D(Log(EQU))	-6.887***	-6.839***	-8.131***	-8.326***		2007
Log_GOV	-1.908	-2.452	-2.035	-2.042		2013
D(Log_GOV)	-3.424**	-3.353*	-3.503**	-3.732**	-5.05***	
Log_IGI	-6.209***	-2.403	-6.451***	-6.408***	-8.945***	2013
D(Log_IGI)		-7.148***				
Log(IG without governance)	-1.999	-14.38***	-6.909***	-13.665***	-2.03***	2008

Source: Authors' calculations using EViews.
***, **, *, symbolizes the significance at 1%, 5%, 10% level, respectively. D( ) refers to first difference
Economy, living conditions, equality, and governance (ECO, LIVING, EQU and GOV)

Table (12) Toda- Yamamoto Granger non-causality test

| Null Hypothesis	Chi-squ	Direction of causality
Log FII does not granger cause log IGI	13.221***	bidirectional
Log IGI does not granger cause log FII	3.243*	bidirectional
Log FII does not granger cause log ECON	20.813***	bidirectional
Log ECON does not granger cause log FII	63.699***	bidirectional
Log FII does not granger cause log LIVING	2.674	none
Log LIVING does not granger cause log FII	64.709***	Log LIVING causes log FII
Log FII does not granger cause log EQU	65.356***	bidirectional
Log EQU does not granger cause log FII	17.134***	bidirectional
Log FII does not granger cause log GOV	47.337***	bidirectional
Log GOV does not granger cause log FII	17.037***	bidirectional
Log FII does not granger cause log IGI without governance	33.64***	bidirectional
Log IGI without governance does not granger cause log FII	9.958**	bidirectional

Source: Authors' calculations using EViews
***, **, * indicates rejection of the null hypothesis at 1%, 5% and 10% significance level, respectively.

6.2. Discussion

Figure (12) shows that the FII has significantly increased since 2018, this particularly resulted from improvement in digital access indicators. Reducing dependence on banknotes has been a government priority since 2016, when the CBE introduced regulations for mobile payments and directed banks to boost the share of customers actively using e-wallets. The IGI experienced an upward trend, with its value more than doubling from 2012 to 2022. The living conditions, economy and equality dimensions contributed positively to IG in Egypt during the period 2004-2022. The equality index improvement is mainly related to gender equality as several important laws were amended to guarantee gender equality and women's empowerment in opportunities and rights. However, governance indicators contribute negatively, though with relatively lower weight, to IG, indicating that more improvement in governance indicators is needed to enhance IG in Egypt.

Figure (12): FI and IGI in Egypt
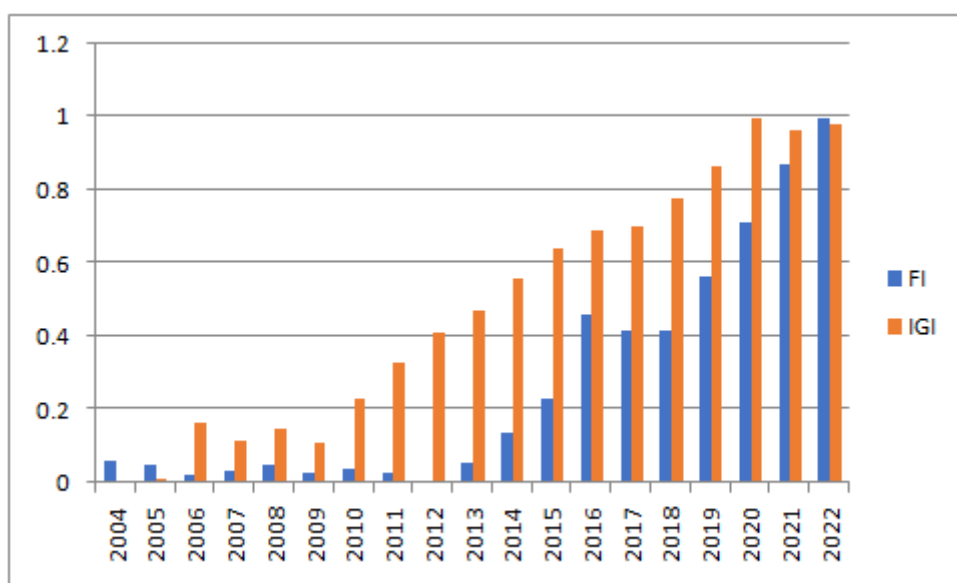
The findings of this paper are consistent with Apergis et al. (2007) and Sethi and Acharya (2018) who found a bidirectional causality between FI and economic growth. Also, Aslan et al. (2017) revealed that inequality in financial access is one of the most important factors that significantly impact income inequality. However, we detect a one-way causality running from living conditions pillar to FI, while the hypothesis that Log (FI) does not Granger cause log (living conditions) cannot be rejected which means that no causality was evident from FI to living conditions. This is compatible with Kabakova and Plaksenkov (2018) who considered social development as a core condition for FI. In contrast, other studies such as Rajan (2009) and Barik et al. (2018) found that FI plays a significant role in enhancing the standard of living.

The bidirectional causality between FI and IG highlights the importance of supply and demand side factors in the success of the financial inclusion strategy (Öncü, 2015; Hassouba, 2023). The supply-side factors are associated with accessibility and affordability that are reflected in our FII. The demand-side factors include low income, poverty, financial illiteracy, and location in rural/remote areas; those factors can be reflected in the utilized sub-indices of our IGI. The results also highlight the importance of the governance dimension in enhancing IG, this is compatible with the findings of Emara and El Said (2021), revealing that FI affects economic growth positively in countries with good governance and political stability.

7. Conclusion

Several studies investigated the impact of FI on economic growth while its effect on IG is barely considered. The present study investigated the relationship between FI and IG in Egypt during the period 2004-2022. The novelty of this research resides in constructing IGI and FII using the principal component method in addition to exploring the direction of causality between them.

Access indicators contribute by a larger weight than usage indicators to the constructed FII. Thus, Egypt suffers from high levels of financial exclusion due to the relatively low levels of access indicators, mainly geographic access. In Egypt, as is the case worldwide, rural regions suffer from a multiplicity of challenges related to low levels of financial literacy. Moreover, those regions have a higher share of poor population compared to urban ones. However, access to financial services has started to increase in recent years, thanks to advancements in digital access indicators.

The IGI constructed in our paper is composed of four sub-indices: economy, living conditions, equality, and governance. The economy sub-index has an increasing trend over the study period which was associated with the increasing trend of the GDP per capita and labor productivity. Also, living conditions improved because of rising safely managed sanitation, and declining mortality rates. However, public expenditure on education has been decreasing hence affecting living conditions negatively during this period. The trend of the constructed equality index has been increasing since 2014 because of gender equality and improvement in opportunities for women. The governance index has fluctuated with a declining trend during the study period. It has decreased significantly since 2011 because of political instability conditions associated with the revolution; however, the index started to increase after 2015. The overall IG in Egypt has shown an increasing trend since 2009. The economy and living dimensions have nearly equal weights in the overall index, followed by the equality dimension. The governance dimension showed the lowest factor loading and was correlated negatively to IG, indicating that efforts to improve Egypt's performance in governance indicators would enhance IG.

Since some variables were stationary at level while others at first difference, the Toda-Yamamoto causality test was conducted to examine the direction of causality between FI and IG. Our findings support the bidirectional causal relation between FII and IGI as well as three of the pillars of IG (economic, equality and governance). While there was unidirectional causality running from living conditions to FI.

The results of this paper provide an explanation as to why the central bank's FI efforts to channel more credit to SMEs, women and youth did not achieve its intended outcome, as simultaneous efforts are needed to improve the IG levels in Egypt. The unidirectional causality running from living conditions to FI confirms the need for a parallel IG strategy to be able to reap the full benefit of the conducted efforts. Moreover, the bidirectional causality between FI and other dimensions highlights the need for measures to improve gender inequality, and access to financial services in addition to establishing a well-designed regulatory framework, besides investing in innovative technologies that increase the value added per employee. Further research needs to be developed to compare FI and IG across urban and rural areas.

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