Financial Liberalization, Institutional Quality and Economic Growth Nexus: Panel Analysis of African Countries

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Abstract

The present article has investigated the impact of financial liberalization and institutional quality on economic growth in Africa from 1996 to 2021. The estimated results of the study show that the availability of physical capital, total labor force participation, political stability, and effectiveness of the government have a positive and significant impact on the economic growth of the selected countries. The availability of physical capital and total labor force participation have a bidirectional causal relationship with economic growth. Financial liberalization has an insignificant impact on the economic growth of African countries. The study recommends that to enhance economic growth in Africa, the governments of the African countries should manage physical capital, raise the number of skilled labor force participation and promote institutional quality at the same time. Moreover, to get the true benefit of financial liberalization, African nations should control the negative effect of financial liberalization so that this economic growth can be achieved.

Keywords: financial liberalization, economic growth, political stability, government effectiveness

JEL Codes: D72, F60, G18, O40

1. Introduction

In this modern era, financial liberalization plays a vital role in the process of economic growth. Since international financial markets are integrated among most of the developed, countries and they have experienced economic prosperity (Xu et al., 2008). After the emergence of the IMF and WTO, many developed countries as well as several developing countries have started to liberalize

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their financial markets to achieve higher economic growth. Although, the idea of financial liberalization is still controversial among economists and policymakers. Some studies show that financial liberalization improves the level of economic growth (Bekaert et al., 2011; Bussiere and Fratzscher, 2008; Adeel-Farooq et al., 2017). But, since the 1980s most African countries had experienced low levels of economic growth by liberalizing their financial markets partially (APkan and Atan, 2016). Hence, there is no evidence that financial liberalization is an appropriate development strategy in African countries.

Simply, the concept of financial liberalization is defined as; the removal of government intervention from financial markets (Misati and Nyamongo, 2012; Bekaert et al., 2006). In other words, financial openness is the process of liberalizing the financial system of an economy by reducing the restrictions and controls on the financial markets (Laeven, 2003; Demirguc-Kunt and Degatriache, 1998). To evaluate the impact of financial liberalization on economic growth the most important step is to construct an accurate measure of financial liberalization. Leaven (2003) develops the financial liberalization index with the help of interest rate deregulation, reduction of entry barriers, reduction of reserve requirements, and reduction of credit controls. In contrast, Uchenna et al., (2016) measure financial openness with the help of trade liberalization, exchange rate, lending rate, and saving rate. Several other studies measure financial openness by using de jure and de facto financial globalization (Kose et al., 2006; Ghehringer, 2013; Kose et al., 2009).

Institutional quality has received considerable attention, as some researchers believe that institutions set routes for economic activities (Butkiewicz and Yanikkaya, 2006; Alzer and Dadasov, 2013). Institutional quality is a broad concept and it is difficult to define in a single definition. Bekaert et al., (2011) point out that the quality of the institutions has been measured by law and order, investment profile, and corruption level. Apkan and Atan (2016) constructed

institutional quality index with the help of control of corruption, regulatory quality, rule of law, government effectiveness, and political stability. Alvarez et al., (2018) point out that institutional quality and economic growth have a significant relationship. But policymakers still are not clear that how institutional quality impacts economic growth (Nguyen, 2018; Valeriani and Peluso, 2011). Some studies empirically examined the impact of institutional quality on economic growth (Kutan et al., 2018; Gazdar and Cherif, 2014). The current study has investigated the impact of financial liberalization, and institutional quality on economic growth in African countries. The previous studies focused on developed countries and Asian developing countries. There is hardly any study in the case of African countries, so this is a healthy contribution to respective literature in the case of African countries and novel in its nature.

2. Literature Review

Since the 1980s in Africa, few countries have adopted the liberalization of financial markets while the majority of the countries have an insufficient understanding of liberalization and financial integration. Therefore, this study is going to investigate the link between financial liberalization, institutional quality, and economic growth in African countries. From its start, financial liberalization remains one of the most controversial topics in the world, although many developed countries have implemented various financial reform programs to increase their economic growth (Jin, 2000; Miller and Upadhyay, 2000; Anderson, 2001; Bekaert et al., 2005; Beck et al., 2000; Edison et al., 2002; Leaven, 2003; Yanikkaya, 2003; Olufemi, 2004; Hwang and Wang, 2004; Lee et al., 2004; Bonfiglioli and Mendicino, 2004; Bekaert et al., 2005; Butkiewicz et al., 2006; Ranciere et al., 2006; Kose et al., 2006; Bekaert et al., 2006; Ito, 2006; Ang and McKibbin, 2006; Mitton, 2006; Butkiewicz et al., 2006; Tswamuno et al., 2007; Galindo et al., 2007; Naceur et al., 2007; Xu et al., 2008; Bonfiglioli, 2008; Bussiere and Fratzscher, 2008; Cecchini and Lai-Tong,

2008; Sarkar, 2008; Yucel, 2009; Chang et al., 2009; Kose et al., 2009; Madsen, 2009; Cajueiro et al., 2009; Garita, 2009; Chandran and Munusamy, 2009; Abizadeh and Pandey, 2009; Ahmed, 2010; Levchenko et al., 2009; Audi et al., 2022; Senutrk and Ali, 2022; Ali et al., 2022; Audi et al., 2022).

Since the last three decades, the role of financial liberalization and the quality of institutions for economic growth has become the topic of discussion among researchers all over the world. Many developed as well as developing countries are taking precautionary steps for improving financial liberalization and the quality of institutions to enhance their economic growth (Olufemi, 2004; Berger et al., 1997). Financial liberalization impacts economic growth is empirically tested by Ang (2010), Chimobi (2010), Atif et al., (2010), Okpara (2010), Bekaert et al., (2011), Valeriani and Peluso (2011), Adam (2011), Eichengreen et al., (2011), Shahbaz (2012), Misati and Nyamango (2012), Saha (2012), Bumann et al., (2013), Haye and Wizarat (2013), Gehringer (2013), Haddad et al., (2013), Ahmed (2013) Amaira (2016), Bekaert et al., (2005), Ali (2015), Ali and Bibi (2017), Keho (2017), Ali and Naeem (2017), Ali (2018).

There are many previous studies consider financial openness is an important factor of economic growth (Kose et al., 2009; Ang and McKibbin, 2006; Nasreen and Anwar, 2014; Ali and Ahmad, 2014; Mackton et al., 2014; Kinuthia and Etyang, 2014; Ali and Rehman, 2015; Serdaroglu, 2015; Celik and Citak, 2016; Amaira, 2016; Ali and Audi, 2016; Uchenna et al., 2016; Ali and Audi, 2018), but African countries are ignored by the researchers. The quality of the institutions and economic growth empirically examined by many studies (Kutan et al., 2017; Adeel-Farooq et al., 2017; Nteegah et al., 2017; Abdillahi, 2017; Keho, 2017). The good quality institutions should lead to higher economic growth while poor-quality institutions can cause a low economic growth rate (Sawyer, 2010; Valeriani and Peluso, 2011; Kutan et al., 2017; Alvarez et al., 2018; Apkan

and Atan, 2016; Ali and Zulfiqar, 2018; Nguyen et al., 2018; Ali and Senturk, 2019). Therefore, it is imperative to understand the relationship between institutional quality financial liberalization and economic growth among African countries.

3. The Model

Stable and higher economic growth remains a policy issue among developed and developing countries. During the 1950s the modern literature on economic growth has been started by Solow (1956). The 20th-century literature focuses on neoclassical growth theory mainly Solow (1956), Sawn (1956), and Cass (1965). The neoclassical production function is based on a constant return to scale, which explains diminishing returns to scale with each new input addition and there is no specific financial innovations have existed in the economy. Thus, historically, the modern economic growth theory driven by Solow and Swan, neoclassical growth model indicates that long-run economic growth depends on total capital, total labor force, and technological advancement (Solow, 1956; Swan, 1956). This shows that growth is exogenously determined in the neoclassical framework.

During the 1970s Mackinnon and Shaw introduce a conceptual framework that helps to explain the relationship between financial liberalization and economic growth. The financial sector operationalized the savings of the household for enhancing the quality and quantity of investment (Mackinnon, 1973; Shaw, 1973). International financial market structure plays an important role in deciding the financial market structure, economic growth, and convergence among developed and developing countries. Xu et al., (2008) point out that financial globalization has become an appropriate development strategy after the emergence of the WTO, IMF, and the World Bank.

During the 1980's the proponent of endogenous growth theory revisited neoclassical thoughts and find that growth is determined endogenously not exogenously. The endogenous growth model

introduces an alternative method for examining the determinants of long-run economic growth, which is based on the endogenous economic system Romer, 1986; Lucas, 1988; Rebelo, 1991). The endogenous theory finds that there are non-decreasing returns to scale with each new input addition. Afterward, many researchers attempted to understand the fundamental determinants of economic growth, and various theories of economic growth have been developed (Barro, 1996; Dritsakis et al., 2006; Javed et al., 2018).

Presently, institutional quality has received considerable attention for enhancing economic activities (Butkiewicz and Yanikkaya, 2006; Alzer and Dadasov, 2013). But still, it is a debatable issue among the policymakers, but all agreed that institutional quality plays a significant role in international transactions (Alvarez et al., 2018). The most notable theoretical and empirical work related to economic growth and institutional quality (Butkiewicz and Yanikkaya, 2006; Valeriani and Peluso, 2011; Alzer and Dadasov, 2013; Gazdar and Cherif, 2014; Ali et al., 2016; Kutan et al., 2017; Nguyen et al., 2018; Sulehri and Ali, 2020; Audi et al., 2021; Ahmad et al., 2022). To examine the determinants of economic growth, and to build our arguments, the present study follows the basic Cobb-Douglas production function. The functional form of the model becomes as;

$$Y_{it} = f(K_{it}, L_{it}) \qquad (1)$$

Y=total output

K=physical capital

L=labor force participation

Eq. 1 shows that the total output of a country depends upon physical capital and labor force participation. Following the methodologies of Ghura (1997), Ramirez (1998), Ghura (1997),

Christopoulos and Tsionas (2004), Musila and Yiheyis (2015), and Ali and Rehman (2015), the model of our study becomes as;

$$GDP_{it} = f\,(CF_{it}, TLF_{it,} FGI_{it,} GE_{it,} PS_{it}) \qquad (2)$$

GDP = economic growth (Gross Domestic Product rate (GDP) has been used as a proxy of economic growth. The data on GDP growth has been taken from the World Development Indicator (WDI); a database maintained by the World Bank.)

TLF = total labor force participation. Total labor force participation is the number of people who are employed plus the unemployed who are willing and able to work. The data of these variables have been taken from World Development Indicator (WDI); a database maintained by the World Bank.

CF= capital formation as a proxy for physical capital. Capital formation is used to describe the net capital accumulation during a specific period. The data of these variables have been taken from World Development Indicator (WDI); a database maintained by the World Bank.

FGI = financial liberalization index (KOF financial globalization index has been used for measuring financial liberalization. The concept of financial globalization refers to increasing global linkages created through cross-border financial flows. Financial integration refers to an individual country's linkage to international capital markets. The data on financial globalization has been taken from by the University of Gotham Burg and the World Bank databases.)

GE = government effectiveness (The government effectiveness index has been constructed with the help of control of corruption, rule of law, regulatory quality, political stability, voice, and accountability. World Bank and many other institutions construct a government effectiveness index to know the situation of government effectiveness. The government's effectiveness also gives information related to the credibility of the government’s commitments, policy

implementation, policy formulation, civil service, and quality of public services. Normally, it ranks countries from 2.5 (more effective) to -2.5 (less effective). The data on government effectiveness has been taken from the Freedom House Database and the World Bank databases.)

PS = political stability (Political stability means the absence of violence/terrorism, it measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. The data on political stability has been taken from Freedom House Databases and the World Bank databases.)

The econometric model of the study becomes as;

$$GDP_{it} = \alpha+\beta_1 CF_{it} + \beta_2 TLF_{it} + \beta_3 FGI_{it} + \beta_4 GE_{it} + \beta_5 PS_{it}+e_{it} \quad (3)$$

α = constant

β_i = slope coefficients ($\beta_1,\ldots\beta_5$)

t= time-period (1996 . . 2021)

i= number of cross-sections (1, . . . 12)

e_t = Error term

This study examines the impact of financial liberalization and institutional quality on economic growth in African countries. The selected African countries are; Algeria, Botswana, Burkina Faso, Cameroon, the Republic of Congo, Egypt, Kenya, Morocco, Nigeria, Rwanda, Senegal, and South Africa.

4. Results and Discussions

This part presents the empirical results and discussions of the model. The results consist of descriptive statistics, correlation matrix, unit root, long-run ARDL, short-run dynamics, and Bringer causality. The results of diagnostic tests have been presented in the appendix. The

estimated descriptive statistic has been given in table 1. The results reveal that all the selected variables have a reasonable descriptive statistic property for further empirical analysis.

Table 1: Descriptive Statistic

	GDP	CF	LTLF	FGI	PS	GE
Mean	4.638383	7.708384	15.80239	48.39924	-0.614894	-0.421516
Median	4.490383	7.884271	16.01151	49.30000	-0.551135	-0.517734
Maximum	15.32916	71.04250	17.89326	69.50000	1.105562	1.020496
Minimum	-7.652310	-52.47780	13.19055	27.30000	-2.211123	-1.949610
Std. Dev.	2.886282	12.97549	1.130166	9.458141	0.776160	0.551082
Skewness	0.041916	0.245782	-0.451028	-0.002939	0.232896	0.438290
Kurtosis	5.057374	7.761139	2.599993	2.508877	2.806506	2.546107
Jarque-Bera	46.63797	252.0109	10.71080	2.653601	2.798421	10.71853
Sum	1224.533	2035.013	4171.831	12777.40	-162.3321	-111.2804
Sum Sq. Dev.	2190.955	44279.59	335.9236	23527.04	158.4377	79.87073

Table 2 provides the estimated results of the correlation among the variables of the model. The estimated results reveal that the availability of capital has a positive and significant correlation with gross domestic product. The results explain that the total labor force, political stability, and effectiveness of government have a negative but insignificant correlation with the gross domestic product in African countries. Financial globalization has a negative and significant correlation with the gross domestic product in African countries. The results show that total labor force participation, final globalization, political stability, and government effectiveness have an insignificant correlation with the availability of physical capital in African countries. The results explain that financial globalization, political stability, and the effectiveness of the government have a negative and significant correlation with total labor force participation among African countries. The estimated results of the correlation matrix show that the political stability and effectiveness of the government have a positive and significant correlation with financial globalization in African countries. The results show that political stability has a positive and significant correlation with the effectiveness of the government in African countries over the

selected period. Overall, the results of correlation show that all explanatory variables do have not a high correlation which creates the issue of multicollinearity. Thus, there is no issue of multicollinearity, and we can go for further empirical analysis.

Table 2: Correlation Matrix

Variables	GDP	CF	LTLF	FGI	PS	GE
GDP	1.000000					
CF	0.294271***	1.000000				
LTLF	-0.035483	0.001849	1.000000			
FGI	-0.130691**	-0.066658	-0.16295***	1.000000		
PS	-0.054092	-0.068817	-0.53153***	0.43125***	1.000000	
GE	-0.100499	-0.036838	-0.17411***	0.38471***	0.6955****	1.000000
Note: The asterisks ***, ** and * denote the significant at 1%, 5% and 10% levels, respectively						

The estimated results of unit root tests have been presented in table 3. This study has used Levin-Lin-Chu, Fisher-ADF, and Fisher-PP unit root tests for examining the stationarity of the variables. The results indicate that economic growth is stationary at level I (0). The results demonstrate that capital formation is stationary at level I (0). The estimated results reveal that the total labor force is non-stationary at level. However, when the data are converted into the first difference, the total labor force becomes stationary at I (1). Financial liberalization is non-stationary at the level, but it is stationary at the level in the case of Fisher-ADF and Fisher-PP. Moreover, when the data of this financial liberalization is converted into the first difference it becomes stationary. The estimated results show that government effectiveness and political stability are stationary at level I (0). The overall result of the panel unit root test indicates that all variables are non-stationary at the level I (0), except economic growth, capital formation, and government effectiveness. However, when data are converted into 1st difference all variables become stationary. This reveals that there is a mixed order of integration among the selected variables of the model. It is the best situation for applying panel ARDL cointegration.

Table 3: Panel Unit Root Outcomes

		At Level		At 1st Difference	
Variables	**Methods**	**Statistic**	**P- value**	**Statistic**	**P- value**
	Levin-Lin-Chu	-1.762	(0.039)	-2.580	(0.004)
	Fisher-ADF	69.118	(0.000)	153.663	(0.000)
GDP	Fisher-PP	157.440	(0.000)	971.540	(0.000)
	Levin-Lin-Chu	-3.638	(0.001)	-12.371	(0.000)
	Fisher-ADF	84.0261	(0.000)	198.035	(0.000)
CF	Fisher-PP	149.940	(0.000)	1191.941	(0.000)
	Levin-Lin-Chu	1.222	(0.8892)	-6.05914	(0.000)
	Fisher-ADF	10.061	(0.9943)	56.8156	(0.000)
LTLF	Fisher-PP	31.138	(0.1498)	53.8192	(0.001)
	Levin-Lin-Chu	-0.832	(0.202)	-7.246	(0.000)
	Fisher-ADF	34.416	(0.077)	97.153	(0.000)
FGI	Fisher-PP	54.074	(0.000)	180.444	(0.000)
	Levin-Lin-Chu	-4.360	(0.000)	-7.803	(0.000)
GE	Fisher-ADF	44.652	(0.006)	89.970	(0.000)
	Fisher-PP	41.769	(0.013)	185.582	(0.000)
	Levin-Lin-Chu	-1.397	(0.081)	-3.594	(0.000)
PS	Fisher-ADF	35.307	(0.064)	65.851	(0.000)
	Fisher-PP	64.189	(0.000)	175.627	(0.000)

The results of long-run panel autoregressive distributed lag (ARDL) have been given in table 4. The long-run results show that the availability of physical capital has a positive and significant impact on economic growth in African countries. Although the size of the coefficient is not very large, it implies that a one percent increase in the availability of physical capital can lead 0.090590 percent increase in economic growth. The findings of this study are aligned with the economic growth theory developed by Solow (1956) and Swan (1956) which state that total capital is the key determinant of long-run economic growth.

The estimated results show that total labor force participation has a positive and significant impact on economic growth in African countries. The results show that a 1 percent increase in total labor force participation brings 3.985873 percent increase in economic growth in Africa. These findings are consistent with the idea of the neoclassical theory of economic growth. Moreover, the findings of this study are aligned with the economic growth theory developed by Solow (1956) and Swan

(1956) which states that total labor force participation is the key determinant of long-run economic growth.

Financial liberalization negatively and insignificantly influences economic growth in the long run among African countries. The results show that 1 percent increase in financial liberalization brings 0.008633 percent decrease in economic growth in African countries. However, the idea that financial liberalization impacts economic growth is backed by Jin (2000), Lee et al., (2004), Bonfiglioli and Mendicino (2004). These studies find that financial liberalization positively and significantly impacts economic growth in developed countries. Our results are not consistent with the existing literature as there is hardly any study which is done in the case of Africa. But Kose et al., (2006) and Levchenko et al., (2009) find that financial liberalization decreases the economic growth of developing countries. This also shows that financial liberalization is not suitable in the case of African developing countries.

The estimated results show that political stability has a positive and significant impact on the economic growth of African countries. The outcomes show that 1 percent increase in the level of political stability 0.851419 percent increase have occurred in economic growth in African countries. African countries are considered the most venerable part, of the world. Numerous political, and religious movements create political instability in African countries. The results confirm that political instability negatively and significantly impacts the gross domestic product in the long run.

Government effectiveness has a positive and significant impact on economic growth in Africa. The estimated results show that 1 percent increase in the effectiveness of the government 2.081624 percent increase is occurring in the case of African countries. So, government effectiveness has a positive and statistically insignificant relationship with economic growth in the long run. Political

stability and government effectiveness are considered the best representative of institutional quality, the estimated results show that institutional quality has a positive and significant impact on economic growth in the case of African countries. These findings are consistent with the findings of Nguyen et al., (2018) and Valeriani and Peluso (2011).

Table 4: Long Run Estimates

Dependent Variable: GDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
CF	0.090590	0.012550	7.218290	0.0000
LTLF	3.985873	0.500569	7.962682	0.0000
FGI	-0.008633	0.025233	-0.342129	0.7330
PS	0.851419	0.284619	2.991439	0.0035
GE	2.081624	0.649068	3.207098	0.0018
R-squared	0.086931	Mean dependent var		4.638383
Adjusted R-squared	0.072829	S.D. dependent var		2.886282
S.E. of regression	2.779193	Akaike info criterion		4.900956
Sum squared resid	2000.493	Schwarz criterion		4.968682
Log likelihood	-641.9262	Hannan-Quinn criter.		4.928170
Durbin-Watson stat	1.727731			

The estimated short-run dynamic of the model has been presented in table 5. The results show that the availability of physical capital has a negative and significant short-run impact on economic growth in African countries. This shows that 1 percent increase in the availability of physical capital brings 0.04666 percent decrease in economic growth in the case of African countries during the short run. These findings are different from the estimated long-run outcomes of the study. Total labor force participation has a negative and insignificant impact on economic growth during the short run, these findings are opposite from long-run findings. The outcomes show that financial liberalization has a negative and significant impact on the economic growth of African countries in the short run. Political stability has a positive and significant impact on African economic growth, the results show that 1 percent increase in political stability 7.054983 percent increase in economic growth during the short run in Africa. These findings are consistent with the long-run findings. Government effectiveness has a positive and significant impact on economic growth in

African countries. The estimated value of ECT is theoretically correct. The findings show that the short run needs 6 years and 6 months for the convergence in long run. Moreover, a 15 percent short-run variation has been corrected very next year.

Table 5: Short Run Dynamic

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(CF)	-0.046666	0.022867	-2.040749	0.0438
D(LTLF)	-28.25696	118.4037	-0.238649	0.8119
D(FGI)	-0.194446	0.091396	-2.127516	0.0358
D(PS)	7.054983	3.857575	1.828865	0.0703
D(GE)	3.125654	3.146160	0.993482	0.3228
C	-64.68912	7.957796	-8.129025	0.0000
ECT	-0.153862	0.153127	-7.535339	0.0000
Mean dependent var	-0.031315	S.D. dependent var		3.406720
S.E. of regression	2.093000	Akaike info criterion		3.809075
Sum squared resid	451.2069	Schwarz criterion		5.989862
Log likelihood	-341.7979	Hannan-Quinn criter.		4.685382
*Note: p-values and any subsequent tests do not account for model				

The Ganger causality test has been applied to test the direction of the relationship among variables. The estimated outcomes of the Granger causality test have been presented in table 6. The results show that there is bidirectional causality running between economic growth and the availability of physical capital in African countries. The results indicate that there is a bidirectional causal relationship existed between total labor force participation and economic growth in Africa. There is no causality running between financial liberalization and economic growth, between political stability and economic growth, between the effectiveness of the government and economic growth, between total labor force participation and availability of physical capital, between the availability of physical capital and financial liberalization, between the availability of physical capital and political stability, between financial liberalization and total labor force participation in African countries. The estimated results show that there is a unidirectional causality running from the availability of physical capital to government effectiveness in Africa. Bidirectional causality is running between political stability and total labor force participation. Unidirectional causality is

running from the effectiveness of the government and financial liberalization, from political stability to financial liberalization, and from the effectiveness of government to financial liberalization. The estimated results show that there is bidirectional causality running between the effectiveness of the government and political stability in African countries.

Table 6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
CF does not Granger Cause GDP	252	8.00923	0.0050
GDP does not Granger Cause CF		16.7631	6.E-05
LTLF does not Granger Cause GDP	252	0.09768	0.7549
GDP does not Granger Cause LTLF		19.4845	2.E-05
FGI does not Granger Cause GDP	252	1.11812	0.2913
GDP does not Granger Cause FGI		1.18960	0.2765
PS does not Granger Cause GDP	252	0.79676	0.3729
GDP does not Granger Cause PS		0.91746	0.3391
GE does not Granger Cause GDP	252	1.69074	0.1947
GDP does not Granger Cause GE		2.25848	0.1342
LTLF does not Granger Cause CF	252	0.04437	0.8333
CF does not Granger Cause LTLF		2.42035	0.1210
FGI does not Granger Cause CF	252	1.83266	0.1770
CF does not Granger Cause FGI		1.99736	0.1588
PS does not Granger Cause CF	252	0.88324	0.3482
CF does not Granger Cause PS		2.12497	0.1462
GE does not Granger Cause CF	252	0.30503	0.5812
CF does not Granger Cause GE		4.20403	0.0414
FGI does not Granger Cause LTLF	252	1.72201	0.1906
LTLF does not Granger Cause FGI		1.57291	0.2110
PS does not Granger Cause LTLF	252	8.98715	0.0030
LTLF does not Granger Cause PS		9.06258	0.0029
GE does not Granger Cause LTLF	252	6.52241	0.0112
LTLF does not Granger Cause GE		0.89103	0.3461
PS does not Granger Cause FGI	252	5.32020	0.0219
FGI does not Granger Cause PS		0.01595	0.8996
GE does not Granger Cause FGI	252	11.9364	0.0006
FGI does not Granger Cause GE		0.00533	0.9418
GE does not Granger Cause PS	252	3.22001	0.0740
PS does not Granger Cause GE		2.83488	0.0935

The estimated outcomes of the diagnostic tests have been given in the appendixes. The estimated results of the LM serial correlation test in table A.1 show that there is no issue of serial correlation

in the data of selected variables. The results of table A.2 show that the selected data of the variables are normally distributed. The outcomes of table A.3 show that there is no issue of Heteroskedasticity in the selected data. Figure-A also confirms the normality of the selected data set of the model.

5. Conclusions

This part presents the conclusions and policy suggestions based on the findings of the study. The results show that the availability of physical capital and total labor force participation has a positive and significant impact on the economic growth of African countries. The results show that financial liberalization has a negative and insignificant impact on economic growth in African countries. There are several previous studies (Ahmad, 2010; Adam, 2011; Adeel-Farooq, 2017) found that financial liberalization is not still suitable for the economic growth process of developing countries. The results show that political stability and the effectiveness of the government have a positive and significant impact on economic growth, this reveals that institutional quality has positive and significant impact on the economic growth of African countries. The overall findings of the study conclude that the availability of physical capital, total labor force participation, financial liberalization, political stability, and effectiveness of the government decide the level of economic growth in African countries.

Based on the findings and conclusions, there are some policy suggestions, to enhance economic growth in African countries. The availability of physical capital and total labor force participation has a positive and significant impact on economic growth. This suggests that higher economic growth in African nations is attached to higher availability of physical capital and total labor force participation. Africa has higher population growth, which establishes the roots for a higher labor force, but the African labor force is unskilled. So, providing skills and education to labor helps

economic growth to enhance. Financial liberalization hurts economic growth, so for creating a positive impact of financial liberalization for economic growth, African countries should establish sound roots for financial liberalization. It implies that the long-run economic growth in African countries has been sensitive to the integration of international financial markets. Therefore, this study suggests that African governments should formulate such policies which encourage global financial integration. So, they can get benefit from the integration of the international financial markets by adopting advanced technologies generated by developed nations. African countries should reduce trade barriers to increase the efficiency of the economy by allowing domestic producers to buy the required inputs at the lowest cost. Institutional quality has a significant contribution to economic growth, African countries need major reforms, rules, and regulations for their domestic institutions so that more foreign investors can be attracted. Thus, higher economic growth can be achieved with sound institutional quality.

References

Abdillahi, U. A., & Manini, M. M. (2017). Impact of Trade Openness on Economic Growth In Kenya. *International Journal of Economics, Commerce and Management*, 5 (6), 109- 137.

Abizadeh, S., & Pandey, M. (2009). Trade Openness, Structural Change, and Total Factor Productivity. *International Economic Journal*, 23 (4), 545–559.

Adam, A. M. (2011). Financial Openness Induced Growth and Poverty Reduction. *International Journal of Applied Economics and Finance*, 5 (1), 75- 86.

Adeel-Farooq, R. M., Bakar, N. A. A., & Raji, J. O. (2017). Trade openness, financial liberalization and economic growth: The case of Pakistan and India. *South Asian Journal of Business Studies*.

Adeel-Farooq, R. M., Bakar, N. A., & Raji, J. O. (2017). Trade Openness, Financial Liberalization and Economic Growth The Case of Pakistan and India. *South Asian Journal of Business Studies*, 6 (3), 229-246.

Ahmad, K., Ali, A., & Yang, M. (2022). The Effect of Trade Liberalization on Expenditure Structure of Pakistan. *Bulletin of Business and Economics (BBE)*, *11*(1), 73-84.

Ahmed, A. D. (2010). Financial Liberalization, financial Development and Growth Linkages In Sub-Saharan African Countries: An Empirical Investigation. *South Asian Journal of Business Studies*, 27 (4), 314-339.

Ahmed, A. D. (2013). Effects of Financial Liberalization on Financial Market Development and Economic Performance of The SSSA Region. *Economic Modelling*, 30, 261- 273.

Akpan, U. F., & Atan, J. A. (2016). Relationship between trade openness, institutions and economic growth in Sub-Saharan Africa: a further look at the evidence. *British Journal of Economics, Management & Trade*, *15*(1), 1-20.

Ali, A. & Naeem, M.Z. (2017). Trade Liberalization and Fiscal Management of Pakistan: A Brief Overview. *Policy Brief-Department of Economics, PU, Lahore*. 2017 (1), 1-6.

Ali, A. (2015). *The impact of macroeconomic instability on social progress: an empirical analysis of Pakistan*. (Doctoral dissertation, National College of Business Administration & Economics Lahore).

Ali, A. (2018). Issue of Income Inequality Under the Perceptive of Macroeconomic Instability: An Empirical Analysis of Pakistan. *Pakistan Economic and Social Review*, 56(1), 121-155.

Ali, A. (2022). Determining Pakistan's Financial Dependence in the Face of Financial Globalization and Corruption. *Journal of Business and Economic Options*.

Ali, A. (2022). Foreign Debt, Financial Stability, Exchange Rate Volatility and Economic Growth in South Asian Countries. *Journal of Business and Economic Options*.

Ali, A. and Bibi, C. (2017). Determinants of Social Progress and its Scenarios under the role of Macroeconomic Instability: Empirics from Pakistan. *Pakistan Economic and Social Review* 55 (2), 505-540.

Ali, A., & Ahmad, K. (2014). The Impact of Socio-Economic Factors on Life Expectancy in Sultanate of Oman: An Empirical Analysis. *Middle-East Journal of Scientific Research*, 22(2), 218-224.

Ali, A., & Audi, M. (2016). The Impact of Income Inequality, Environmental Degradation and Globalization on Life Expectancy in Pakistan: An Empirical Analysis. *International Journal of Economics and Empirical Research*, 4 (4), 182-193.

Ali, A., & Audi, M. (2018). Macroeconomic Environment and Taxes Revenues in Pakistan: An Application of ARDL Approach. *Bulletin of Business and Economics* (BBE), 7(1), 30-39.

Ali, A., & Rehman, H. U. (2015). Macroeconomic instability and its impact on gross domestic product: an empirical analysis of Pakistan. *Pakistan Economic and Social Review*, 285-316.

Ali, A., & Rehman, H. U. (2015). Macroeconomic instability and its impact on the gross domestic product: an empirical analysis of Pakistan. *Pakistan Economic and Social Review*, 285-316.

Ali, A., & Şenturk, I. (2019). Justifying the Impact of Economic Deprivation, Maternal Status and Health infrastructure on Under-Five Child Mortality in Pakistan: An Empirical Analysis. *Bulletin of Business and Economics*, 8(3), 140-154.

Ali, A., & Zulfiqar, K. (2018). An Assessment of Association between Natural Resources Agglomeration and Unemployment in Pakistan. *Pakistan Vision*, 19(1), 110-126.

Ali, A., Ahmed, F., & Rahman, F. U. (2016). Impact of Government Borrowing on Financial Development (A case study of Pakistan). *Bulletin of Business and Economics* (BBE), 5(3), 135-143.

Ali, A., Ehsan, R., Audi, M., & Hamadeh, H. F. (2022). Does Globalization Promote Financial Integration in South Asian Economies? Unveiling the Role of Monetary and Fiscal Performance in Internationalization.

Alvarez, I. C., Barbero, J., & L.Zofio, A. R.-P. (2018). Does Institutional Quality Matter for Trade? Institutional Conditions In a Sectral Trade Framework. *World Development*, 103, 72-87.

Alzer, M., & Dadasov, R. (2013). Financial Liberalization and Institutional Development. *Economics & Politics*, 25 (3), 424-452.

Amaira, B. (2016). Financial Liberalization and Economic Growth: Evidence From Tunisia. *Theoretical and Applied Economics*, 33 (4), 243-262.

Andersson, L. (2001). Openness and Total Factor Productivity In Swedish Manufacturing,. *Weltwirtschaftliches Archiv*, 137 (4) , 690- 713.

Ang, J. B. (2010). Does Foreign Aid Promote Growth? Exploring The Role of Financial Liberalizationrode. *Review of Development Economics*, 14(2), 197–212.

Ang, J. B., & Mckibbin, W. J. (2006). Financial Liberalization, Financial Sector Development and Growth: Evidence From Malaysia. *Journal of Development Economics*, 84, 215- 233.

Atif, R. M., Abida Jadoon, K. Z., & Aisha Ismail, R. S. (2010). Trade Liberalisation, Financial Development and Economic Growth: Evidence From Pakistan. *Journal of International Academic Research,* 10 (2), 1- 8.

Audi, M., & Ali, A. (2022). Public Policy and Economic Misery Nexus: A Comparative Analysis of Developed and Developing World.

Audi, M., Ali, A., & Hamadeh, H. F. (2022). Nexus Among Innovations, Financial Development and Economic Growth in Developing Countries. *Journal of Applied Economic Sciences*, *17*(4), 373-393.

Audi, M., Ali, A., & Roussel, Y. (2021). Measuring the Tax Buoyancy: Empirics from South Asian Association for Regional Cooperation (SAARC). *Empirical Economics Letters*, 20(12).

Barro, R. (1996). Determoinants of Economic Growth: A Cross-Country Empirical Study. *NBER Working Paper*, 5698, 1-79.

Beck, T., Levine, R., & Loayza, N. (2000). Finance and The Sources of Growth. *Journal of Financial Economics*, 58 (1), 261- 300.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2006). Growth Volatility and Financial Liberalization. *Journal of International Money and Finance*, 25 (3), 370- 403.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2011). Financial Openness and Productivity. *World Development*, 39 (1), 1- 19.

Bekaert, G., Hurvey, C. R., & Lundblad, C. (2005). Does Financial Liberalization Spur Growth? *Journal of Financial Economics*, 77 (1), 3- 55.

Berger, P. G., Ofek, E., & Yermack, D. L. (1997). Managerial entrenchment and capital structure decisions. *The journal of finance*, *52*(4), 1411-1438.

Bonfiglioli, A. (2008). Financial Integration, Productivity and Capital Accumulation. *Journal of International Economics*, 76 (2), 337- 355.

Bonfiglioli, A., & Mendicino, C. (2004). Financial Liberalization, Bank Crises and Growth: Assessing The Links. *Working Paper In Economics*, 567, 1- 28.

Bumann, S., Hermes, N., & Lensink, R. (2013). Financial Liberalization and Economic Growth: A Meta- Analysis. *Journal of International Money and Finance*, 33, 255- 281.

Bussière, M., & Fratzscher, M. (2008). Financial Openness and Growth: Short-Run Gain, Long-Run Pain? *Review of International Economics*, 16(1), 69–95.

Butkiewicz, J., & Yanikkaya, H., (2006). Institutional Quality and Economic Growth: Maintenance of The Rule of Law or Democratic Institutions or Both?. *Economic Modeling,* 23 (4), 648-661.

Cajueiro, D. O., Gogal, P., & Tabak, B. M. (2009). Does Financial Market Liberalization Increase The Degree of Market Efficiency? The Case of Athens Stock Exchange. *International Review of Financial Analysis*, 18, 50- 57.

Cass, D. (1965). Optimum growth in an aggregative model of capital accumulation. *The Review of economic studies*, *32*(3), 233-240.

Cecchinia, L., & Lai-Tong, C. (2008). The Links Between Openness and Productivity In Mediterranean Countries. *Applied Economics*, 40 (6), 685–697.

Celik, T., & Citak, L. (2016). Banking Competition, Financial Liberalization and Economic Growth: Evidence From Turkish Economy During The 1990-2014 Period. *International Journal of Economics and Financial Issues*, 6(4), 1750-1755.

Chandrana, V., & Munusamyc. (2009). Trade Openness and Manufacturing Growth In Malaysia. *Journal of Policy Modeling*, 31(5), 637–647.

Chang, R., Kaltani, L., & Loayza, N. V. (2009). Openness Can Be Good For Growth: The Role of Policy Complementarities. *Journal of Development Economics*, 90, 33- 49.

Chimobi, O. P. (2010). The Causal Relationship Among Financial Development, Trade Openness and Economic Growth In Nigeria. *International Journal of Economics and Finance*, 2 (2), 137- 147.

Christopoulos, D. K., & Tsionas, E. G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. *Journal of development Economics*, *73*(1), 55-74.

Demirguc-Kunt, A., & Detragiache, E. (1998). Financial Liberalization and Financial Fragility. *Imf Working Papers*, 1-35.

Dritsakis, N., Varelas, E., & Adamonpoulos, A., (2006). The Main Determinants of Economic Growth: An Emprical Investigation With Granger Causality Analysis. *European Research Studies Journal*, 9, 47-58.

Edison, H. J., Levine, R., Ricci, L., & Sløk, T. (2002). International financial Integration and Economic Growth. *Journal of International Money and Finance*, 21 (6), 749- 776.

Eichengreen, B., Gullapalli, R., & Panizza, U. (2011). Capital Account Liberalization, Financial Development and Industry Growth: A Synthetic View. *Journal of International Money and Finance*, 30 (6), 1090- 1106.

Garita, G. (2009). How Does Financial Openness Affect Economic Growth and Its Components?. *Institute For Monetary And Economic Research*, 20099, 1-33.

Gazdar, K., & Cherif, A. M. (2014). The Quality of Institutions and Financial Development In Mena Countries: An Empirical Investigation. *Risk Governance & Control Institutions*, 4 (4), 65-80.

Gazdar, K., & Cherif, M. (2014). The quality of institutions and financial development in mena countries: An empirical investigation. *Risk governance & control: financial markets & institutions, 4 (4-1)*, 65-80.

Gehringer, A. (2013). Growth, Productivity and Capital Accumulation: The Effects of financial Liberalization In The Case of European Integration. *International Review of Economics and Finance*, 25 (1), 291- 309.

Ghura, M. D. (1997). *Private investment and endogenous growth: Evidence from Cameroon*. International Monetary Fund.

Ghura, M. D. (1997). *Private investment and endogenous growth: Evidence from Cameroon*. International Monetary Fund.

Haddad, M., Lim, J. J., Pancaro, C., & Saborowski, C. (2013). Trade Openness Reduces Growth Volatility When Countries Are Well Diversified. *Canadian Journal of Economics*, 46 (2), 765- 790.

Hwang, I., & Wang, E. C. (2004). Does Openness To Trade Affect Total Factor Productivity Growth: Evidence From 45 Japanese Manufacturing Industries. *Journal of Economic Research*, 9 (2), 147–173.

Hye, Q. M., & Wizarat, S. (2013). Impact of Financial Liberalization on Economic Growth: A Case Study Of Pakistan. *Asian Economic and Financial Review*, 3 (2), 270- 282.

Ito, H. (2006). Financial Development and financial Liberalization In Asia: Thresholds, Institutions and The Sequence of Liberalization. *North American Journal of Economics and Finance*, 17 (3), 303– 327.

Javed, I., Mustafa, C., Yasmeen, R., & Javid, H., (2018). Determinants of Economic Growth: An Evidence from Pakistan. *Science, Technology and Development*, 37(2), 101- 107.

Jin, J. C. (2000). Openness And Growth: An Interpretation of Empirical Evidence From East Asian Countries. *The Journal of International Trade & Economic Development*, 9 (1), 5- 17.

Keho, Y. (2017). The Impact of Trade Openness On Economic Growth: The Case of Cote d'Ivoire . *Cogent Economics & Finance*, 5 (1), 1- 14.

Kinuthia, I. K., & Etyang, M. N. (2014). Stock Market Liberalization, Stock Market Performance and Economic Growth In Kenya. *International Journal of Economics and Finance*, 6 (4), 196 - 209.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2009). Does Openness To International Financial Flows Rise Productivity Growth? *Journal of International Money and Finance*, 28 (4), 554- 580.

Kose, M. A., Prasad, E. S., & Terroness, M. E. (2006). How Do Trade And Financial Integration Effect The Relationship Between Growth and Volatility? *Journal of International Economics*, 69 (1), 176- 202.

Kutan, A., Samargandi, N., & Sohag, K., (2018). Does Institutional Quality Matter For Financial Development and Growth? Further Evidence from Mena Countries. *Australian Economic Papers*, 56 (3), 228- 248.

Laeven, L. (2003). Does Financial Liberalization Reduce Financing Constraints? *Financial Management Association International*, 32 (1), 5- 34.

Lee, H. Y., Antonioricci, L., & Rigobon, R. (2004). Once Again, Is Openness Good For Growth? *Journal of Development Economics*, 75 (2), 451- 472.

Levchenko, A. A., Ranciere, R., & Thoenig, M. (2009). Growth and Risk At The Industry Level: The Real Effects of Financial Liberalization. *Journal of Development Economics*, 89, 210-222.

Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, *22*(1), 3-42.

MacKinnon, J. C. (1973). Analysis of energy flow and production in an unexploited marine flatfish population. *Journal of the Fisheries Board of Canada*, *30*(11), 1717-1728.

Mackton, W. S., Yegon, J. C., & Kemboi, J. K. (2014). The Impact of Financial Sector Liberalization On Financial Development and Economic Growth: Evidence From Kenya. *Journal of Economics and Sustainable Development*, 5 (7) , 25- 38.

Madsen, J. B. (2009). Trade Barriers, Openness, and Economic Growth. *Southern Economic Journal*, 76 (2), 397– 418.

Miller, S. M., & Upadhyay, M. P. (2000). The Effects of Openness, Trade Orientation, and Human Capital On Total Factor Productivity. *Journal of Development Economics*, 63, 399- 423.

Misati, R. N., & Nyamongo, E. M. (2012). Financial Liberalization, Financial Fragility and Economic Growth In Sub- Sahran Africa. *Journal of Financial Stability*, 8 (3), 150- 160.

Mitton, T. (2006). Stock Market Liberalization and Operating Performance at The Firm Level. *Journal of Financial Economics*, 81, 625- 647.

Musila, J. W., & Yiheyis, Z. (2015). The impact of trade openness on growth: The case of Kenya. *Journal of Policy Modeling*, *37*(2), 342-354.

Naceur, S. B., & Ghazouani, S. (2008). Does Stock Market Liberalization Spur Financial and Economic Development In The MENA Region? *Journal of Comparative Economics*, 36, 673- 693.

Nasreen, S., & Anwar, S. (2014). Causal Relationship Between Trade Openness, Economic Growth and Energy Consumption: A Panel Data Analysis of Asian Countries . *Energy Policy*, 69, 82- 91.

Nguyen, H. M. (2018). The relationship between urbanization and economic growth: An empirical study on ASEAN countries. *International Journal of Social Economics*.

Nteegah, A., Nelson, M., & Owede, V. M. (2017). Trade Liberalization And Economic Growth In Nigeria. *International Journal of Social Science and Economics Invention*, 3 (2), 120- 132.

Okpara, G. C. (2010). The Effect of Financial Liberalization On Selected Macroeconomic Variables: A Lesson From Nigeria. *The International Journal of Applied Economics and Finance*, 54, 1-9.

Olufemi, S. M. (2004). Trade Openness And Economic Growth In Nigeria: Further Evidence On The Causality Issue. *South African Journal of Economic And Management Sciences*, 7 (2), 299- 315.

Ramirez, M. D. (1998). Does public investment enhance productivity growth in Mexico? A cointegration analysis. *Eastern Economic Journal*, *24*(1), 63-82.

Ranciere, R., Tornell, A., & Frankwestermann. (2006). Decomposing The Effects of Financial Liberalization: Crisis Vs Growth. *Journal of Banking and Finance*, 30 (12), 3331- 3348.

Rebelo, S. (1991). Long-run policy analysis and long-run growth. *Journal of political Economy*, *99*(3), 500-521.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political economy*, *94*(5), 1002-1037.

Saha, S. (2012). Productivity and Openness In Indian Economy. *Journal of Applied Economics and Business Research*, 2(2), 91-102.

Sarkar, P. (2008). Trade Openness and Growth: Is There Any Link? *Journal of Economic Issues,*42 (3), 763-785.

Sawyer, W. C. (2010). Institutional Quality and Economic Growth In Latin America. *Global Economy Journal,* 10(4), 1-13.

Şenturk, İ., & Ali, A. (2022). The Relationship between Institutional Quality and Welfare: Panel-SUR Analysis on BRICS-T Countries. *Journal of Policy Research*, *8*(1), 45-52.

Serdaroğlu, T. (2015). Financial Openness and Total Factor Productivity In Turkey. *Procedia Economics and Finance*, 30, 848 – 862.

Shahbaz, M. (2012). Does Trade Openness Effect Long Run Growth? Cointegration, Causality, Forecast Error, and Variance Decomposition Test For Pakistan. *Economic Modeling*, 29, 2325-2339.

Shaw, E. S.. (1973). Financial deepenmg m economic development (Oxford University Press, New York).

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics,* 70(1)*,* 65-94.

Sulehri, F. A., & Ali, A. (2020). Impact of political uncertainty on Pakistan stock exchange: An event study approach. *Journal of Advanced Studies in Finance*, *11*(2), 194-207.

Swan, T. W. (1956). Economic Growth and Capital Accumulation. *Economic Record,* 32(2), 334-361.

Tswamuno, D. T., Pardee, S., & Wunnava, P. V. (2007). Financial Liberalization and Economic Growth: Lessons From The South African Experience. *International Journal of Applied Economics*, 4 (2), 75-89.

Uchenna, O. L., Nwakoby, C. I., & Modebe, N. J. (2016). Impact of Economic Liberalization On The Growth of The Nigerian Economy. *African Banking and Finance Review*, 2 (2), 87-100.

Valeriani, E., & Peluso, S. (2011). The Impact of Institutional Quality on Economic Growth and Development: An Empirical Study. *Journal of Knowledge Management, Economics and Information Technology*, 1 (6), 1-25.

Xu, H., Lai, M., & Qi, P. (2008). Openness, Human Capital and Total Factor Productivity: Evidence From China. *Journal of Chinese Economic and Business Studies*, 6 (3), 279-289.

Yanikkaya, H. (2003). Trade Opennss and Economic Growth: A Cross Country Empirical Investigation. *Journal of Development Economics*, 72 (1), 57- 89.

Yucel, F. (2009). Causal Relationships Between Financial Development, Trade Openness and Economic Growth: The Case of Turkey. *Journal of Social Sciences*, 5 (1), 33- 42.

APPENDIXES

Diagnostic Tests

Table A.1

VAR Residual Serial Correlation LM Tests		
Null Hypothesis: no serial correlation at lag order h		
Sample: 1996 2021		
Included observations: 240		
Lags	LM-Stat	Prob
1	40.60367	0.2746
Probs from chi-square with 36 df.		

Table A.2

VAR Residual Normality Tests				
Orthogonalization: Residual Correlation (Doornik-Hansen)				
Null Hypothesis: residuals are multivariate normal				
Sample: 1996 2021				
Included observations: 240				
Component	Skewness	Chi-sq	df	Prob.
1	-0.242131	2.420005	1	0.1198
2	0.170361	1.213613	1	0.2706
3	-0.264648	2.876911	1	0.0899
4	-0.452546	7.968139	1	0.0048
5	-0.083910	0.297339	1	0.5856
6	0.104299	0.458589	1	0.4983
Joint		15.23460	6	0.0185

Table A.3

VAR Residual Heteroskedasticity Tests: Includes Cross Terms		
Sample: 1996 2021		
Included observations: 240		
Chi-sq	Df	Prob.
2655.356	1869	0.1120

Figure A.1