UNRAVELING THE INTERPLAY: FINANCIAL INCLUSION'S IMPACT ON GROWTH, TRADE DYNAMICS, AND FOREIGN INVESTMENT – A COMPREHENSIVE EMPIRICAL STUDY

Kushwah, S.V.[1] and Siddiqui, A.A.[2]

[1]*Department of Finance, New Delhi Institute of Management*
[2] *Dubai Business School, University of Dubai*

Abstract

The present study develops a Financial Inclusion (FI) index and extends an interlinkage between FI and Economic Growth (EG). The study is the first to develop an FI index created for the main trading nations from 2001-2019 based on financial development, financial depth, and financial stability and creates an association between FI and EG, including trade and foreign investment. Once the FI index is constructed, panel data analysis is applied by examining the stationarity and co-integration of the series, followed by panel regression and causality tests. Findings highlight a strong interlinkage between FI, EG, trade, and foreign investment for the selected nations. It suggests that the nations emphasize financial inclusion to stimulate EG, enhance trade, and increase foreign investment inflows. Each of the three variables is highly integrated, as indicated in the results, and acts as prerequisites for each other. The study is a significant contribution to the field of FI, trade, and EG. As very few studies have been carried out for integrated analysis, this study helps devise policies for expanding further relationships between FI, trade, investment, and EG across nations. Moreover, this study is the first to select a time period that marks major events like the US-China Trade War (2018) and the Global Financial Crisis (2008). The results of this study are helpful to the governments and policymakers of various economies. They can improvise the existing policies and procedures related to trade and foreign investment to enhance FI and EG. It is seen that for each country, the effect of the variables selected is different. In terms of developing holistic and effective trade policies, each nation can assess the relationship between these four key macroeconomic variables.

Corresponding author: Silky.kushwah@ndimdelhi.org

1 Introduction

The economic growth of both developed and developing economies in this integrated world is dependent on one of the crucial factors, i.e., Financial Inclusion (FI) (Adeniyi et al., 2015; Cama & Emara, 2022; Bayraktar, 2014; Domeher et al., 2022; Pradhan et al., 2015; Purwiyanta et al., 2022; Rousseau & Yilmazkuday, 2009; Samargandi, Fidrmuc, & Ghosh, 2015; Sulong & Bakar, 2018; Sethi & Acharya, 2018; Younas et al., 2022; Zhang et al., 2012). Although the relation direction, i.e., whether FI results in EG or FI, is the consequence of EG remains unresolved. It may also be that these two economic variables have a two-way relationship (Polat et al., 2015). Past research on EG and FI renders us inconclusive about whether EG influences FI or vice-versa.

Some of the earlier studies support the influence of FI on EG (Afonso & Blanco, 2018; Abu-Bader & Abu-Qarn, 2008; Bairer et al., 2004; Ifediora et al., 2022; Levine, 1996; Vo & Vo, 2019). If the financial systems of an economy are well established, efficient, robust and have volumes, then it means that they cater to the majority of the nation's population for financial transactions and financial needs. Such an economy is deemed to prosper and grow (Baltagi, Demetriades & Law, 2009). Moreover, suppose the financial markets and institutions of an economy are well functioning, in that case, the financial intermediaries are working efficiently, and the financial instruments are catering to the needs of the borrowers and lenders. Then people start saving through such financial systems, and these funds can be channelised to invest in productive investment projects which will ultimately lead to stimulating the EG (Beakert et al., 2001, 2002, 2005; Beakert & Harvey, 2000; Fung, 2009, Law, 2009; Makina & Walle, 2019). Past research also highlights four ways in which EG is enhanced by FI (Pradhan et al., 2016). Firstly, by refining the effectiveness in the flow of money between money borrowers and money lenders, secondly, by refining the distribution of resources; thirdly, by increasing the saving rates, and lastly by encouraging the progress of financial markets and financial instruments that enable hedging, sharing of risk and thus facilitating EG (Goodhart,2004; Yilmazkuday, 2011). Internationally, the governments across the border also dream of achieving it to sustain EG.

A strand of studies shed light on whether FI is significant for stimulating EG (Domeher et al., 2022; Bhattarai, 2015; Christopoulos & Tsionas, 2004; Greenwood & Scharfstein, 2013; Herwartz & Walle, 2014; Jedidia et al., 2014; Lee & Hsieh, 2014; Pradhan et al., 2014; Purwiyanta et al., 2022; Younas et al., 2022). There are some controlled variables in the

literature that relate to the FI-EG nexus, and two of the most common economic variables are trade and foreign investment (Chen & Emile, 2013; Law, 2009; Otchere et al., 2016). Voluminous studies are examining the Financial Inclusion-EG nexus, but the results are still not conclusive. One of the crucial reasons for the vagueness in the empirical results of various research could be using different factors or indicators used for FI/FI index. Another reason may be that the empirical model is not appropriately specified. Drawing from the inconclusive results, this study tries to combine both strands of literature and employ the FI index constructed by researchers in the current study to analyse the FI-EG nexus conclusively.

2 Literature Review

The empirical research and theoretical concepts throw light on the crucial nexus between FI and EG (Ahmad et al., 2021; Ali et al., 2021; Bascom, 1994; Beck *et al.*, 2000; Claessens & Laeven, 2004; Dow, 1996; Goodhart, 2004; Guariglia & Poncet, 2008; Huang et al., 2021; Kaminsky & Schmukler, 2003; Kim et al., 2018; Levine, 1997; McKinnon, 1973; Singh & Stakic, 2021; Van et al., 2021). The literature on FI-EG nexus is based on various parameters. These parameters are based on the literature on developed and developing nations, studies are based on demand, supply and feedback hypotheses and bilateral relations between FI and EG. All these strands highlighting the causal connection between FI and EG are discussed below in detail.

While examining the developed and emerging economies for the causal relationship between FI and EG, the relation of banking stock returns is witnessed in EG (Cole et al., 2008). Based on the findings of dynamic panel estimations, one of the studies by Sethi and Acharya (2018) highlights that FI has a positive effect on EG. Another study conducted on emerging economies supports a positive relationship between FI and EG(Van et al. 2021). It is also highlighted that industrial economies and developing economies have a strong causal relationship between FI and EG. As FI occurs, more capital accumulation and productivity growth ultimately enhance EG (Calderón & Liu, 2003). It is also witnessed that the relationship is more robust in developing economies as compared to developed economies. Another study has seen a significant positive relationship between stock market developments and EG for 35 developing economies from low to medium-income nations (Cooray, 2010). Another cross-country study of developed economies shows a positive relationship between stock market developments and EG (Levine & Zervos, 1996). The

researchers further extend their research and conclude that overall, FI involving stock market and banking development results in more investments, capital accumulation, and productivity improvement, resulting in EG (Levine & Zervos, 1998; Levine, 2004). Several underdeveloped economies emphasize the relationship between financial inclusion variables and economic growth (Cicchiello et al., 2021; Ishioro, 2020; Kagochi et al., 2013; Murinde, 2012). The results summarise that there is no effect of financial intermediaries on EG. Some developing nations witnessed EG improvement due to different development stages in the stock market (Caporale et al., 2005). Contrary to that, another research conducted in similar underdeveloped nations witnesses that not all nations have a similar relationship between FI and EG (Enisan & Olufisayo, 2009).

There is a strand of literature based on research conducted on individual countries or a panel of countries. The current strand discusses the studies based on country-specific studies analysing the relationship between FI and EG in different economies. Some studies indicate that there is a relationship between FI on the EG of a country (Abu-Bader & Abu-Qarn, 2008; Ang, 2008; Christopoulos & Tsionas, 2004; Hondroyiannis, et al. 2005; King & Levine, 1993; Neusser & Kugler, 1998; Rousseau & Wachtel, 1998; King & Levine, 1993). If there is development in the financial sector, it enhances flexibility in the economy and creates better, new opportunities for investors to feel confident and safe investing. The overall increase in investments eventually results in EG (supply leading hypothesis). A study conducted in the Chinese economy shows that FI results in EG (Shan & Jianhong, 2006). The empirical findings of another study conducted in China show that digital financial inclusion significantly affects China's provincial economic growth (Ahmad et al., 2021). In another study conducted in Bangladesh during 1976-2005, applying a structural vector autoregressive model, a similar effect of FI on EG (Rahman, 2004 is tested. According to the results, both bank development and stock market development are positively related to EG. A positive relationship is also seen between the two variables in Saudi Arabia (Ageli, 2013). Contrary to that, some studies concluded that FI has no relationship with EG (Levine, 1997; Majumder & Eff, 2012). Simultaneously, few studies conclude that the financial sector's role is exaggerated in achieving EG (Lucas Jr, 1988; Stern, 1989).

The current strand of literature describes the relationship between EG and FI through cross-country studies, wherein investigation is done on several economies simultaneously, and the relation is examined. The results of such studies highlight that the relationship between the

two variables is country-specific. For example, within the panel data, some economies show a causal relationship between the two variables (Beck et al., 2000; Calderón & Liu, 2003; Christopoulos & Tsionas, 2004; Cole et al., 2008;), whereas some economies confirm no relationship between the variables, (Kar et al., 2011) and some economies show a bilateral relationship. Like in a cross-country study, data from both the stock market and banks of five developed nations (Germany, the United States, Japan, the UK and France) are tested, and results suggest that not all the nations reflect the relation of FI on EG (Arestis et al., 2001). In another cross-country study, the results reflect that FI's relation is statistically significant on EG (Beck et al., 2000).

Another strand of studies is based on demand, supply and feedback hypotheses. Some studies indicate that EG leads to FI (Asghar & Hussain, 2014; Jung, 1986; Lee, 2009; Mah, 2010; Menyah, Nazlioglu, & Wolde-Rufael, 2014; Robinson, 1952; Romer 1990; Ul Ain et al., 2020; Zhang, 2001) and supports the demand leading hypothesis. Studies boldly describe FI as the servant of EG (Robinson, 1952; Romer, 1990) and conclude that EG drives FI (Jung, 1986). In a panel study conducted on 16 nations, similar results supported the drive from EG to FI, especially bank development (Demetriades & Hussein, 1996). However, it is noticed that the results are quite country-specific. This results in a new research strand wherein data across several economies are investigated together to analyse the FI-EG nexus. The other part of this parameter explains that more trade and foreign investment adopted by an economy lead to an increase in EG which means they support the supply leading hypothesis (Abdelhafidh, 2013; Arvin & Norman, 2014d; Jin, 2000; Gries, Kraft, & Meierrieks, 2009; McKinnon, 1973; Lee, 2010; Levine, 1997; Shaw, 1973; Siddiqui & Ahmed, 2017; Siddiqui & Parikh, 2018;). The justification behind this relationship is that trade enhances investments and makes the financial sector more competitive because foreign banks and institutions entered into the domestic financial markets (Pradhan et.al, 2015b).

Another type of research witnesses the bilateral relationship between EG and Trade and supports the feedback hypothesis (Ahmed, Cheng, & Messinis, 2011; Asghar & Hussain, 2014; Awokuse, 2008; Dash & Sharma, 2011; Herzer, 2012; Hossain, Sanchez, & Yu, 2011; Lee, 2010; Pistoresi & Rinaldi, 2012; Pradhan, Arvin, & Norman, 2015b;). In a Sri Lankan study, during the period 1955-2005, it is highlighted that both demand-side and supply-side hypotheses are proved. It reflected the relation of FI on EG and vice and versa (Perera & Paudel, 2009). Similar results are showcased by a study conducted in Egypt, where

investment is introduced as a new variable, and a tri-variate VAR model is applied. It showed strong evidence of a mutually causal relationship between FI and EG variables (Abu-Bader & Abu-Qarn, 2008). Similar bilateral results are also confirmed by Apergis et al. (2007) and Luintel & Khan (1999).

Few potential controlled variables like trade and foreign investment make the relationship between FI and EG stronger or weaker. Literature is also available studying these variables and analysing their relation on either of the study variables or both. There are reasons for Trade and Foreign Investment in explaining the FI and EG relationship. Vast literature throws light on trade and foreign investment's significance in spurring FI and EG (Ang 2009; Choong, Yusop, & Soo, 2004; Law, 2009; Liu, Wang, & Wei, 2001; Liu & Qiu, 2014). The logic existing in the earlier studies on the relation of Trade and Foreign Investment on FI is that Trade and Foreign Investment in any economy result in an enhanced supply of external finance through international business opportunities available to firms. Secondly, they cause liberalization, which results in prevailing healthy competition among firms by not restricting new firms' entry (both national and international firms).

This study contributes in the following way: (1) the study is the first one to develop a FI index created for the main trading nations from 2001-2019 based on financial development, financial depth and financial stability and creates an association between FI and EG including Trade and foreign investment. The FI Index created for the selected nations is based on Financial development, financial depth and financial stability. Moreover, to the best of knowledge, this study is the first to select a time period that marks major events like the US-China Trade War (2018) and the Global Financial Crisis (2008). (2) study proposes a comprehensive model to analyse the link between FI and EG, including trade and foreign investment. The current research utilizes the Cobb-Douglas production function as conceptualized by Mankiw et al. (1992) as its foundation. This study advances the model by incorporating the four key economic variables: financial inclusion, economic growth, trade, and foreign investment, aiming for a comprehensive analysis.

3 Research Methodology

3.1 Data

Voluminous studies are examining the FI -EG nexus, but the result is still not conclusive. One of the crucial reasons for the vagueness in the empirical results of various research could

be using different factors or indicators used for FI/FI index. Another reason may be that the empirical model is not appropriately specified. There have been four hypotheses that came to light from the literature. The supply led hypothesis supports a unidirectional causality, i.e. FI leads to EG, the demand led hypothesis supports the unidirectional causality that it is the EG that relates to FI, the feedback hypothesis supports the bidirectional causality which means FI leads to EG which in turn results in EG relating to FI. The last one is the neutral hypothesis that there is no causal relationship between FI and EG. The Cobb-Douglas function has been widely employed across numerous studies, offering a robust analytical framework to examine the relation between FI and EG without considering the role of Trade on FI and eventually on EG (Acaravci et al., 2011; Odhiambo, 2010, 2011; Shahbaz, 2012; Uddin et al., 2013,).

The production function is as given in equation (1).

$$Z_t = B_t C_t^\beta L_t^{1-\beta} \qquad \text{where, } 0 < \beta < 1 \tag{1}$$

Z_t is the real domestic output, B_t is technological progress, C_t is capital stock, and labour is L_t.

For the current study, the CD production function is extended to include FI and international trade. FI, which plays a pivotal role in enabling the growth of a country, increases the capital formation and motivates producers to concentrate in specific sectors, increase production, and enhance trade flows.

Trade fosters economic growth by facilitating the transfer of technological innovations and resources from more developed to less developed nations, as demonstrated by Siddiqui and Singh (2019). Hence, the model is as stated in equation (2).

$$A_t = \phi . V_t^\alpha W_t^\delta \tag{2}$$

Where ϕ. is time-invariant constant, V is an indicator of trade, and W is Financial Inclusion.

On merging equations (1) and (2), we get

$$Z_t = \phi . B_t^\alpha W_t^\delta C_t^\beta L_t^{1-\beta} \tag{3}$$

A log is taken on both sides and divided by the population and with labour constant to reach the model. The final equation (4) for the empirical model is thus arrived at.

$$\text{Ln } Z_t = \varphi 1 + \varphi 2 \ln W_t + \varphi 3 \ln TO_t + \varphi 4 \ln C_t + u_i \tag{4}$$

In this equation, $\varphi_1 = \log(\varphi)$ represents the constant term, Zt ln denotes the natural logarithm of real GDP per capita, Wt ln indicates the index created to measure Financial Inclusion, Tot ln represents the natural logarithm of Trade, Ct ln signifies the real capital stock per capita, and ui stands for the error term.

A limitation of previous studies has been selecting financial proxy variables to measure the nations' FI. Usually, Broad Money has been used, but it cannot give a holistic view of the nation's FI. Hence, a FI index is developed using the Principal Component Analysis and selected variables for FI, financial depth and financial stability (Hussain and Chakraborty 2012) for the key trading nations of the world, namely, United Kingdom, Netherlands, South Korea, Italy, Germany, France, Canada, Belgium, China, Hong Kong, Japan, Mexico, Russia, Spain, and the United States for 2001-2019 to examine its relation on the EG. The time-period has been selected as it is marked by significant events like the US-China Trade War (2018) and the Global Financial Crisis (2008). These trading nations have been selected based on total exports and imports of goods and services, and these are the top nations in terms of absolute values in the chosen time- period. Hence, the study's main objective is to assess the relationship between FI Index and nations' EG . The study also includes variables like foreign investment and trade and assesses their relationship with FI and growth.

Literature throws light on three different approaches to examine the finance-growth nexus, cross-sectional approach (considers more than one country but the period of investigation is one year), longitudinal approach (considers only one country but the period is more than one year) and panel data approach (considers more than one country and time- period is also more than one year). As the current study is conducted over a long time- period, and casual relationship is examined over various economies, the approach adopted in this study is a panel data approach. This approach gives robust and reliable estimates for the casual relationship between variables (Baltagi, 2005).

For the present study, a FI index for the selected nations for 2001-2019 was constructed based on Principal component analysis (PCA) (Siddiqui & Singh, 2019). The variables used are as stated in Table-1 as per each parameter selected.

Table-1 : Construction of Indices (Selected Variables)

Parameter	Source
Private sector credit to GDP	International Financial Statistics (IFS), International Monetary Fund (IMF)
Total assets held by deposit money banks as a share of GDP	
Central bank assets to GDP	
Liquid liabilities of the financial sector to GDP	
Remittance inflows to GDP	World Banks' World Development Indicators (WDI) database
M2 (ratio to monetary GDP)	World Banks' World Development Indicators (WDI) database
Financial system deposits to GDP	International Financial Statistics (IFS), International Monetary Fund (IMF)
Credit to government and state-owned enterprises to GDP	
Gross domestic savings as a GDP share	World Banks' World Development Indicators (WDI) database
Stock market liberalization to GDP ratio	International Financial Statistics (IFS), International Monetary Fund (IMF)
Stock market total value traded to GDP	
Total reserves to GDP	World Banks' World Development Indicators (WDI) database

Source: Authors compilation as per definitions from World Bank, IFS and IMF

Chart-1 showcases the leading trading nations, encompassing their combined exports and imports. These countries, spanning the years 2001 to 2019, are: the United States, China, Germany, Japan, France, the United Kingdom, Italy, Canada, South Korea, Spain, Mexico, Netherlands, Belgium, Russia, and Hong Kong. These nations have been selected for the present study as they have also witnessed continuous economic growth over the selected time period as depicted in Chart-2.
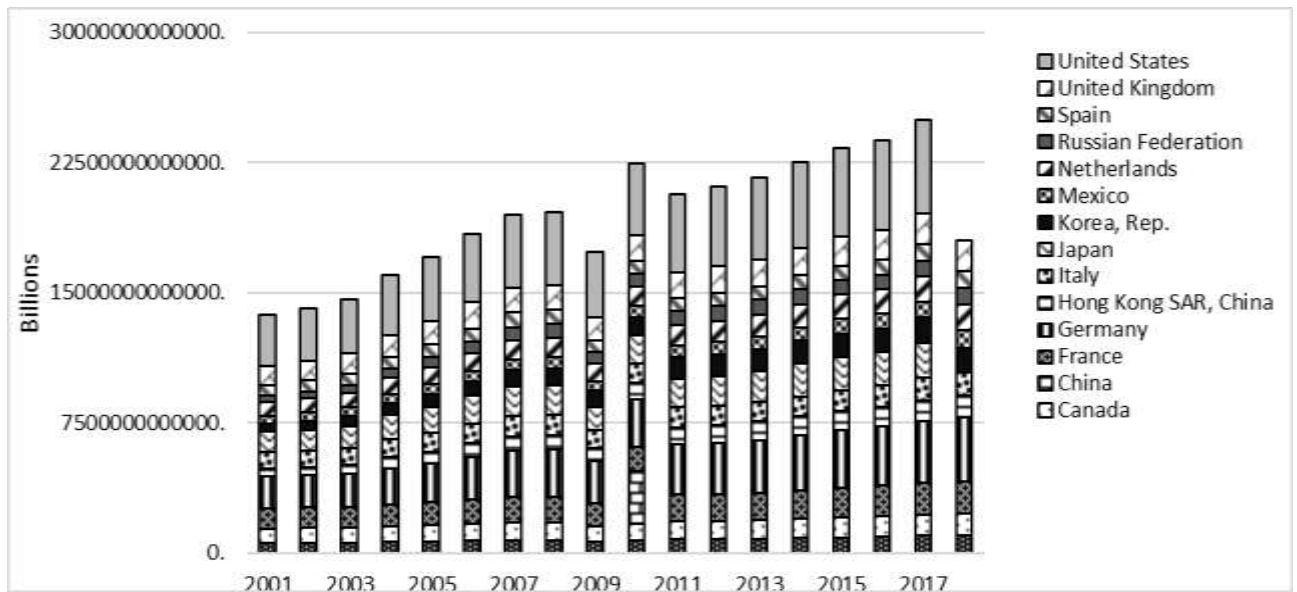
Chart-1 Major Trading Nations of the World
Source: World Development Indicators, World Bank
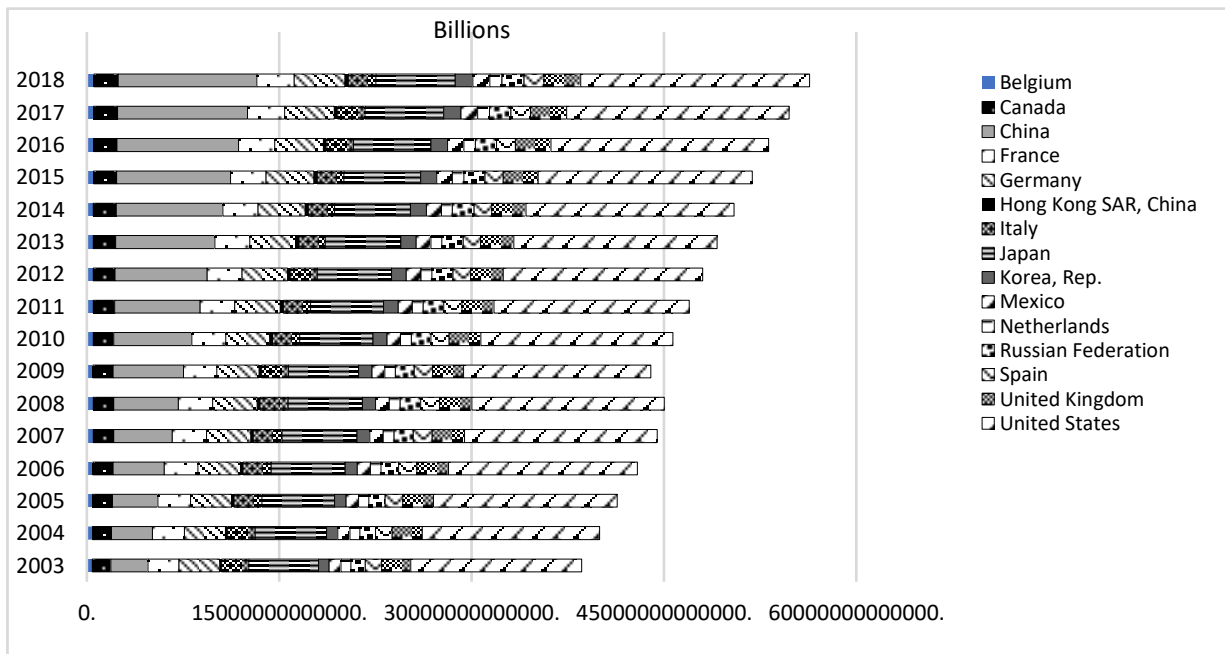
Chart-2: Economic Growth of selected trading nations
Source: World Development Indicators, World Bank

Table 2 presents descriptive statistics to provide insights into the fundamental characteristics of the data. The mean-to-median ratio is observed to be approximately 1, indicating a balanced distribution. Furthermore, the standard deviation suggests consistency across variables, while the Jarque-Bera statistics affirm the non-normality of the data.

Table-2:Descriptive Statistics

	Growth	**Fin**	**FI**	**TO**
Mean	12.226	0.038	12.671	12.071
Median	12.202	-0.233	12.659	12.040
Maximum	13.251	5.149	13.866	12.728
Minimum	11.275	-1.294	9.543	11.563
Std. Dev.	0.414	1.084	0.5051	0.244
Skewness	0.339	3.452	-1.069	0.772
Kurtosis	3.651	14.430	8.984	3.271
Jarque-Bera	7.752	1560.57	353.431	21.506
P-value	0.020	0.000	0.000	0.000

Growth-GDP, Fin-Financial Inclusion Index, FI- Foreign investment, TO- Trade Openness
Source: Authors Calculations

3.2 Methods

As a single variable cannot explain FI and no aggregate index is available to measure FI, this paper constructs a FI index by applying PCA. The broad parameters are FI, financial depth and financial stability.

Once the Financial Inclusion Index is constructed, panel data analysis is applied by examining the stationarity and co-integration of the series, followed by panel regression and causality test. To evaluate the objective of the paper, the equations which are formulated are

$$lnGrowth= \beta_0 + \beta_1 lnFIn + \beta_2 lnTO + \beta_3 lnFI + \varepsilon \quad ---- (5)$$

$$lnTO= \beta_0 + \beta_1 lnFIn + \beta_2 lnGrowth + \beta_3 lnFI + \varepsilon \quad ---- (6)$$

$$lnFI= \beta_0 + \beta_1 lnFIn + \beta_2 lnTO + \beta_3 lnGrowth + \varepsilon \quad ---- (7)$$

In this context, "growth" represents annual GDP data adjusted for inflation, "Fin" denotes the Financial Inclusion Index, "TO" signifies Trade, and "FI" represents foreign investment. To mitigate heteroskedasticity, the selected variables are transformed into logarithmic form. Moreover, all data undergoes stationarity testing, as non-stationary data can yield unreliable regression results, impairing the interpretation of findings.

Engel and Granger explain that to explore non-stationary series at level, all the data series are integrated in the same order and co-integrated. Next, the Johansen Fisher test for assessing panel co-integration is employed. Regression is applied to estimate the relationship between variables, which may be a fixed or random-effect model. Hausman specification test is applied to assess the applicability of the selected model.

4   Results

The results for constructing an index are indicated in Table 3. Eigen values suggest that the first principal component explains 47.4 percent variance and on rotation 34.73 percent. The factor scores are depicted in Table 4. The KMO and Bartlett's Test for sampling adequacy in the analysis is more than 75.4 percent.

Table-3
Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.162	47.401	47.401	4.516	34.736	34.736
2	1.972	15.169	62.570	2.522	19.400	54.137
3	1.210	9.305	71.875	2.173	16.717	70.854
4	1.108	8.525	80.400	1.241	9.546	80.400
5	.834	6.413	86.813			
6	.594	4.571	91.384			
7	.417	3.210	94.594			
8	.264	2.034	96.628			
9	.161	1.241	97.870			
10	.132	1.014	98.884			
11	.063	.598	99.482			
12	.046	.518	99.724			

Source: Authors Calculations

Table-4

Component Score Coefficient Matrix

Variables	Components			
	1	2	3	4
Broad Money	.045	.047	.112	.243
Central bank assets to GDP (%)	-.189	.362	.055	.013
Credit to government and state-owned enterprises to GDP (%)	-.030	.487	-.249	-.020
Financial system deposits to GDP (%)	.128	.221	-.117	-.031
Liquid liabilities to GDP (%)	.082	.146	.028	.111
Private credit by deposit money banks and other financial institutions to GDP (%)	-.041	.016	.382	-.151
Remittance inflows to GDP (%)	.134	.198	-.598	-.058
Stock market total value traded to GDP (%)	.211	-.154	.112	-.140
Gross domestic savings (% of GDP)	-.093	-.007	-.002	.820
Total reserves (% GDP)	.214	-.026	-.114	.186
Stock market capitalization to GDP (%)	.276	-.092	-.062	-.138
Deposit money banks' assets to GDP (%)	.006	.126	.164	-.020

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Source: Authors Calculations

Thus, the FI index can now be considered as an independent variable. The correlation matrix is seen to assess if there is an existing correlation between variables as enumerated in Table 5.

Table-5

Correlation Matrix

	Growth	Fin	FI	TO
Growth	1	-0.581	0.213	0.786
Fin	-0.581	1	0.215	-0.131
FI	0.213	0.215	1	0.422
TO	0.786	-0.131	0.422	1

Growth-GDP, Fin-Financial Inclusion Index, FI- Foreign investment, TO- Trade Openness
Source: Authors Calculations

There is a low correlation between the variables. To check the panel data series for stationarity is important as non-stationary series may result in spurious results. The stationarity of the data series is checked through various tests. The log-transformed growth, FI Index, foreign investment, trade and inflation were tested for stationarity. ~~Table VI depicts the results, which suggest that all the selected variables at the level are non-stationary but stationary at the first difference~~.

Table-6
Summary of Panel Root Test

Variables	Level	Levin, Li and Chu t-test for common unit root	PP-Fisher Chi-Square
Growth	**Level**	-3.79*** (0.000)	94.73*** (0.000)
	1st Difference	-13.84*** (0.0000)	160.634*** (0.000)
Fin	**Level**	-3.46*** (0.000)	296.45*** (0.000)
	1st Difference	-7.72*** (0.000)	50.58*** (0.010)
FI	**Level**	-5.56***	89.11***

		(0.000)	(0.000)
	1st Difference	-8.50***	470.83***
		(0.0000)	(0.000)
TO	**Level**	-4.11 ***	114.96***
		(0.000)	(0.000)
	1st Difference	-8.87***	158.93***
		(0.000)	(0.000)

Growth-GDP, Fin-Financial Inclusion Index, FI- Foreign investment, TO- Trade Openness
* Significant at 10%, **Significant at 5 % ,***Significant at 1 % level of significance
Source: Authors Calculations

The data series are stationary at the first difference, and hence the data is tested for panel co-integration by employing the Johansen Fisher Panel co-integration test, as depicted in table-7.

Table-7
Johansen Fisher Panel Cointegration Test

Hypothesised No. of Co-integrating Equations	Fisher Stat	Probability
None	212.1	0.000
At most 1	105.4	0.000
At most 2	36.71	0.046
At most 3	39.77	0.022

* Significant at 10%, **Significant at 5 %, ***Significant at 1 % level of significance
Source: Authors Calculations

In the co-integration test, the null hypothesis is rejected as the probability is less than 0.05, Therefore co-integration exists in the data set. It implies that EG, Foreign investment, FI Index, Trade and inflation indicate a long-run equilibrium. Thus, the panel least squares method is employed in equations (5), (6), and (7) for assessing the relationship between FI Index, EG, Trade and Foreign investment. Table 8 presents the regression model results for assessing the FI Index's relation with the selected variables.

The findings from the panel data analysis reveal a notable and positive correlation between the FI Index, Trade, and the (EG) of the chosen nations. Both the R-squared and adjusted R-squared values signify the reliability of the results and suggest the absence of autocorrelation.

Table-8
Panel Least Squares

Relation of Fin on	Variable	Coefficient	Std. Error	t-statistic	Prob.
Economic Growth	C	5.966	0.171	34.873	0.000
	Fin	0.012	0.003	4.007	0.000***
	FI	0.003	0.003	1.096	0.274
	Trade Openness	0.516	0.013	37.698	0.000***
Trade Openness	C	-2.823	0.432	-6.533	0.000
	Fin	0.016	0.005	3.124	0.002***
	FI	0.004	0.006	0.660	0.509
	Growth	1.211	0.035	34.067	0.000***
FI	C	3.701	2.717	1.362	0.174
	Fin	0.192	0.052	3.656	0.000***
	Growth	0.277	0.314	0.882	0.378
	Trade Openness	0.459	0.349	1.312	0.190

Growth-GDP, Fin-Financial Inclusion Index, FI- Foreign investment, TO- Trade Openness
* Significant at 10%, **Significant at 5 % ,***Significant at 1 % level of significance
Source: Authors Calculations

Whereas the FI Index and Egalso have a positive and significant relation to Trade Openness. There is a positive and significant relationship between the FI Index and Foreign investment. Other variables do not have any significant relationship. In the FI Index's effect on Foreign Investment, the R squared and adjusted R squared values are relatively low and do not explain the results adequately. Random panel least squares test is applied as indicated by Hausman Test as enumerated in Table-9. The p-values for all three tests are reported as

0.0000, indicating that the relationships between financial development and other study variables namely, EG, TO and FI are statistically significant.

Table-9
Hausman Test

Test Summary	Prob.
Fin and Economic Growth	0.0000
Fin and Trade Openness	0.0000
Fin and FI	0.0000

Source: Authors Calculations

Table-10 illustrates the cross-sectional effects, allowing for an exploration of the correlation within each country. It unveils a substantial relationship between the FI Index and EG, as well as between Trade and Foreign Investment. Remarkably, a negative correlation is detected in Hong Kong, South Korea, Mexico, Belgium, Spain, Canada, and Netherlands. In contrast, a positive correlation is apparent in China, Japan, Germany, Italy, Russia, UK, USA, and France regarding the linkage between EG and the FI Index.

Table-10
Cross-section effect of Financial Inclusion Index

	Country	Economic Growth	Trade Openness	FI
		Effect	Effect	Effect
1	Belgium	-0.467	0.460	0.306
2	Canada	-0.012	-0.0086	0.032
3	China	0.358	-0.270	0.225
4	France	0.125	-0.115	-0.039
5	Germany	0.112	-0.001	-0.000
6	Hong Kong	-0.872	0.878	-0.241
7	Italy	0.097	-0.114	-0.322
8	Japan	0.448	-0.477	-0.655
9	Korea, Rep.	-0.173	0.170	-0.511
10	Mexico	-0.080	-0.004	0.005

11	Netherlands	-0.317	0.352	0.606
12	Russian Federation	0.035	-0.123	0.038
13	Spain	-0.008	-0.057	0.082
14	United Kingdom	0.105	-0.100	0.194
15	United States	0.647	-0.586	0.278

Source: Authors Calculations

The positive impact of the FI Index on Trade is observed exclusively in Hong Kong, Belgium, Netherlands, and Korea. At the same time, the FI Index effect on Foreign Investment is positive for Belgium, Canada, China, Mexico, Netherlands, Russian Federation, Spain, United Kingdom and the United States.

The present study indicates a short and long-run relationship between FI, EG, Trade and Foreign investment for the world's major trading nations, consisting of developed and developing nations. It is seen from the empirical results that Trade relations FI (Law, 2009; Zhang et al., 2015). The present study also indicates the influence of Foreign Investment on FI (Adjasi et al., 2012; Azman et al., 2010; Chen & Emile, 2013; Otchere et al., 2016). There is empirical evidence of Trade and Foreign Investment relating to FI (Choong, 2012; Lee & Chang, 2009). It is also seen that there is a significant role of Trade and FI in stimulating EG in an economy (Awokuse, 2007; Hsiao & Hsiao, 2006). According to the present study, Trade and Foreign Investment result in technology transfer and an accumulation of physical assets in an economy. Eventually, Trade and Foreign Investment have a positive and significant influence on EG and promote it.

5   Conclusion

In line with existing literature, the present study indicates a short and long-run relationship between Financial Inclusion, Economic Growth, Trade Openness, and Foreign Investment. There is a fair degree of integration between the selected macroeconomic parameters. As the selected nations are major trading nations globally, they are a combination of developed and developing nations. As a single proxy variable cannot indicate FI, an index comprises various financial institutions and financial market variables. This index caters to the country's FI, depth, and stability by considering different financial variables. This constructed index has been taken as the proxy for FI in the selected nations for 2001-2019. The results attained through empirical analysis suggest that FI causes and impacts EG, Trade and Foreign

Investment inflows for each nation at the aggregate level. FI is a prerequisite in attracting investments other than in a few highly developed nations on analysing each nation's relation. Trade at the country level does not have a positive relationship with FI and thus may not be a prerequisite for enhancing trade. At the same time, EG is highly dependent on FI. Unlike previous studies, the present study develops a holistic relationship between the four key macro variables of an economy. The paper also draws a comparative relationship between developed and developing major trading nations.

The results of this study is helpful to the governments and policymakers of various economies. They can improvise the existing policies and procedures related to Trade and Foreign Investment to enhance FI and EG. It is seen that for each country, the effect of the variables selected is different. For example, in the USA, a developed economy, there is a positive relationship between FI, Growth and Foreign Investment but a negative association with Trade Openness. This indicates that the USA's Trade is related to the FI scale but impacts Foreign Investment inflows and growth. Similarly, for China, the results are similar. Thus, as FI's importance vary from country to country, so are their long-term policy goals of attracting investments, enhancing trade or promoting growth. In terms of developing holistic and effective trade policies, each nation can assess the relationship between these four key macroeconomic variables. Most of the nations treat these variables of development, trade, financial inclusion and investment distinctly, though they are highly interrelated. Financial inclusion leads to enhancing investment which leads to an increase in production and hence trade which fosters economic growth of a nation. An example of this is I's trade policy. Presently the trade policIIndia has been designed to enhance exports which may lead to economic growth while the FDI policy also aims at attracting investment to foster growth but the link between exports and FDI is missing. It is anticipated that the new policy which will be implemented soon will have a holistic linkage between trade, growth and investment. Researchers may carry forward the present study by introducing policy perspectives of each of these variables.

The study proposes that trading nations prioritize FI to stimulate economic growth, bolster trade activities, and attract higher levels of investment inflows. Trade is not exclusive of growth and investment. All three variables are highly integrated, as indicated in the present study and act as prerequisites for each other. This research is a significant contribution to the field of FI, trade and growth. As very few studies have been carried out for integrated

analysis, this study is helpful devising policies for expanding further relationships between FI, trade, investment and growth across nations.

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