DETERMINANTS OF TRADE OPENNESS IN WESTERN BLOC OF AFRICA: DO THRESHOLD OF INDUSTRIAL VALUE ADDED AND INSTITUTIONS MATTER?

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Abstract

The research work explores the determinants of trade openness in western bloc of Africa with critical emphasis on value added by the industrial sector of the economy and quality of institutions in the bloc. With the pre-estimation test of unit root test that suggested panel autoregressive distributed lag and fully modified least square for the robustness check for the period of 1996 to 2020. The result of the analysis revealed that the threshold of industrial value added, quality institutions and financial deepening as vital determinants of trade openness in the bloc. Unfortunately, the interaction of the existing institutions with the threshold of value added by the industrial sector of the economy has no impact on trade openness. Conclusion of the research work was on more development of financial deepening, quality institutions and improved value added by the industrial sectors for the bloc to engage in trading beyond primary agrarian products.

Keywords: Quality institutions, threshold of industrial value added, trade openness and financial deepening

Introduction

The adopted import substitution as a double policy package by major west Africa countries in the early 60s, was to reduce the excessive reliance on primary agrarian products, transforming the economy with value added by the industrial sectors and protection of local market from foreign competition. The African continent controls about thirty (30) percent of the entire world's mineral reserves with about twelve (12) percent of the world's oil and approximately eight (8) percent of the natural gas reserve (Manocha, 2022). Irrespective of the endowed natural resources with thirty-three (33) percent of oil production controlled by indigenous companies, west Africa gains from trade openness is still very low compared to the developed economy (Bunje, Abedin & Wang 2022; Oyende & Agbabiaka, 2022).

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Openness to trade is the extent a nation engages in trading activities with the other countries. It is the ratio of a country's imports plus exports to the gross domestic product (GDP). Western region of Africa has been experiencing low trade openness due to the types of products traded with the developed economy. By the year 2000, the region experienced 0.16% increase in average trade openness, it improved by the year 2005 with an average increase of 6.10%. By 2010, It extremely dropped to average of 1.69% but by the year 2015, there exist an average increase of 1.43%. surprisingly, by the year 2020 due to infrastructural deficit and economic shock of covid 19, there exist an average dropped of 1.43% (Wang, Yang & Yang, 2023).

However, statistical observation reveals value added by the industrial sector of the economy as a vital variable that is too significant to be neglected on the determinant of trade openness in western bloc of Africa. Meanwhile, quality institutions according to North (1990) are the essential rules of the game in any given society. It consists of the social and traditional interaction, norms and beliefs together with the system of exchange (Naz, Akram & Khan, 2023). From another perspective, it is the humanly conceived constraints that sharpens the interaction of the people. It stands the better chance of removing market manipulations, by ensuring fair and reduced cost of transaction among economic agents (Ozpolat et al., 2016). There is a common consensus that poor institutions are the major factor of economic instability in the African continent (Mathew & Adegboye, 2007).

With the deficient on trade in west Africa, most especially on the determinants of trade openness, this study comes up with the contribution by providing the empirical analysis on the variables that conform with the openness to trade in the region, observing the threshold of value added by the industrial sector and identifying the interacting role of value added by the industrial sector and quality institutions. Which to the best of my knowledge has not been really explored. The rest of the study is put in order as follows: next is the review of literature on the concept of trade openness, data and specification in part three, section four highlight the data analysis with empirical result while section five converse about the conclusion and recommendation.

Theoretical review

The debate of trade being an engine of growth started by the classical school of taught. The dominant economic school of taught in the early 18th and 19th centuries with the Scottish economist (Adam Smith) as the progenitor. The

economist argued with total support of trade openness. Smith (1776) opined international trade as a stimulus to growth whereby the market size and offer of each member country increases with the advantages of division of labour and specialization. In this respect, each trading partner focuses on the production and exportation of goods in which she has absolute advantage and imports the goods with absolute disadvantages. David Ricardo (1772 – 1823) was of the opinion on comparative advantages where difference in technology determines the specialized area or focus of different countries. From his work, a nation should specialize in the production of goods in which it has less opportunity of production or comparative advantages over other trading countries. Invariably, world total output increases and each nation benefits from the openness to trade.

From another perspective Bertil Ohlin (1899 – 1979) a Swedish economist, indicates that an economy with open trade system where unskilled labour in less developed economy such as Africa specialized in the production of commodity that requires low or unskilled labours while nation with the abundant capital should engaged in the production and exportation of commodity that requires capital. As such, specialization and utilization of factor input will increase the general output of the countries involved.

Empirical review

Naz, Akram and Khan (2023) observed macroeconomic determinants of trade openness in developing countries for the period spanning from 1996 to 2020. With the use of generalized method of moment (GMM), the result revealed that foreign direct investment (FDI) and per capital income have a direct impact on trade openness. The conclusion was on trade liberalization to encourage more foreign direct investment. Also on FDI and openness determinants Manocha (2021) identified the impact of trade openness on growth of economy in OECD countries for the period of 2000 to 2018 with the use of fixed effect model. The result shows that trade openness has a positive and significant impact on economic growth. Recommendation was on economic integration with increased investment. From another view, Mbogela (2019) identified the determinants of trade openness in Africa from 1989 to 2009 with the use of a generalised method of moment, findings show that population size, economic location and per capital income are major determinants of trade openness. Also, in another view, Su, Nguyen and Christophe (2019) analysed the determinants of openness to trade in Africa taking into consideration the income level of the people. The finding revealed

that economic growth enhances trade openness in low income nations but reverse is the case in middle income nations.

From the nexus between trade openness and economic growth, Bunje, Abedin and Wang (2023) observed the effect of trade openness on economic growth in Africa, using generalized method of moment (GMM) for the period spanning from 2000 to 2018. The result revealed that trade openness has a mixed influence on growth, suggesting import substitution and exportation that will promote economic growth and development. from another view, Adu-Gyamfi, Nketiah, Obuobi and Adjei (2020) analysed trade openness, inflation and gross domestic product (GDP) for the period spanning from 1998 to 2017 with the aid of pooled ordinary least square for nine (9) west Africa countries. The finding shows that trade openness and quality institutions has insignificant negative impact on growth. Also, Osai, Azubuike, Nwogwugwu and Nwokoye (2023) highlighted the determinants of trade openness in low income and low and middle income countries, with the use of generalized method of moment (GMM). Result shows that economic growth influences trade openness in low income and middle income countries. Suggestion was on economic policies to enhance trade openness which will have a multiplier effect on inclusive growth. From the transition economy, Kilavuz and Dogan (2021) Observed the determinants of trade openness in transition economies, with the use of generalized method of moment (GMM) for the period of 2000 to 2018. Finding revealed there exists a positive significant impact on trade openness. transition economies are encouraged to develop and put into practice policies that will enhance foreign direct investment (FDI) and capital development in the economy.

Also on trade openness determinants, Azu and Muhammed (2020) observed political influences on bilateral trade in western region of Africa. Findings revealed that an effective political regime has a significant impact on bilateral trade. More-so, Nga (2020) investigated foreign direct inflow and trade openness using time series statistical analysis for the period spanning from 2005 to 2008. Results show that the economy had a significant negative influence on trade balance. The exchange had an insignificant impact in Vietnam. From another perspective, Mbogela (2019) analysed the determinants of trade openness using the panel data for Africa countries for the period of 1989 to 2009. Findings show that per capital gross domestic product (PGDP), location of the economic, agricultural productivity and growth of the mining sector have significant financial impact on trade openness. from the south Asian association, Tahir et al, (2018) identified the determinants of trade openness for the period spanning from 1971 to 2011.

Result indicates that human capital development, per capital gross domestic product (PGDP), financial development, exchange rate and size of the labour force all have significant positive impact on trade openness.

From sub-Saharan Africa, Sanga, Kongolo and Mnongya (2023) analysed trade openness with reference to quality institutions, using statistical technique of generalized method of moment (GMM). Finding shows institutions as a composite index of trade openness determinant. Recommendation was on the development of quality institutions. Also on sub-Saharan Africa countries. Contrarily, Kim, (2017) investigated trade openness and economic growth in transition economies. Finding shows that only active trade openness stimulates economic growth in an inclusive pattern while passive trade openness may not really have influence on inclusive growth of the economy. Conclusion was on promotion of active trade openness.

Table 1: Presentation of variable measurement and source

variable	Symbol	measurement	source	Definition
Trade Openness	TO	export plus import divided by the GDP of a nation	United nation conference on trade and development (UNCTAD)(2020)	This captures extend of openness of a nation economy
Institutional quality	INQ	Analysis of political stability, rule of law, government effectiveness, control of corruption, regulatory quality and voice and accountability	Worldwide Governance indicator (WGI) 2020	
(Government effectiveness)	(GEF)	Government effectiveness	Worldwide Governance Indicator (WGI) 2020	It captures government quality in policies formulation and implementation
(Regulatory quality)	(RQ)	Regulatory quality	WGI 2020	ability of regulatory agencies in compliance with standards for the public goods
(Voice and accountability)	(VA)	Voice and accountability	Worldwide Governance Indicator (2020)	level of freedom enjoyed by the citizen of a country
Financial deepening	FP	Credit to private sector of the economy	WDI 2020	the extend of financial sector development

Inequality	IQ	Gini coefficient	Standard Income Inequality Data Base (SEWIID) 2020.	World extent of uneven distribution of income within the population
Population growth rate	PGR	Annual population growth rate	World Development Indicator (2021)	It captures the growth of individual population
Unemployment	UEM	Unemployment total percentage of total labour force)	(WDI 2021	percentage of labour force willing to work that could not get work
Treshold of Industrial value added	IDA^2	Contribution of the industry annual percentage of growth	World Development Indicator (2021)	It captures the level of industrial development

Author's computation, 2023

Apriori expectation

$$\beta_1 > 0, \beta_2 > 0, \beta_5 > 0, \beta_3 > 0, \beta_7 > 0 \quad \beta_4 < 0, \beta_6 < 0$$

Model specification

The panel auto regressive distributed lag (ARDL) estimation techniques was used based on the result of the stationary test where the variables were integrated at both level i(0) and first different i(1). Panel ARDL simultaneously estimate the short run and long run dynamics and as well showing the speed of adjustment from short run to long run (ECT)

$$TOP = F[FP, QIN, IDA^2, X] \quad \text{.....1}$$

Where:
TOP -: Is the trade openness in the bloc.
FP -: Is the financial deepening of the western bloc.
QIN-: Is the quality of existing institutions.
IDA^2 -: Is the threshold of value added by the industrial sector of the bloc
IDIN-: Is the interaction of value added and quality institutions of the bloc
X-: Is the control variables in the model

Introducing the control variables equation 1 is written as:

$$TOP = F[FP, QIN, IDA^2, IQ, PGR, UEM] \quad \text{.....2}$$

considering the interaction of value added and quality institutions, equation 2 is written as:

$$TOP = F[FP, QIN, IDA^2, IQ, PGR, UEM, IDIN] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

$$TOP = \beta_1 FP_{it} + \beta_2 QIN_{it} + \beta_3 [IDA^2]_{it} + \beta_4 IQ_{it} + \beta_5 PGR_{it} + \beta_6 UEM_{it} +, \beta_7 [IDA^2 * QIN]_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Considering the lag of dependent variable and the white noise, equation 5 is written as:

$$TOP = \alpha_0 + \alpha_1 TOP_{it-1} + \beta_1 FP_{it} + \beta_2 QIN_{it} + \beta_3 [IDA^2]_{it} + \beta_4 IQ_{it} + \beta_5 PGR_{it} + \beta_6 UEM_{it} +, \beta_7 [IDA^2 * QIN]_{it} + \ell_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

Table 2: Descriptive Statistic for Western Bloc of Africa

VAR	TOP	IQ	FP	QIN	PGR	IDA^2	UEM	IDIN
MEAN	0.6008	41.3364	18.2430	0.0000	2.6725	42.624	10.4240	0.9532
MED	0.5726	41.2500	14.5254	0.2166	2.6745	42.081	4.74400	4.6541
MAX	1.1782	52.5000	72.5665	2.9815	3.9073	74.8909	69.9300	75.248
MIN	0.2072	31.5000	2.6591	-3.0139	1.0945	25.1329	0.3200	-101.08
STD.Dev	0.2137	4.2858	12.9315	1.5827	0.5795	9.0072	16.1913	34.337
SKEWN	0.7822	0.3538	2.0802	-0.1238	-0.4448	0.6608	2.5449	-0.1532
KURTO	3.0332	3.1928	7.5366	2.1111	4.1089	3.4076	8.0177	2.5239
JARQ-B	25.5065	5.6016	394.727	8.8688	21.0518	19.9235	532.137	3.3396
PROB	0.0003	0.0607	0.0000	0.0119	0.0000	0.0000	0.0000	0.1883
SUM	150.194	10334.1	4560.76	0.0006	668.13	10656.1	2606.02	238.20
SUM SQ	11.3800	4573.82	41639.3	623.77	83.6479	20201.3	65277.9	293576
OBSER	250	250	250	250	250	250	250	250

Source: Authors' computation, 2024

Table 2 Present the descriptive statistic over the period under study. Trade openness had a mean value of 0.60 with a median value of 0.57. It revealed that trade openness in the region is skewed to the right. The maximum value of trade openness in the year 2016 (1.18 in Cabo Verde) and the minimum in 2016 (0.21 in Nigeria). the mean and median value lies in between the maximum and minimum value while the low standard deviation (0.21) indicates that the region openness to trade skewed positively. Threshold of industrial value added had a mean of 42.6 and a median of 42.1 with a positive

skewness of 0.66. the mean and median value of the quality institutions lies in between the maximum and minimum value. Likewise, the interaction of the value added by the industrial sector and quality institutions. With regards to normal distribution, the coefficient of the kurtosis for quality institutions and the interaction of quality institutions with the industrial value added are Platykurtic (less than 3) while other coefficients are Leptokurtic (greater than 3). All the probability of Jarqua Bera are below the 5% level of significance (in absolute terms) except for iQ and IDIN. We therefore accept the alternative hypothesis that the variables under review are not normally distributed.

Table 3: Correlation Matrix

VAR	TOP	IQ	FP	QIN	PGR	IDAS	UEM	IDIN
TOP	1.0000							
IQ	0.3344	1.0000						
FP	0.6674	0.2379	1.0000					
QIN	0.3512	0.0767	0.4304	1.0000				
PGR	-0.622	-0.4344	-0.6847	-0.3689	1.0000			
IDA^2	-0.1652	-0.0265	-0.1149	0.1342	-0.0173	1.0000		
UEM	-0.239	-0.0598	-0..0629	-0.3020	-0.2013	0.4241	1.0000	
IDIN	0.3926	0.0736	0.4017	0.6715	-0.3458	0.0931	-0.4104	1.0000

Source: Authors' computation, 2024

Table 3 indicates that there is no threat of multicollinearity among variables as depicted in the correlation matrix. There exists positive correlation between IQ & TOP, FP & TOP, QIN & TOP and IDIN & TOP, indicating that as inequality, financial deepening, quality institutions, and interaction of industrial value-added and quality institution increases, trade openness of the region also increases. Other negative correlation is between population growth rate, threshold of industrial value added, unemployment with trade openness, quality of institutions and poverty, poverty and industrial value added, poverty and trade openness. There exists a positive correlation between population growth rate and poverty, unemployment and poverty. The coefficient of correlation among the variables in the correlation box, have moderate and low correlation with few having weak correlation but does not constitute any serious threat of multicollinearity among the variables.

Table 4: Stationary test

	@ level			@ 1st diff			
VAR/P	LL&Ct	LP&Sw	ADF-fs	LL&Ct	LP&Sw	ADF-fs	001
TOP	0.069	-0.0742	16.832	-1.496	-6.195	78.722	
PROB	0.527	0.470	0.664	0.067*	0.000***	0.000***	I
FP	1.3407	2.5353	12.844	-4.534	-5.882	71.341	
PROB	0.910	0.994	0.884	0.000***	0.000***	0.000***	I
QIN	-1.669	-2.315	36.382	-0.123	-6.608	86.154	
PROB	0.048**	0.000***	0.014**	0.000***	0.000***	0.000***	0
PGR	-9.459	-7.883	117.164	-8.660	-9.542	131.72	
PROB	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0
IDA	-0.123	-0.344	21.075	-5.5143	-6.313	79.279	
PROB	0.451	0.393	0.393	0.000***	0.000***	0.000***	I
UEM	-1.159	0.4055	20.797	-3.365	-3.814	53.368	
PROB	0.123	0.658	0.398	0.000***	0.000***	0.000***	I
IDIN	-1.7021	-2.145	35.061	-5.811	-6.455	78.819	
PROB	0.044**	0.016**	0.019**	0.000***	0.000***	0.000***	0
IDA^2	-0.1229	-0.3491	21.0734	-5.5143	-6.3137	79.2798	
PROB	0.451	0.369	0.393	0.000***	0.000***	0.000***	I

Source: Authors' computation via e-view, 2024

Note: Levin, Lin and Chu t-test is represented by L,L&Ct, Lim Pesaran and Shin W, Statistic is represented by LP&Sw, Augmented Dickey Fuller Chi-square is represented with ADF-fc. I(0) rep level I(1) rep at first different, *** rep 1%, ** rep 5%. OOI rep order of integration

Table 4 shows the panel unit root with individual effect, the statistical analysis reveals that quality of institutions (QIN), population growth rate (PGR) and the interaction of industrial value added with quality institutions (IDIN) are significant at level with at least two of the three method used. After taking the first different other variables (TOP, IDA^2, UEM, FP) became significantly different with at least two of the three methods used. As a result of the stationary test, panel autoregressive distributed lag was used to analysed the short and long run statistical analysis

Table 5: Panel Autoregressive distributed lag [PANEL ARDL]
LONG RUN EQUATION

VAR	COEFF	STD. ERR	T-STAT	PROB
IQ	-0.005	0.0018	-2.435	0.017
FP	0.0103	0.001	15.7651	0.000
QIN	0.447	0.0413	10.823	0.000
PGR	-0.329	0.003	-7.344	0.000
IDA^2	0.005	0.001	3.638	0.005

UEM	0.689	0.0016	12.1778	0.000
IDIN	-0.0209	0.0019	-10.719	0.000
SHORT RUN EQUATION				
VAR	**COEFF**	**STD. ERR**	**T- STAT**	**PROB**
COINTE Q_{01}	-0.567	0.191	-2.976	0.004
D(TOP{-1}	-0.152	0.242	--0.631	0.532
D(IQ)	-0.015	0.012	-1.232	0.222
D(IQ{-1}	-0.018	0.006	-1.872	0.065
D(FP)	-0.009	0.005	-1.872	0.065
D(FP{-1}	-0.018	0.009	-2.105	0.039
D(QIN)	-0.429	0.303	-1.417	0.161
D(QIN{-1}	0.024	0.187	0.128	0.898
D(PGR)	1.528	1.348	1.133	0.261
D(PGR{-1}	-1.108	0.025	-0.360	0.719
$D(IDA^2)$	-0.005	0.0127	-0.360	0.719
$D(IDA^2\{-1\}$	0.013	0.007	1.919	0.059
D(UEM)	-0.009	0.046	0.196	0.845
D(UEM{-1}	0.009	0.014	1.447	0.152
D(IDIN)	0.019	0.018	-0.304	0.764
D(IDIN{-1}	-0.003	0.006	1.385	0.532
C	0.743	0.274	2.782	0.0082

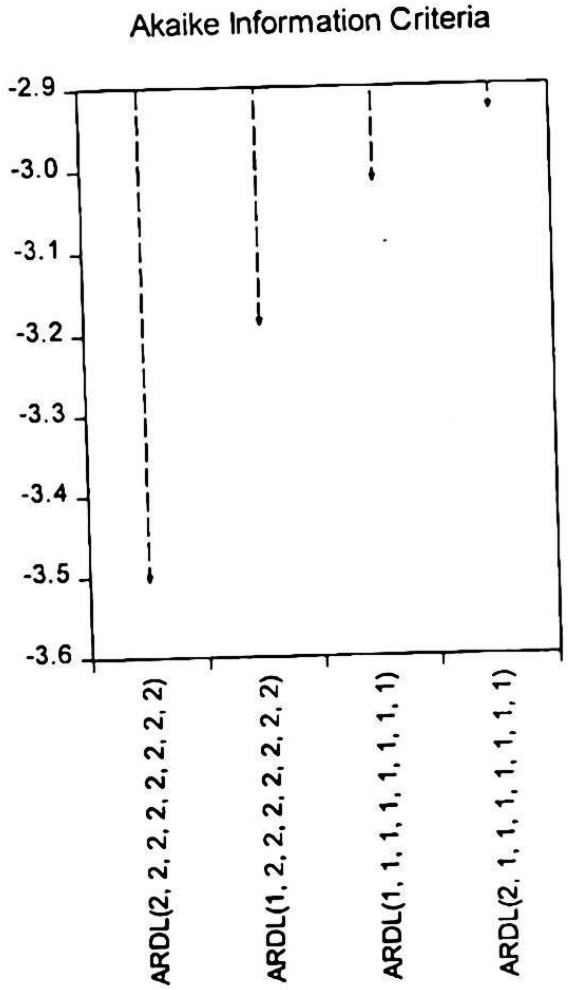
Source: Authors' computation, 2024

Table 5 shows the long run and short statistical analysis. The less than one error term value (-0.567) with statistically significant at 1%, signifies that there is a long run relationship between the short run and the long run. If there is any form of disequilibrium in the system, it takes an average of 56.7% to return back from the short run to the long run.

The long run analysis demonstrates drastic changes in the relationship among the variables. Virtually all the variables are significant with most coefficient in line with the apriori expectation. For every unit increase in inequality, trade openness dropped by 0.005 and it is statistically significant at 1% it conforms with the Su, Nguyen and Christophe (2019). A unit increase in financial deepening, increases the trade openness by 0.0103 it is also statistically significant at 1% which is in line with the work of Tahir et al, (2018) and Naz, Akram and Khan (2023). More so, a unit increase in the quality of institutions, lead to 0.447 increase in the trade openness of the region it is significant at 1% and conform with the Azu and Mohammed (2020). Furthermore, a unit increase in unproductive population of the region leads to falls in trade openness by 0.309 it is statistically significant and it is in line with Minogya

(2023). A unit increase in the threshold of industrial value added leads to increase in the trade openness by 0.005 it is also stiatistically significant but not in lie with the apriori expectation, as a result of mono cultural system of economy and high taste of foreign goods. Also a unit increase in unemployment leads to increase in trade openness by 0.689, it does not conform with the apriori expectation. The increase in the interaction of value added by the industrial sector together with the quality institutions is inversely related to trade openness and statistically significant at 1%. It revealed that the existing institutions in the western bloc has no economic impact on value added that can really influence the trade openness of the region

Model selection criteria



The above shows the selected criterial for the model analysis. The auto regressive distributed lag with lag 2 dependent variable and lag 2 of independent variables shows the best lag model for the analysis

Robustness check (Fully modified ordinary least square)

VAR	COEFF	STD. ERR	T.STAT	PROB
IQ	-0.0007	0.0028	-0.2545	0.799
FP	0.0051	0.0015	3.4529	0.001
QIN	0.0223	0.0383	-0.5815	0.562
UEM	0.0041	0.0044	-0.0926	0.926
IDIN	-0.0024	0.0018	-1.313	0.190
IDA^2	0.0006	0.0016	-0.4331	0.665
PGR	-0.1228	0.055	2.233	0.027

Source: Authors' computation, 2024

The table shows that robustness checks with the use of fully modified ordinary least square (FMOLS) having major coefficient which are in line with the major coefficient of the parameter in the baseline regression result.

Table 6: Granger Causality test

Null Hypothesis	Obs	F-Stat	Prob
PGR doesn't granger cause TOP	230	0.9216	0.3994
TOP doesn't granger caused PGR		4.6707	0.0108
IQ doesn't granger caused TOP	230	0.9739	0.3792
TOP doesn't granger caused IQ		3.5458	0.0305
UEM doesn't granger caused IDA^2	230	3.4349	0.0339
IDA^2 doesn't granger caused UEM		0.1659	0.8471
IDIN doesn't granger caused IDA^2	230	1.8508	0.1593
IDA^2 doesn't granger caused IDIN		3.2287	0.0415
QIN doesn't granger caused IQ	230	2.5604	0.0795
IQ doesn't granger caused QIN		3.6448	0.0277
IDIN doesn't granger caused IQ	230	3.3690	0.0362
IQ doesn't granger caused IDIN		3.9198	0.0212

Source: Authors' computation, 2024

Table 6 estimated result of Dumestrescu-Hurlin (2012) granger non-causality test indicates unidirectional causality between growth rate of the population and trade openness. It shows that population growth rate does not granger caused Trade openness but trade openness granger caused population growth rate of the region. There also exists unidirectional causality between

unemployment and threshold of industrial value added, interaction of industrial value added with quality institution and threshold of industrial value added, quality institutions and inequality. Between the interaction of industrial value added with institution and inequality, there exist bi-directional causality

Conclusion

From the baseline regression result, the study concluded that:

The major determinant of trade openness in the western bloc of Africa is value added by the industrial sector of the economy. The higher the value contributed by the industrial sector of the economy, the more and better impact of trade openness in the bloc. The quality of institutions is too significant to be neglected in west Africa with its impact in restructuring and re-distributing the factor input of the economy. Also, lack of industrilisation has made the population growth rate to be unproductive due to under-utilization of the factor input.

Financial deepening of the economy has a great impact on trade openness of the region but the high inequality of the region has been reducing the trade openness. Also, the high unemployment of the region has been increasing the trade openness but most of the benefit are not coming to the region, because the terms and conditions of trade are determined by the trading partners (developed economy). The interaction of the existing institutions with the value added by the industrial sector has no impact on trade openness

Recommendation

From the conclusion, the research work recommends that:

The value added by the industrial sector needs to be more developed because it determines the types of goods to be traded and also reduce the high exportation of primary agrarian products from the bloc, by creating employment opportunity where the unproductive growth rate of the population can be accommodated in the industries. Quality institutions of the bloc is a paramount variable that needs to be more developed for its impact in the redistribution of factor input and reducing the wide gap between the rich and the poor. Also to improve the value added by the industrial sector of the economy.

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