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Introducing a New Broad-Based Index of Financial Liberalization in Developed and Developing Countries

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Abstract

The effect of Financial Liberalization (FL) on Economic Growth (EG) has been extensively studied in the literature. In typical empirical research, one of two measures of Financial Liberalization – the ratio of private credit to GDP or stock market capitalization to GDP – is used to approximate Financial Liberalization (FL). These measures, however, do not account for the dynamic, multidimensional aspect of Financial Liberalization (FL). This study contributes by developing six (06) indices that represent the ratio of Broad Money to the Gross Domestic Product (M_2 / GDP), Gross Domestic Saving (GDS), Domestic Credit to Private sector (CRDTP), Domestic Credit to the Private Sector by the Banks (CRDT B), FDI Net Inflow (FDINF), and FDI Outflow (FDIOUF). An overall indicator of Financial Liberalization (FL) is created by combining these indexes. The database should offer scholars and decision-makers a helpful analytical tool given that it covers 08 of the 25 sample countries that are developed countries and the remaining 17 countries are developing nations yearly between 1995 and 2020.

Keywords: *Financial Liberalization Index*

1. Introduction

A well-functioning financial process is important to an economy's growth because it helps mobilize financial resources, enhance risk management, and allocate financial resources to effective initiatives (Levine, 1997). In the previous two decades, some nations have implemented financial reforms on both a domestic and international level (Hermes and Lansing, 2005). During the 1970s and 1980s, the majority of the world's emerging and impoverished countries encountered economic policy crises and economic instability, and their economies continued to decline. The worsening

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financial and economic system slowed economic development, exacerbated poverty, and failed to deliver the expected advantages of long-term sustainability and real output growth. Late in the 1980s and early in the 1990s, these economies used the Structural Adjustment Program (SAP) to execute extensive governmental reforms and market-friendly incentives to attain the aim of stability. SAP's policy agenda aims to stimulate growth through the market economy's mechanisms, as well as through creating a favorable corporate climate.

Financial Liberalization (FL) promotes Economic Growth (EG) by allowing the market to run efficiently without the interference of government and legislation. A variety of indicators have been developed to assess the efficacy and scope of Financial Liberalization (FL) in the literature. Quinn's index, Delphi index, and Chin-Ito index were all used in various research as Financial Liberalization (FL) measures. Chinn-Ito Financial Openness Index (KAOPEN), which is meant to gauge a country's capital account openness, is the most recently utilized indicator for 182 nations. Beck et al. (2001) generated the latest dataset of several indicators of Financial Liberalization (FL) and used it for calculation in Beck et al. (2000) and Levine (1999). Similarly, Goldsmith's (1969) pioneering study used the ratio of financial institutions' assets to GDP as an indication of financial deepening, and subsequently, the study used the same indicator with a few amendments and alterations. The well-known and regularly used indices of Financial Liberalization (FL) include broad money, gross domestic saving, FDI inflow, and FDI outflow, domestic credit to private credit, and domestic credit to private credit given through the banking industry.

Financial Liberalization (FL) demonstrates the dominant role of market forces in the financial sector of the economy, and it has been a debatable issue in the global economy since McKinnon (1973) and Shaw (1973) highlighted the prospective performance of a greater rate of interest in mobilizing investment and savings. In terms of Financial Liberalization (FL), positive interest rates on savings and investment were theorized to promote economic growth and improve bank efficiency as well and government restrictions on the banking sector hinder investment flow, lowering the quality and amount of investments. Another aspect of Financial

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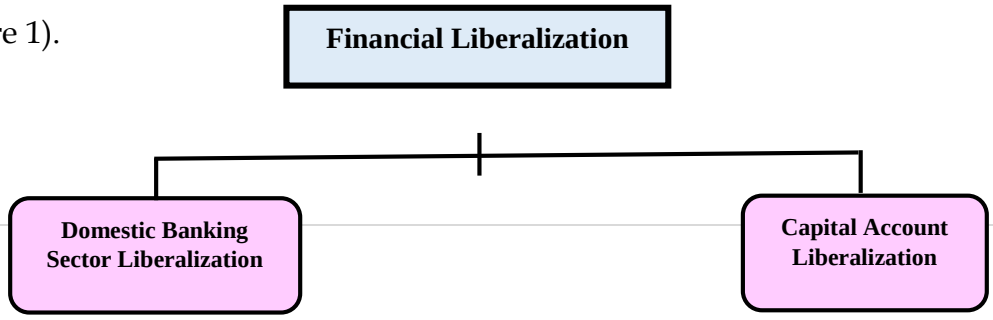
Liberalization (FL) is the advocacy of removing entry barriers, which would extend the financial sector and boost the financial depth of the economy by expanding the financial resources accessible to investors (Akpan, 2004). However, it should be noted that the open financial market is not a risk-free process, financial crises along with recessions in various countries are a direct or indirect outcome of this process. In addition to this instability in the financial market, poor governance structure and banking sector collapse may also be caused in various countries with weak infrastructure and lack of macroeconomic environment required for the efficient functioning of the financial sector including Bekaert et al. (2005) and Kose et al. (2009).

The study's primary research question is: What is the weight assigned to indicators for the development of an index of Financial Liberalization (FL) of the selected twenty-five (25) developed and developing countries? The idea behind the question is that if Financial Liberalization (FL) is truly a high gear toward growth, as was said previously in the last two decades, then how have some countries demonstrated certain unstable empirical realities regarding growth and development, particularly in the recent decade? The objectives of the research are:

- To develop the index for Financial Liberalization (FL) of the selected economies.

The study develops several indices that evaluate the efficiency of financial institutions and financial markets to overcome the limitations of single indicators as proxies for Financial Liberalization (FL), resulting in the final index of Financial Liberalization (FL) (Figure 1).



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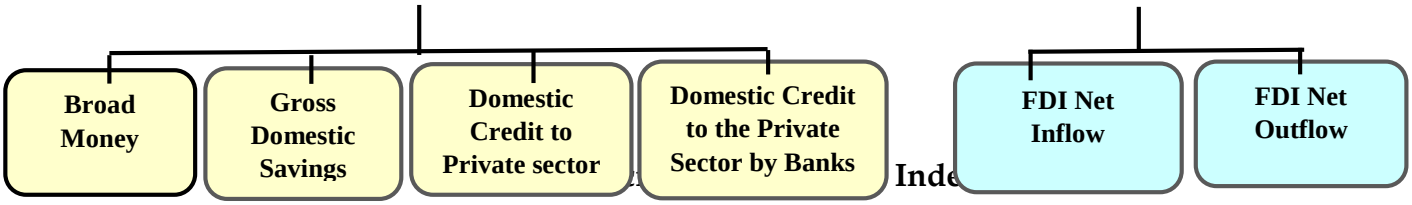

Source: WB - World Bank (2020)

Literature Review

According to Shaw (1973) and McKinnon (1973), Financial Liberalization (FL) policies, would boost savings, promote investment, and drive economic growth. They said that liberalization causes higher interest rates, which leads to more effective resource allocation, more investment, and economic growth in developing countries. McKinnon (1973) and Shaw (1973) addressed their original framework on financial repression and the need to ease financial repression by enabling the market to decide real interest rates and removing credit controls. McKinnon (1973) and Shaw (1973), claim that financial repression will result in low savings, excessive consumption, low investments, and stifled economic progress. The McKinnon–Shaw (1973) approach focuses on market inefficiencies produced by financial restrictions (Savanhu et al., 2011).

Shaw (1973) proposed the debt-intermediation hypothesis, according to this theory, increased financial intermediation between savers and investors as a result of Financial Liberalization (FL) and Financial Development (FD) increases the incentive to save and invest, stimulates investment as a result of increased credit supply and increased average investment efficiency. Qureshi and Shah (2018) compiled the financial liberalization index on behalf of Pakistan's economy for 24 years from 1991 to 2014 using the key component process. However, the verdicts of the exit study describe that the reforms should be improved from 1999 to 2003 but that the liberalization process has remained slow over a future period. Moreover, the result of the present study is exclusive to the viewpoint of the Pakistani economy as compared to previous literature, since no study on the index of financial liberalization linked to

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the Pakistani economy was carried out between 1990 and 2014. Finally, because of the real-time shift in the enactment process, the analysis aims to extend the base of the financial liberalization index. Amaira (2016) used the Principal Component Analysis approach to create a financial liberalization index for Tunisia for 36 years from 1980 to 2015. The findings reveal that the financial liberalization index and economic growth have a long-term link and that the financial liberalization index and economic growth have a Granger unidirectional causal relationship.

The empirical literature on financial sector liberalization was emphasized in the above-mentioned comprehensive review of literature on all themes pertinent to the study's subject. In addition to a comprehensive assessment of the worldwide literature, this section assesses national and international research in the framework of the Financial Liberalization Index (FLI). It is common knowledge that the influence of Financial Liberalization (FL) on the growth rate of the economy has gotten a lot of attention but the results have varied due to a multitude of reasons, such as the majority of available research is confined to a single country and concentrate one or two indicators of Financial Liberalization (FL). However, the current study has provided two sectors of financial sector liberalization such as the bank sector, and the capital account which contains several new indicators of Financial Liberalization (FL), whether or not the liberalization of financial sectors to a rise in the economic growth of the countries.

2. Methodology

The following analytical techniques are used in this work to estimate the connection between the variables in models. The study has employed the Principal Component Technique (PCA) for assigning weight to different indicators of Financial Liberalization (FL)[1] for the development of the Financial Liberalization Index (FLI).

[1] Broad Money, Gross Domestic Saving, Domestic Credit to the Private Sector by Banks, & Foreign Direct Investment.

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3.1 Principal Component Analysis (PCA)

Much recent research in economics and other social sciences has employed the PCA method to generate indexes. PCA is a statistical method that uses the variances of correlated values to break them down into smaller uncorrelated values called components, allowing for Financial Liberalization (FL) and Economic Growth (EG) without losing the original data (Jolliffe, 1986). PCA also tackles the problem of data multicollinearity. PCA calculates the eigenvalues factor and may be used to calculate the value of any component. If the explanatory variables are the same, their mean and variance are equal to 0 and 1 (Shahiki and Sheidaei 2012).

To clarify the variance of the observed data, it is intended to employ a few linear combinations of the initial data. Although, if there are Q variables, $x_1, x_2, \dots \dots \dots x_Q$, a large portion of the data's fluctuation may frequently be explained by a few principal components or uncorrelated linear relationships of the initial data $Z_1, Z_2, \dots \dots Z_Q$. There are now Q major components or the same number of components as variables. The next move is to choose the first principal component, such as $P<Q$, that retains a "high" percentage of the total variance of the initial data.

$$Z_1 = a_{11}x_1 + a_{12}x_2 + \cdots + a_{1Q}x_Q$$
$$Z_2 = a_{21}x_1 + a_{22}x_2 + \cdots + a_{2Q}x_Q$$
$$\dots\dots\dots$$
$$Z_Q = a_{Q1}x_1 + a_{Q2}x_2 + \cdots + a_{QQ}x_Q \qquad (1)$$

The variables x_j in equation (1) are given weights a_{ij} an (also known as a component or factor loading) so that the major components Z_i fulfill the requirements.

(i) They are orthogonal (uncorrelated);

(ii) The first principal component accounts for the majority of the variance in the set, the second principal component accounts for the majority of the remaining variance, and so on until the final principal component absorbs all of the remaining variances that have not been covered by the previous components; and

$$a_{i1}^2 + a_{i2}^2 + \cdots + a_{iQ}^2 = 1. i = 1,2, \dots, Q$$

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Wherever $x_1, x_2, \ldots x_Q$ are the variables (indicators), a_{ij} is the factor loadings, and Q is the number of variables.

In PCA, the sample covariance matrix's eigenvalues are determined for $\lambda_j, j = 1, \ldots, Q$.

$$CM = \begin{bmatrix} cm_{11} & cm_{12} \ldots . & cm_{1Q} \\ cm_{21} & cm_{22} \ldots \ldots & cm_{2Q} \\ cm_{Q1} & cm_{Q2} \ldots \ldots & cm_{QQ} \end{bmatrix} \qquad (2)$$

Where $cm_{ij}\ is$ the covariance of variables $x_i\ and\ x_j$, and the diagonal element cm_{ii} represent the variance of x_i, respectively. The characteristic equation$|CM - \lambda I| = 0$, where I is the identity matrix of the same order as CM and λ is the vector of eigenvalues, may be used to determine the eigenvalues of the matrix CM, which are the variances of the main components. The fact that the eigenvalues add up to the diagonal elements of CM is a significant characteristic of the eigenvalues. In other words, the total of the variances of the primary components equals the sum of the variances of the initial variables.

$$\lambda_1 + \lambda_2 + \cdots + \lambda_Q = cm_{11} + cm_{22} + \cdots + cm_{QQ} \qquad (3)$$

It is usual to practice standardizing the variables (x_s) at the beginning of the analysis to have zero means and unit variances to prevent one variable from having an excessive impact on the main components.

3.2 Data & Data Sources

The study includes an unbalanced panel of selected twenty-five (25) countries of the world covering the years from 1995 to 2020. The data is collected from secondary sources, containing World Development Indicators (WDI), and the World Bank, which are used to extract data for measuring the Financial Liberalization Index (FLI).

3. Results and Discussions

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3.1 Descriptive Statistics and Correlation Matrix of Financial Liberalization Index

To statistically test the hypotheses, the current study has employed the Financial Liberalization Index (FL). The research follows Adeel-Farooq, Bakar, and Raji (2017) who provided the Financial Liberalization Index (FL) de facto along several Financial Liberalization indicators. Through the main component approach, this study also created a Financial Liberalization Index (FLI) for the sample nations. The Financial Liberalization Index has taken two (02) dimensions of financial sectors such as banking sector liberalization and capital account liberalization:

1. **Banking Sector Liberalization:**
    - M_2 / GDP = Broad Money (% of GDP)
    - GDS = Gross Domestic Saving (% of GDP)
    - CRDTP = Domestic Credit to Private Sector (% of GDP)
    - CRDT B = Domestic Credit to the Private Sector by the Banks (% of GDP)
2. **Capital Account Liberalization:**
    - FDINF = FDI Net Inflow (% of GDP)
    - FDIOUF = FDI Outflow (% of GDP)

Table: 1 Descriptive Statistics and Correlation of Financial Liberalization Index of Developed Countries

	M2/GDP	GDS	CRDTP	CRDTB	FDINF	FDIOUF
Mean	0.39	42.54	66.05	23.22	57.45	1.95
Median	0.52	34.25	69.24	23.07	55.16	2.09
Maximum	3.84	139.77	81.65	24.36	140.88	4.51
Minimum	-2.75	-22.74	41.08	22.12	-3.10	-1.63
Std. Dev	1.04	33.62	13.75	0.69	30.78	1.04
Skewness	-0.25	0.29	-0.47	0.04	0.36	-0.35
Kurtosis	3.29	2.54	1.85	1.83	2.67	3.18

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Jarque-Bera	2.11	3.53	2.20	1.37	4.03	3.30
Probability	0.35	0.17	0.33	0.50	0.13	0.19
Sum	60.03	6593.08	1585.09	557.25	8904.7	301.5
Sum Seq.	166.52	174065.6	4351.05	11.02	145917.1	166.5
Observation	155	155	155	155	155	155
	M_2/GDP	**GDS**	**CRDTB**	**CRDTP**	**FDINF**	**FDIOUF**
M_2/GDP	1					
GDS	0.21	1				
CRDTP	0.21	0.05	1			
CRDTB	0.07	-0.45	0.36	1		
FDINF	0.30	0.01	0.77	0.48	1	
FDIOUF	0.13	0.09	0.14	0.26	0.27	1

Source: Author's Estimation

Table: 2 Descriptive Statistics and Correlation of Financial Liberalization Index of Developing Countries

	M_2/GDP	**GDS**	**CRDTP**	**CRDTB**	**FDINF**	**FDIOUF**
Mean	0.32	45.63	30.53	8.45	49.28	1.59
Median	0.29	46.50	27.17	9.47	48.32	1.53
Maximum	3.84	139.77	99.63	53.82	147.65	4.89
Minimum	-2.75	-47.67	-36.61	-36.15	-45.18	-1.49
Std. Dev	1.10	28.67	24.81	24.97	37.78	1.26
Skewness	0.02	-0.13	0.15	-0.01	0.13	0.16
Kurtosis	2.92	3.25	2.64	2.07	2.73	2.70
Jarque-Bera	0.17	2.93	4.67	1.22	3.08	4.29
Probability	0.92	0.21	0.10	0.54	0.21	0.11
Sum	165.0	23681.9	15845.7	287.11	25575.9	826.5
Sum Seq.	621.4	425742.2	318732.6	20574.10	739246.7	817.7

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Observation	495	495	495	495	495	495
	M_2/GDP	**GDS**	**CRDTP**	**CRDTB**	**FDINF**	**FDIOUF**
M_2/GDP	1					
GDS	0.05	1				
CRDTP	-0.09	-0.12	1			
CRDTB	0.15	-0.19	-0.15	1		
FDINF	0.11	-0.01	-0.23	0.78	1	
FDIOUF	0.11	-0.18	-0.13	0.25	0.26	1

Source: Author's Estimation

The use of Descriptive Statistics is assumed to examine the nature of the data. By computing the variable's median, mean, standard deviation, range, minimum, and maximum values, it can be shown. To ascertain the link between all explained and explanatory variables applied in the study, correlation analysis is used. Another function of the correlation table is the multicollinearity test. It indicates whether or not multicollinearity exists between the variables. Multicollinearity develops between the variables when the coefficient of correlation is greater than 0.80 (Allen, 1997).

In Tables 1 and 2, the Correlations Matrix and Descriptive Statistics for various indicators of Financial Liberalization (FL) of developed and developing countries have been shown. These findings demonstrate there is a normal distribution for all variables. The correlation coefficient of the variables utilized in the study is shown in Tables 1 and 2. After the Correlations Matrix, the findings indicate that there is a weak and significant link. In developed countries, the pair-wise correlation results reveal a positive connection between the indicators of Financial Liberalization. While, in developing countries, all the indicators of Financial Liberalization (FL) are positively correlated instead of Gross Domestic Credit to the Private Sector (CRDTP). There is no indication of multicollinearity between the series in both groups of developed and developing countries, in line with the correlation analysis.

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4.2 Construction of Financial Liberalization Index of Developed and Developing Countries

The process of Financial Liberalization (FL) entails the adoption and implementation of several reforms in the nation's financial sector (Ahmad et al., 2013). It is seen to be crucial to assess how far the financial sector is liberalizing at a given point in time. As a result, the present study created the Financial Liberalization Index (FLI) for developed and developing countries based on information gathered from the financial sector. To create the index for various nations, prior scholars also used the Principal Component Technique (PCA). The index was created using the Principal Component Approach (PCA) by Bandiera et al. (2000) and Leavens (2000). Shrestha and Chowdhury (2006) used the Principal Component Approach (PCA) to create a Financial Liberalization Index (FLI) for Nepal. A comparable financial repression index for China was created by Laurenceson and Chai (2003). Using the Principal Component Analysis (PCA), Demetriades and Luintel (1997) created a nine-dimensional financial repression index for India.

The Financial Liberalization Index (FLI_{it}) in the current study is created using the Principal Component Method (PCM) and includes six (06) financial sector variables as identified by the World Bank in its financial sector progress assessment report. The following is a description of the factors utilized to generate the Financial Liberalization Index (FLI) for developed and developing countries:

- M_2 / GDP: Broad Money
- GDS: Gross Domestic Saving
- CRDTP: Domestic Credit to Private Sector
- CRDT B: Domestic Credit to the Private Sector by the Banks
- FDINF: FDI Net Inflow
- FDIOUF: FDI Outflow

The current study gathered information on the Financial Liberalization (FL) that took place between 1995 and 2020. World Development Indicators (WDI) and the World Bank provided the data designed for the building of the Financial Liberalization Index (FLI) from 1995 to 2020. Prior research in the field has created an index to measure the

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degree of Financial Liberalization (FL) in various regions of the world. Financial Liberalization (FL) was established for India by Demetriades and Luintel in 1997, for China by Laurenceson and Chai in 2003, for Nepal by Shrestha and Chowdhury in 2006, and for Tunisia by Amaira in 2014. Other developed and developing nations were covered by Bandiera et al., in 2000 and Leaven in 2003. The Financial Liberalization Index (FLI), which was developed by this investigation using only two sectors such as the banking sector liberalization in which Broad Money (M_2/GDP), Gross Domestic Saving (GDS), Domestic Credit to the Private Sector (CRDTP), and Domestic Credit to the Private Sector by Banks (CRDTB) are included. While, the capital account liberalization includes FDI Net Inflow (FDINF), and FDI Net Outflow (FDIOUF). By utilizing the Principle Component Approach (PCA), the weight of each component is determined. Use the equation below to calculate the Financial Liberalization Index (FLI_{it}):

$$FLI_{it} = W_1 \frac{M_2}{GDP_{it}} + W_2 GDS_{it} + W_3 CRDTP_{it} + W_4 CRDTB_{it} + W_5 FDINF_{it} + W_6 FDIOUF_{it} \quad (4)$$

Where, t= 1995, 1996…….. 2020 and i= 1…….25. While W_t is the calculated weight of each component.

4.3 Principal Components Analysis

The purpose of Principal Components Analysis (PCA) is to use the fewest number of factors to account for the highest amount of variance in the indicator set. As a result, the composite is now depending on the "statistical" dimensions of the data rather than the data set's dimensionality, which makes the composite less dependent on it. Next, the Covariance Matrix (CM) transforms into a correlation matrix (Table 3).

Table: 3 Correlation Matrix for Financial Liberalization Indicators of Developed and Developing Countries

	Developing Countries					
Variables	M^2/GDP	GDS	CRDTP	CRDTB	FDINF	FDIOUF
M_2/GDP Correlation	1.00	.06	-.06	.16	.13	.10
Sig. value		(0.084)	(.068)	(.000)	(.000)	(.008)

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GDS Correlation		1.00	-.17	-.15	-.05	-.20
Sig. value			(.000)	(.000)	(.120)	(.000)
CRDTP Correlation			1.000	-.03	-1.30	**-0.84**
Sig. value				(.194)	(.000)	(.016)
CRDTB Correlation				1.000	**.77**	.22
Sig. value					(.000)	(.000)
FDINF Correlation					1.000	.26
Sig. value						(.000)
FDIOUF Correlation						1.000
Sig. (1-tailed)						
Determinant=.313						
	Developed Countries					
	M²/GDP	GDS	CRDTP	CRDTB	FDINF	FDIOUF
M_2/GDP Correlation	1.00	.13	.07	.21	.31	.14
Sig. value		(0.003)	(0.179)	(.004)	(0.000)	(.044)
GDS Correlation		1.00	-.44	.05	.02	.10
Sig. value			(.000)	(.258)	(.385)	(.101)
CRDTP Correlation			1.00	.37	**.48**	.27
Sig. value				(.000)	(.000)	(.000)
CRDTB Correlation				1.00	**.78**	.155
Sig. value					(.000)	(.027)
FDINF Correlation					1.00	.29
Sig. value						(.000)
FDIOUF Correlation						1.00
Sig. value						
Determinant=.169						

Note: n=650. Marked correlations become statistically significant at $p < 0.05$.

The Covariance Matrix (CM) then assumes the shape of the Correlation Matrix (CM) (Table 3). The individual indicators such as Domestic Credit to the Private Sector (CRDTP) and Foreign Direct Investment, Net Outflow (FDIOUF) in the Financial Liberalization Indicators (FLI) have the strongest association, with a value of -0.84. While Domestic Credit to the Private Sector by Banks (CRDTPB) and Foreign Direct Investment, the Net Inflow (FDINF) has also strongly correlated with each other, with a value of 0.77 in developing countries. However, in developed countries, the individual indicators such as Domestic Credit to the Private Sector by the Banks

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(CRDTPB) and Foreign Direct Investment, Net Inflow (FDINF) in the Financial Liberalization Indicators (FLI) has the strongest link, with a value of 0.78. Whereas Domestic Credit to the Private Sector (CRDTP) and Foreign Direct Investment, the Net Inflow (FDINF) has moderately correlated with each other with a value of 0.48.

Table: 4 Eigenvalue of Financial Liberalization Indicators of Developed and Developing Countries

	Developing Countries		
Principal Component	**Eigenvalues**	**% of Variance**	**Cumulative**
1	2.00	33.42	33.42
2	1.22	20.35	53.77
3	.94	15.74	69.52
4	.93	15.54	85.07
5	.68	11.39	96.46
6	.21	3.53	100.00
	Developed Countries		
Principal Component	**Eigenvalues**	**% of Variance**	**Cumulative**
1	2.34	39.00	39.00
2	1.42	23.00	62.69
3	.912	15.84	77.89
4	.77	12.84	90.73
5	.35	5.82	96.55
6	.21	3.45	100.00

The Correlation Matrix's Eigenvalues for the six (06) distinct indicators that make up the Financial Liberalization Index (FLI) are shown in Table 4. Keep in mind that the total Eigenvalues ($Q=6$) equals the total number of indicators. All six (06) independent indicators are given identical weights for constructing the main components since the Principal Components Analysis (PCA) uses the Correlation Matrix (CM) alternatively of the Covariance Matrix (CM) (Chatfield & Collins, 1980). All of the individual indicators' maximum variance is described by the First Principal Component

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(eigenvalue of 2.00). The Second Principal Component discusses the maximum of the remaining variation which has a variance of 1.22. A near 1 Eigenvalue is seen in the third and fourth main components. The remaining 15% of the variation in the final two major components is explained by the data set in developing countries, While in developed nations, the eigenvalue of the First Principal Component is 2.34, the Second Principal Component, simplifies the maximum of the remaining variation which has a variance of 1.42. A near 1 Eigenvalue is seen in the third and fourth main components. The remaining 9% of the variation in the final two major components is explained by the data set.

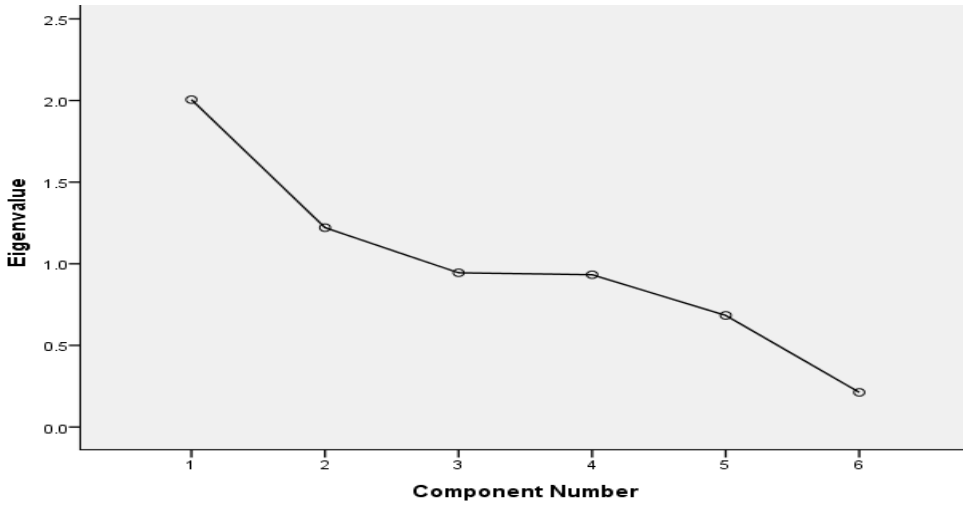

Figure: 2 Eigenvalue for Financial Liberalization Indicators of Developing Countries

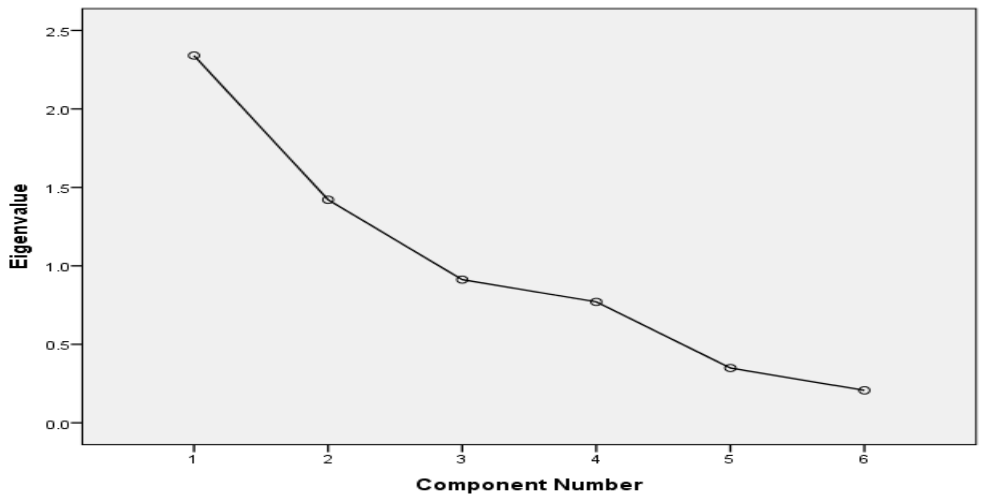

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Figure: 3 Eigenvalue for Financial Liberalization Indicators of Developed countries

Table: 5 Component Loadings for Financial Liberalization Indicators of Developed and Developing Countries

	Principal Components of Developing Countries		
Indicators	**PC1**	**PC2**	**Communality**
M_2/GDP	.31	**.33**	.20
GDS	-.23	**.78**	.66
CRDTP	-.17	**-.67**	.48
CRDTB	**.88**	-.02	.78
FDINF	**.89**	-.10	.80
FDIOUF	**.51**	-.20	.31
Explained Variance	33.42	20.35	
Cumulative (%)	33.42	53.78	
	Principal Components of Developed Countries		
Indicators	**PC1**	**PC2**	**Communality**
M_2//GDP	.41	**.53**	.44
GDS	-.08	**.90**	.81
CRDTP	**.69**	-.55	.78
CRDTB	**.82**	.11	.68
FDINF	**.90**	.09	.83
FDIOUF	**.46**	.14	.23
Explained Variance	39.00	23.00	
Cumulative (%)	39.00	62.69	

Extraction Method: Principal Components, Direct Oblimin rotation. Extraction Method: Principal Component Analysis.

The component loadings for the initial factors in the example of Financial Liberalization Indicators (FLI) are shown in Table 5. Be aware that the rotation has changed the Eigenvalues. The rotating components spread out the variation more equally than the unrotated ones do. Domestic Credit to Private Sectors through Banks (CRDTB) has (0.88), Foreign Direct Investment, Net Inflow (FDINF) has (0.89), and

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Foreign Direct Investment, Net Outflow (FDIOUF) has (0.51) all have large positive coefficients (loadings) for the first component. While Broad Money to GDP (M_2/GDP) has (0.33), Gross Domestic Saving (GDS) has (0.78), and Domestic Credit to Private Sectors (CRDTP) has (-0.67) are the key drivers of component two in developing countries. On the other hand, in developed countries Domestic Credit to Private Sectors by Banks (CRDTB) has (0.82), Domestic Credit to Private Sectors (CRDTP) has (0.69), Foreign Direct Investment, Net Inflow (FDINF) has (0.90), and Foreign Direct Investment, Net Outflow (FDIOUF) has (0.46) all have large positive coefficients (loadings) for the first component. While Broad Money to GDP (M_2/GDP) has (0.53), and Gross Domestic Saving (GDS) has (-0.90) are the key drivers of the second component. To create weights for the Financial Liberalization Indicator (FLI), the loading of the component presented in Table 8 has been employed in the next section on the "Weighting method."

4.4 Weighting Methods of Financial Liberalization Index

4.4.1 Weights Based on Principal Components Analysis

According to principal components analysis (PCA), weighting does not reflect the theoretical significance of the linked indicator; rather, it simply intervenes to compensate for information overlap between two or more correlated indicators. Weights cannot be computed using this approach if no correlation between the indicators is discovered. (See supplement B of the Business and Consumer Surveys Result N. 8/9 August/September 2001)[2].

Table: 6 Square of Components Loadings of Financial Liberalization Indicators of Developed and Developing Countries based on Principal components

Developing Countries				
	Component Loading		Squared Components Loading	
Indicators	**PC1**	**PC2**	**PC1**	**PC2**
M_2/GDP	.307	.327	0.09	**0.11**
GDS	-.228	.780	0.05	**0.61**

[2] http://europa.eu.int/comm/economy_finance/publications/european_economy/2001/b2001_0809_en.pdf

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CRDTP	-.166	-.673	0.03	**0.45**
CRDTB	.883	-.024	**0.78**	0.00
FDINF	.887	-.103	**0.79**	0.01
FDIOUF	.513	-.204	**0.26**	0.04
Expl.Var	33.423	20.354		
Expl./Tot	10.36	6.31		

Developed Countries

	Component Loading		**Squared Components Loading**	
Indicators	**PC1**	**PC2**	**PC1**	**PC2**
M_2/GDP	.407	.526	0.17	**0.28**
GDS	-.075	.895	0.00	**0.80**
CRDTP	.686	-.553	**0.47**	0.31
CRDTB	.818	.108	**0.67**	0.01
FDINF	.904	.090	**0.82**	0.00
FDIOUF	.462	.135	**0.21**	0.01
Expl.Var	39.00	32.00		
Expl./Tot	10.36	6.11		

Note: The variance explained by a factor is denoted by the terms Expl.Var and where Expl. /Tot is the explained variance divided by the sum of the variances of the two components.

Considering that the square of component loadings signifies the percentage of the total unit variance of the indicator that is justified by the components, the final step deals with constructing the weights from the matrix of component loadings after rotation. Nicoletti et al. (2000) the method involves combining the single indicators with the highest component loadings toward intermediate composite indicators.

There are two intermediate composites available with the financial Liberalization data collection (Table 6). Domestic Credit to the Private Sector by Banks (with a weight of 0.78), FDI Net Inflow (weight of 0.79), and FDI Outflow (weight of 0.26) are all included in the first category. Similar to the first intermediate, the second intermediate is generated by Broad Money to GDP (weight of 0.11), Gross Domestic Saving (weight of 0.61), and Domestic Credit to Private Sectors (Weight of 0.45) of

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developing countries. In developed countries, Domestic Credit to the Private Sector by Banks (with a weight of 0.67), Domestic Credit to the Private Sector (Weight of 0.47), FDI Net Inflow (weight of 0.82), and FDI Outflow (weight of 0.21) are all included in the first category. Similar to the first intermediate, the second intermediate is generated by Broad Money to GDP (weight of 0.28), and Gross Domestic Saving (weight of 0.80), Now, each financial liberalization dimension's weight is entered in equation number (4).

- **Weights of Financial Liberalization Indicators (FLI) for Developing Countries:**

$$FLI_{it} = 0.11\frac{M_2}{GDP_{it}} + 0.61GDS_{it} + 0.45CRDTP_{it} + 0.78CRDTB_{it} + 0.79FDINF_{it} + 0.26FDIOUF_{it} \quad (5)$$

- **Weights of Financial Liberalization Indicators (FLI) for Developed Countries:**

$$FLI_{it} = 0.28\frac{M_2}{GDP_{it}} + 0.80GDS_{it} + 0.47CRDTP_{it} + 0.67CRDTB_{it} + 0.82FDINF_{it} + 0.21FDIOUF_{it} \quad (6)$$

The Financial Liberalization Index (FLI) for developed and developing countries is created by considering six elements of the financial sector, each of which addresses a different feature of Financial Liberalization (FL), such as capital account liberalization, and bank sector liberalization. There isn't much literature on different countries' efforts to build a financial liberalization index, nevertheless. The index describes the financial sector reforms in developed and developing countries.

4.5 Ranks of Countries Based on the Degree of Financial Liberalization Index (KAOPEN)

KAOPEN is the first main element of the original variables relating to regulatory restrictions over current or capital account operations, the availability of several exchange rates, and the demands of relinquishing export earnings, as is detailed in detail by Chinn and Ito (2006, 2008).

Principal component analysis (PCA) is a statistical approach for identifying principal components (PCs), which are orthogonal linear combinations of a group of

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variables chosen for their capacity to represent variance. Table 7 shows changes in national rank from 1995 to 2020 to give an overview of the long-term changes in national rank for the level of financial liberalization. East Asia and the Pacific, Europe and Central Asia, and North America include the majority of the world's financially liberalized nations. The rating makes it clear that high-income nations like France, the United States, the United Kingdom, New Zealand, Germany, and Thailand are among the top-ranked nations for Financial Liberalization (FL). In addition, certain nations, including Argentina, India, Nepal, Pakistan, South Africa, Sri Lanka, and Bangladesh, rose from a low rank in terms of Financial Liberalization (FL) in 1995 to a high rank in terms of Financial Liberalization (FL) in 2019.

Table: 7 Rankings of Nations Based on the Index of Financial Liberalization (KAOPEN)

Ranking	Country Name	KAOPEN(2019)	Change in KAOPEN	Ranking	Country Name	KAOPEN(2019)	Change in KAOPEN
1	France	2.32	Up	102	Nigeria	-0.65	Up
1	Germany	2.32	Up	104	Argentina	-0.97	Down/Up
1	New Zealand	2.32	Up	106	India	-1.23	Down/Up
1	Singapore	2.32	up	106	Nepal	-1.23	Down/Up
1	United Kingdom	2.32	up	106	Pakistan	-1.23	Down/Up
1	United States	2.32	up	106	South Africa	-1.23	Down/Up
66	Kenya	1.05	Down	106	Sri Lanka	-1.23	Down/Up
66	Mexico	1.05	Down	106	Bangladesh	-1.23	Down/Up

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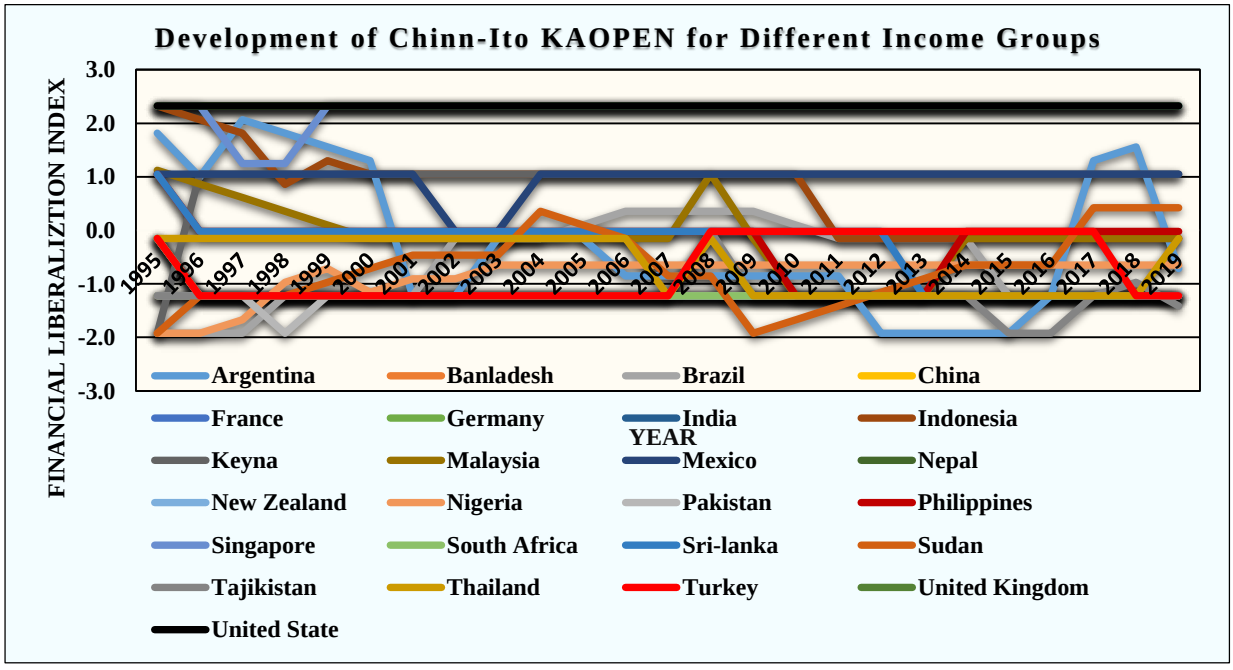
82	Sudan	0.42	Down	106	Brazil	-1.23	Down/Up
86	Philippines	-0.02	Down	106	Turkey	-1.23	Down/Up
92	Indonesia	-0.15	Down	106	China	-1.23	Down/Up
92	Malaysia	-0.15	Down	164	Tajikistan	-1.41	Down
92	Thailand	-0.15	Up				

Source: Chinn and Ito (2019)

http://web.pdx.edu/~ito/Readme_kaopen2019.pdf

Table 9 lists nations according to their 2019 KAOPEN scores. The column on the far right shows whether a country of concern raised ("Up") or decreased ("Down") the level of KAOPEN relative to that as of 2018. As of 2019, there are 6 nations with a "most financially open" score of 2.32, while there are 9 nations with a "least financially open" score of -1.23.



Source: Chinn-Ito. Higher values indicate greater financial openness.

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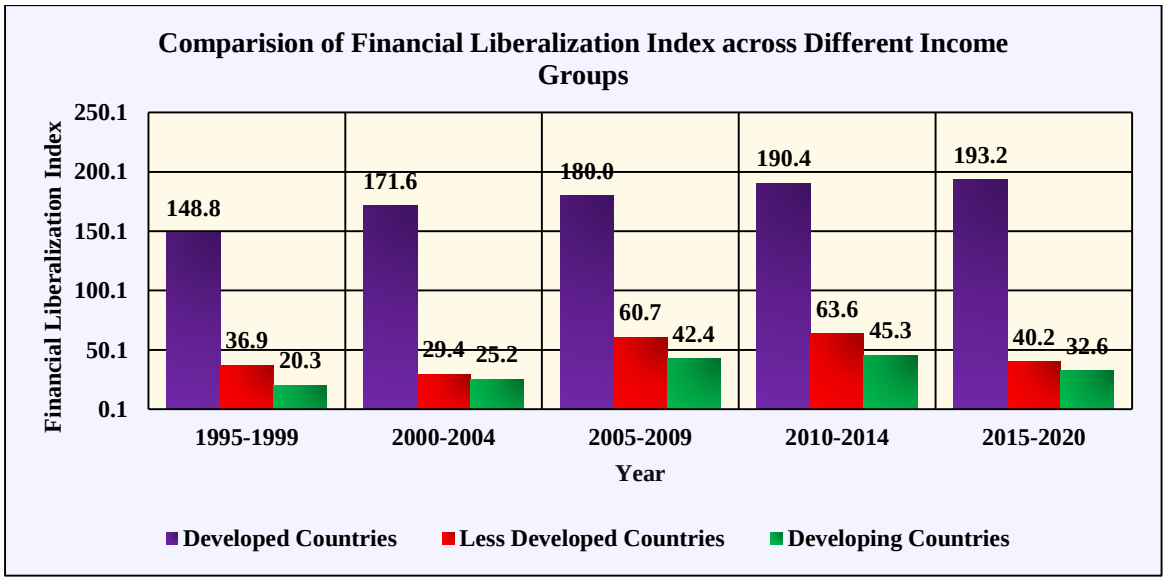
Figure 4: Chinn-Ito KAOPEN series for Argentina, Bangladesh, Brazil, China, France, Germany, India, Indonesia, Kenya, Malaysia, Mexico, Nepal, New Zealand, Nigeria, Pakistan, Philippines, Singapore, South Africa, Sri Lanka, Sudan, Tajikistan, Thailand, Turkey, United Kingdom, United States,

4.6 Comparison of Financial Liberalization Index across Different Income Groups

The subsample averages of Financial Liberalization (FL) for various income categories of nations are compared in Figure 6. Figure 7 illustrates the comparison of Financial Liberalization (FL) and the Governance Quality Index (GOV) for different nations across various income groups.



Note: Author's calculations

Source: World Development Indicators (2020)

Figure 5: Comparison of Financial Liberalization Index across Different Income Groups

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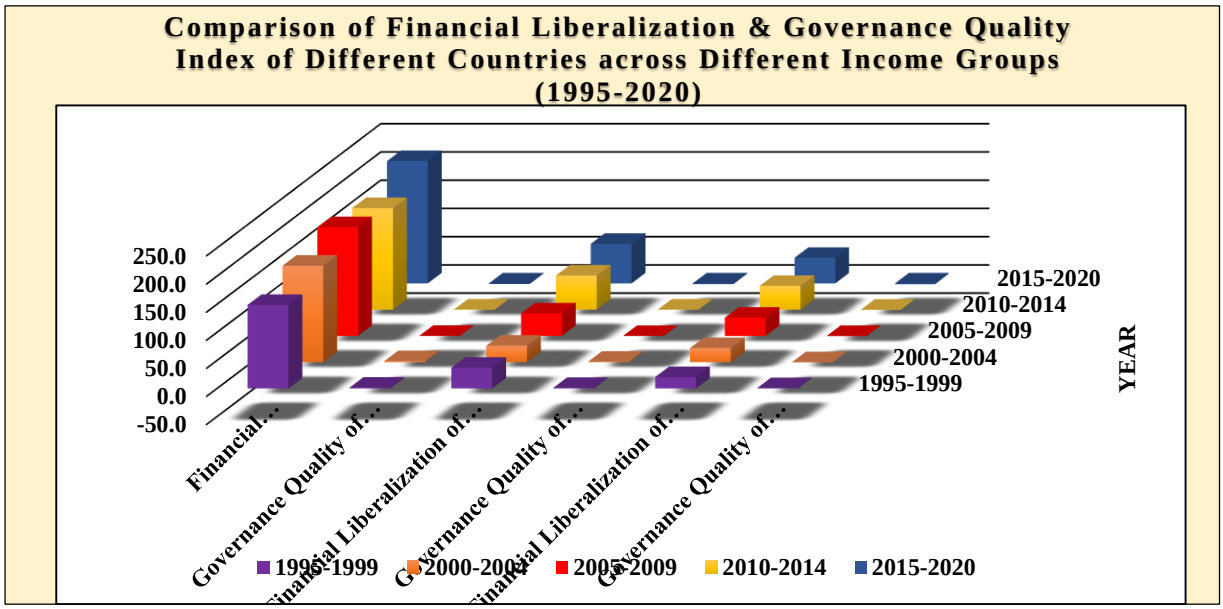
4.7 Comparison of Financial Liberalization Index & Governance Quality Index of Different Countries across Different Income Groups



Note: Author's calculations

Source: World Development Indicators (2020)

Figure 6: Comparison of Financial Liberalization Index & Governance Quality Index of Different Countries across Different Income Groups

4. Limitations of the Study and Future Research

Currently, there are numerous approaches to expanding this research. This study indicated several areas where additional research may be done to enhance the quality of the findings. First, the future study must build a joint Financial Liberalization Index (FLI) of different financial sectors, such as the domestic banking sector, capital account liberalization, and stock market openness to represent the Financial Liberalization Index (FLI) comprehensively. Second, our research did not take into account that due to the unavailability of data limitations, the important and more complex indicators of Financial Liberalization (FL), such as portfolio flows, were left out of the models. Future research must include this indicator of Financial Liberalization (FL) in the analysis. Due to the restricted data availability, the conclusions in this study can be much improved in the future. The study also expects that other researchers will use our findings and technique to obtain a full

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understanding of research on the introduction of a new broad-based index of Financial Liberalization (FL) of Developed and Developing Countries

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Appendix-1

Table A1 Description of the Variables and Data Sources

Variable	Symbol	Description	Scale	Sources
Financial liberalization index	FLI	The development of the financial liberalization index which contains six indicators which are presented in the table		Author's calculation
Broad Money	(M_2/ GDP)	Broad Money to total GDP	% of GDP	World Bank (2020
Domestic credit to the private sector by the banks	CRDT B	Domestic Credit to the Private Sector by the banks	% of GDP	World Bank (2020)
Domestic credit to the private sector	CRDTP	Domestic Credit to the private sector	% of GDP	World Bank (2020)
Gross domestic saving	GDS	Gross Domestic Saving	% of GDP	World Bank (2020)
FDI net inflow	FDINF	The value of inward FDI of foreign investors in the reporting countries.	% of GDP	World Bank (2020)
FDI outflow	FDIOUF	The value of outward FDI by domestic investors in foreign countries	% of GDP	World Bank (2020)

Source: WB - World Bank (2020)

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Table A2 Summary of Expected Signs of the Coefficients in the General Model

Variable	Construction	Explanation	Expected signs about GDP	This was used in studies for empirical analysis
Financial Liberalization Index (FLI_{it})	$\left(\frac{M_2}{GDP}\right)_{it}$, GDS_{it}, $CRDTB_{it}$, FDI_{it}, CR	Constructed by Chinn and Ito (2002, 2005)	(+)	Arestis et al (2002)
Broad Money $\left(\frac{M_2}{GDP}\right)_{it}$	$\left(\frac{M_2}{GDP}\right)_{it}$ are proxies by the index which is taken from the WDI	$\left(\frac{M_2}{GDP}\right)_{it}$ = Broad Money	(+)	Adeel-Farooq, Bakar, & Raji, (2017)
Gross domestic saving (GDS_{it})	GDS_{it} are proxies by the index which is taken from the WDI	GDS_{it} =gross domestic saving	(+)	Adeel-Farooq, Bakar, & Raji, (2017)
Domestic Credit to the Private Sector by Banks ($CRDTB_{it}$)	$CRDTB_{it}$ are proxies by the index which is taken from the WDI	$CRDTB_{it}$= Domestic Credit to the Private Sector by Banks	(+)	Adeel-Farooq, Bakar, & Raji, (2017)
Foreign direct investment (FDI_{it})	$FDI_{it} = {}^{FI_{it}}/_{NGDP_{it}}$	FI_{it} = foreign direct investment $NGDP_{it}$ = nominal gross domestic product	(+)	Adeel-Farooq, Bakar, & Raji, (2017)

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Domestic credit to the Private Sector ($CRDT_{it}$)	$CRDT_{it}$ are proxies by the index which is taken from the WDI		(+)	Adeel-Farooq, Bakar, & Raji, (2017)

Note: Author's calculations

Table: A3 Classification of countries as per income Groups

Number of Countries	Group	Income Group	List of Countries	Classification
01	1	Lower-income	Sudan	Developing Countries
09	1	Lower middle income	Bangladesh, India Indonesia, Nigeria, Pakistan, Philippines, Sri Lanka, Kenya, & Nepal	Developing Countries
07	1	Upper middle income	Argentina, Brazil, Malaysia, Mexico, South Africa, Thailand, & Turkey	Developing Countries
08	2	High Income	The United Kingdom, United States, Germany, China, Singapore, Finland, France, New Zealand	Developed Countries

Notes: *Group: 1. US$1,941 to US$4,020, Upper Middle Income: US$4,021 to 12,629, Group: 2. High Income: US$12, 630 or more. Source; World Bank (2020)*