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THE IMPACT OF TRADE AND EXPORT ON ECONOMIC GROWTH: A PANEL DATA ANALYSIS OF BRICS COUNTRIES

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ABSTRACT
This study aims to estimate the impact of export on economic growth in BRICS countries by utilizing panel data over the time period from1990 to 2017. Gross Domestic Product Per Capita (GDPPC), GDP (current US$) and export earnings were used as dependent variables and independent variables included oil rents (percent GDP), imports (US$), Export (US$), Tax revenue (percent GDP), population growth, Government consumptions, food production, inflation consumer price, trade, trade openness, gross capital formation, foreign investment, and debt services in the study. Levin Lin Chu, I'm, Pesaran and Augmented Dickey-Fuller (ADF) unit root tests were employed to check the stationarity. Results found that some variables were integrated at different differences and others integrated at level indicating the use of Autoregressive Distribution Lag (ARDL) Model. Results were investigated in two phases. In the first phase, ARDL was used for analysis purpose, the findings of which revealed that a long-run relationship between Oil rents (percent GDP), Export (US$), population growth, Government consumption, food production, inflation consumer price, trade, trade openness, gross capital formation, foreign investment, and debt services. Having limited natural resources, underdeveloped countries face low exports and as consequently less export earnings, hindering economic growth. In the second phase the Granger causality test was applied to examine the direction of causality between GDP per capita and export earnings. Our study found a positive relationship between export earnings and economic growth.

Key Words: *Economic growth; export; import; Gross domestic product (GDP); total population; ARDL model and Granger causality test.*

1. INTRODUCTION

Exports are a crucial component of a country's economy, as the sale of such goods adds to the producing nation's gross output (Koopman *et al*., 2012). Export has a positive effect on the economic growth and an important source of foreign earnings, beneficial for the balance of payment and generates employment opportunities (Sun, 2018). Through different government policies based on export-led strategies, producers get more incentives to export their goods and services. The effect of external shocks on the domestic economy can be reduced by export and it helps to compete the world economy as exports are considered as an engine of the economic growth (Tsen, 2006). Export is the major component of GDP, creating positive externalities (Geossman and Helpman, 1991) and leads to expansion in every sector of production.

The export instability badly affects the economic growth (MacBean, 2012; Jung and Marshall, 1985).

FDI is an investment in the form of ownership in a business in another country. FDI has a positive effect on economic growth and financial sectors and Foreign Direct Investment (FDI) helps to improve export instability and economic growth (Zhang, 2001). Key benefits of FDI are an improvement in export human and physical capital, serve new

technological techniques and reduce imports in an economy. New markets with good management and skill are introduced by foreign trade.

GNP plays an important role in the development of a country. GNP depends on export earning when export earnings change GNP also change but some economist says that there is no relationship between GNP and export earnings. A policymaker gives attention to the potential benefits of export instability and says that due to export instability there is a link created between other countries by doing business activities. The main benefit of export instability is that there is an increase in the economic growth in the host economy. We found a little bit of research on export instability. Here is a question, in the long run; does export instability affect economic growth? Can a country improve economic activities by export of different goods and services?

The main objectives of the study include:

1. To examine the historical trend in export earnings of BRICS countries and its economic development.
2. To judge the causal association between uncertainty in BRICS countries export earning, investment and monetary expansion.
3. To measure the short and long-run impact of export earning improbability on fiscal expansion of BRICS countries.
4. To recommend suitable policy suggestions, on the basis of experimental facts, for the mean of competent and suitable export enhancing strategies of BRICS countries.

2. LITERATURE REVIEW

In the related study review of literature means simply "Overlooking or look again". Excluding the possibility unnecessary copying of effort sand the figuring and finding of related studied is the highlights of literature reviewing, Locating reports of causal information, reading and assessment research and its reports and to the research projects are related to discuss of judgment, it provides an opportunity to the researcher to know what was done previously. Still, it is well-read "what down have down" and anything left over's will be down in specific areas. Thus it is problematic to plan a previous study, While, the review of literature types the 'base upon which all coming research work must be assembled (Borg and Galls 1989)

Table 1 Summary of the existing literature reviews on the relationship between GDP, FDI, EC, REC, TOP and environment degradation.

From the literature review, it is accomplished that there is a positive association between export and economic growth in both, the short run and the long run. There was a significant impact of food consumption on growth and sustainable development. Further the trade openness, export earning, and tax revenue effect economic growth significantly and positively. Our review of literature also suggests some econometric techniques for panel data analysis, like unit root tests, random and fixed-effect model, Generalized Method of Moments (GMM), fully modified OLS (FMOLS), Vector Error-Correction Model (VECM), Granger Causality Test, Autoregressive Distributed Lag Model (ARDL) and Dynamic Ordinary Least Square (DOLS), OLS, Two-Stage Least Squares (2SLS) and Limited Information Maximum Likelihood (LIML).

3. DATA AND MODEL SPECIFICATION

The panel data for the studied variables during 1990-2017 is collected from WDI and World Data Atlas.

3.1 Econometric Models:

The specification of the interest in our empirical analysis is the Cob-Douglas production function following Kahouli, (2014), Fayissa and Nsiah, (2010), Awokuse, (2008) and Szkorupová, (2014).

$$GDPPC_{it} = A_0 EE_{it}^{\beta_{1i}} GC_{it}^{\beta_{2i}} FI_{it}^{\beta_{3i}} DS_{it}^{\beta_{4i}} T_{it}^{\beta_{5i}} \mu_{it} \quad (1)$$

The chances of hetroskedasticity and data sharpness are minimize using natural logarithmic form (Hossain, 2011).

$$ln(GDPPC_{it}) = \beta_0 + \beta_{1i}\, ln(EE_{it}) + \beta_{2i}\, ln(GC_{it}) + \beta_{3i}\, ln(FI_{it}) + \beta_{4i}\, ln(DS_{it}) + \beta_{5i}\, ln(T_{it})$$

where lnGDPPC, lnEE, ln GC, ln FI, lnDS, lnT are Log of gross domestic product per capita, log of export, log of government consumption, log of foreign investment, log of debt services, and log of trade, respectively.

The second econometric model is also in the Cob-Douglas form following the given literature.

$$GDPPC_{it} = A_0 GCF_{it}^{\beta_{1i}} TO_{it}^{\beta_{2i}} TR_{it}^{\beta_{3i}} FP_{it}^{\beta_{4i}} \mu_{it} \quad \textbf{(2)}$$

Following the first model, it is also transferred in the natural logarithmic form as follows:

$$ln(GDPPC_{it}) = \beta_0 + \beta_{1i}\, ln(GCF_{it}) + \beta_{2i}\, ln(TO_{it}) + \beta_{3i}\, ln(TR_{it}) + \beta_{4i}\, ln(FP_{it}) + \mu_{it} \quad (2)$$

Where lnGDPP, lnGCF, lnTO, lnTR, and lnFP are natural log of GDP Per Capita, Gross Capital Formation, Trade Openness, Tax revenue, and Food production, respectively. μ is the error term. B_s are the related coefficients of independent variables.

3.2 Estimation techniques

Firstly, the unit root test for the stationarity check is the first step to find the best fit model. In our model, some variables are stationary at level while some are stationary at 1st difference. Therefore, the Autoregressive distribution lag (ARDL) is the suitable method for empirical estimation. 3 unit root tests i.e. Levin Lin Chu, I'M Pesaran and ADF test problem are used to measure the order of integration.

3.3 Auto-Regressive Distributive Lag (ARDL) technique

An Autoregressive Distributive Lag model is used to measure the short and long-run association in the aforementioned models of the study (Pearson and shin, 1998). The earlier log-linear models are transformed in the following ARDL models.

$$\triangle lnGDP_{i,t} = \beta_0 + \sum_{i=1}^{n} \mu_1 \triangle lnGDP_{t-i} + \sum_{i=0}^{n} \mu^2 \triangle lnEE_{t-i} + \sum_{i=0}^{n} \mu^3 \triangle lnGC_{t-i} + \sum_{i=0}^{n} \mu^4 \triangle lnFI_{t-i} + \sum_{i=0}^{n} \mu^5 \triangle lnDS_{t-i} + \sum_{i=0}^{n} \mu 6 \triangle lnT_{t-i} + \gamma_o lnGDP_{t-1} + +\gamma_1 lnEE_{t-1} + \gamma_2 lnGC_{t-1} + \gamma_3 lnFI_{t-1} + \gamma_4 lnDS_{t-1} + \gamma_4 lnT_{t-1} + \sigma ECT_{t-1} + e_t \quad (3)$$

$$\triangle lnGDP_{i,t} = \beta_0 + \sum_{i=1}^{n} \mu_1 \triangle lnGDP_{t-i} + \sum_{i=0}^{n} \mu^2 \triangle lnGCF_{t-i} + \sum_{i=0}^{n} \mu^3 \triangle lnT_{t-i} + \sum_{i=0}^{n} \mu^4 \triangle lnTR_{t-i} + \sum_{i=0}^{n} \mu^5 \triangle lnFP_{t-i} + \gamma_o lnGDP_{t-1} + \gamma^{1lnGCF_{t-1}} + \gamma^{2lnT_{t-1}} + \gamma^{3lnTR_{t-1}} + \gamma^{4lnFP_{t-1}} + \sigma ECT_{t-1} + e_t \quad (4)$$

Bound test is used to confirm the existence of long term relationship in both models. Furthermore, granger causality test is applied to determine the direction of causality.

4. RESULTS AND DISCUSSION

The following short and long run empirical outcomes are retrieved by using ARDL estimation method for BRICS countries.

Table 1: Long Run Results of Panel ARDL for Model 1.

Variable	Coefficient	St. Error	T-statistic	P-value
Export Earning	-0.2133	0.0692	- 3.0820	0.002
Government Consumption	0.9967	0.0484	20.5531	0.000
Foreign investment	0.0504	0.0227	2.2120	0.029
Debt Services	0.1380	0.0417	3.3038	0.001
Trade	0.4972	0.1364	3.6447	0.000

Table 2: Short Run results of Panel ARDL for Model 1

Variable	Coefficient	St. Error	T-Statistics	P-Value
Export Earning	0.0728	0.0670	1.0868	0.279
Government consumption	0.9741	0.3285	2.9650	0.003
Foreign investment	-0.0067	0.0393	-0.1716	0.864
Debt Services	-0.0510	0.0247	-2.0634	0.041
Trade	0.0242	0.1948	0.1244	0.901
ECM	-0.360	0.081	-2.745	0.046

Firstly, bound test confirms the existence of long-run relationship in both models. Secondly, the empirical outcomes of model (1) show that all independent variables except export earnings have a significant and positive relationship with economic growth. The highly consistent and negative long term relationship of export earnings with GDPPC is

surprising. This negative impact is supported by Chinn and Prasad, (2003) and Stockhammer *et al*. (2008). Among empirical outcomes, 1% increases in government consumption cause 0.97% increase in GDPPC. This result is verified by Plümper and Martin (2003) Blanchard and Perotti (2002). The positive and significant impacts of foreign investment, debt services and trade on economic growth are supported by Busse and Hefeker (2007) and Demirhan and Masca (2008), Deshpande (1997) and Ajayi and Oke (2012), and Makki and Somwaru (2004) and Lederman and Maloney (2003). However, only government consumption and debt services have short run significant impact on GDPPC. The negative and significant coefficient of ECM term confirms the long run association. The value of coefficient (-0.360) shows the speed of adjustment i.e. more than 4 months are required to reach the long term equilibrium.

Table 31: Long Run Results of Panel ARDL for Model 2

Variable	Coefficient	St. Error	T-statistic	P-value
Gross Capital Formation	0.6227	0.0603	10.312	0.000
Trade openness	0.2165	0.0838	2.5834	0.012
Tax revenue	-0.1573	0.0607	-2.5904	0.012
Food production	0.5267	0.2954	1.7827	0.080

Table 4: Short Run Results of Panel ARDL for Model 2

Variable	Coefficient	St. Error	T-Statistics	P-Value
Gross Capital Formation	-0.0960	0.1737	-0.5528	0.5828
Gross Capital Formation (-1)	0.1052	0.1110	0.9479	0.347
Gross Capital Formation (-2)	-0.1076	0.0591	-1.8190	0.0748
Trade openness	0.0631	0.1339	0.4716	0.639
Trade openness (-1)	-0.2940	0.2275	-1.2926	0.202
Trade openness (-2)	-0.0723	0.0830	-08712	0.387
Tax revenue	0.2385	0.0472	5.0442	0.000
Tax revenue (-1)	0.0008	0.1502	0.0053	0.995
Tax revenue (-2)	-0.0316	0.1904	-0.1662	0.868
Food Production	-0.7065	0.5547	-1.2736	0.208
Food Production (-1)	-0.2781	0.4698	-0.5920	0.556
Food Production (-2)	-0.2672	0.4050	-0.6597	0.512
ECM	-0.804	0.276	-2.914	0.005

The long-run results show that all estimated results were significant in model 2. Bound test verifies the long-run relationship in the second model of ARDL. Among research outcomes, gross capital formation economic growth relationship is significantly positive at 1% p-value because it is major component of growth in any economy. It means that investment is positively contributing to the economy of BRICS countries. This outcome is supported by Solarin, (2011), Koskei, *et al*., (2013), and Krkoska, (2002).The negative impact of tax revenue on GDPPC with significant sign is surprising. Decreasing trend of GDPPC with rising tax revenue indicates the existence of corruption element in the mechanism of tax collection of BRICS economies. This outcome is in lined with Keen and Baunsgaard, (2005) and Lee and Gordon, (2005). Furthermore, 1% increases in trade openness causes 0.21% rise in GDPPC with a significant p-value because trade openness raises investment activities in the domestic region as well as it enhances economic growth. This result is supported by Avelino, *et al*., (2005) and Greenaway, *et al*., (2002). 1% increase in food production has raised 0.52% GDPPC at 10% level of significance because BRICS are rich in agricultural sector which is majorly contributing to economic growth as shown in annual figures of BRICS economies. This outcome is verified by Jongwanich, (2009), Parry *et al*., (2004).

Short term outcomes significantly show the convergences from short run to long run with significant coefficient of ECM term.

4.1 Results of Granger Causality Test:

Table 5: Result of Granger Causality

Causality	F-Statistics	Probability
Export earning → GDPPC	0.86022	0.4256
GDPPC→ Export earning	4.40078	0.0142
Government consumption → GDPPC	3.95064	0.0217
GDPPC → Government consumption	2.43830	0.0915
Foreign investment → GDPPC	0.11572	0.8908
GDPPC → Foreign investment	2.17491	0.1179
Debt services → GDPPC	0.92887	0.3977
GDPPC → Debt services	1.18318	0.3097
Trade → GDPPC	0.61452	0.5425
GDPPC → Trade	1.34862	0.2633
Government consumption → Export earning	1.99262	0.1406
Export earning → Government consumption	0.69632	0.5003
Foreign investment → Export earning	1.27009	0.2844
Export earning → Foreign investment	0.52982	0.5900
Debt services → Export earning	0.36873	0.6924
Export earning → Debt services	2.42134	0.0930
Trade → Export earning	0.71926	0.4891
Export earning → Trade	21.6269	0.00
Foreign investment → Government consumption	2.87598	0.0601
Government consumption → Foreign investment	11.8119	0.00
Debt services → Government consumption	2.18194	0.1171
Government consumption → Debt services	9.71535	0.0001
Trade → Government consumption	1.43639	0.2417
Government consumption → Trade	6.72688	0.0017
Debt services → Foreign investment	3.80656	0.0248
Foreign investment → Debt services	1.43029	0.2431
Trade → Foreign investment	2.99692	0.0535
Foreign investment → Trade	0.55917	0.5731
Trade → Debt services	0.28914	0.7494
Debt services → Trade	6.27275	0.0025

Among granger causality outcomes in table 5, export earning does not granger cause LnGDPPC while LnGDPPC does granger cause Ln export earnings. We find two way causation between foreign investment and government consumption, GDPPC and government consumption and debt services and government consumption. However, foreign investment does not granger cause lnGDPPC and lnGDPPC also does not granger cause Foreign investment. Debt services do not granger cause LnGDPPC and L GDPPC also does not granger cause debt services. Similarly, Trade openness does not granger cause LnGDPPC and LnGDPPC also does not granger cause trade openness. Likewise, Government consumption does not granger cause export earnings and export earnings also does not granger cause Government consumption, Similarly, foreign investment does not granger cause export earnings and export earnings also does not granger cause foreign investment. Debt services does not granger causes export earnings while export earnings does granger cause debt services. Similarly, trade does not granger cause export earnings and export earnings also do not granger cause trade. Similarly, trade does not granger cause Government consumption and Government consumption also does not granger cause trade. However, debt services does granger cause foreign investment but foreign investment does not granger cause debt services. Similarly, trade does granger cause foreign investment but foreign investment does not cause granger trade. Trade does not granger cause debt services but debt services do cause granger trade. The significance of all outcomes is verified by F-statistics or their respective probabilities.

Table 7: Result of Granger Causality

Causality	F-Statistics	Probability
GCF→ GDPPC	0.22480	0.7990
GDPPC→ GCF	6.98462	0.0013

Trade openness → GDPPC GDPPC → Trade openness	0.46878 20.6306	0.6269 0.00
Tax Revenue → GDPPC GDPPC → Tax Revenue	1.27173 0.76545	0.2839 0.4673
Food production → GDPPC GDPPC → Food production	1.70386 0.33890	0.1862 0.7132
Trade openness → GCF GCF → Trade openness	2.59474 19.2377	0.0787 0.00
Tax revenue → GCF GCF → Tax revenue	0.07974 3.81912	0.9234 0.0246
Food production → GCF GCF → Food production	3.72995 3.30856	0.0267 0.0398
Tax revenue → Trade openness Trade openness → Tax revenue	1.53677 0.67481	0.2191 0.5111
Food production → Trade openness Trade openness → Food production	1.70619 0.63253	0.1858 0.5329
Food production → Tax revenue Tax revenue → Food production	2.33218 2.62706	0.1013 0.0763

According to the test, it is shown that GCF does not granger cause GDPPC and GDPPC does granger cause GCF. Trade openness does not granger cause GDPPC. GDPPC also does not granger cause Trade openness. Similarly, Tax revenues do not granger cause GDPPC and GDPPC also does not granger cause tax revenues. Food production does not granger cause GDPPC and GDPPC also does not granger cause food production. However, trade openness does granger cause GCF but GCF does not granger cause Trade openness. Tax revenues do not granger cause GCF but GCF does granger cause tax revenues. However, food production does granger cause GCF and GCF also does granger cause food production. Tax revenue does not granger cause trade openness and Trade openness also does not granger cause tax revenues. Similarly L Tax revenue does not granger cause trade openness and trade openness also does not granger cause L Tax revenue. Similarly, tax revenue does not granger cause trade openness but trade openness does granger cause tax revenue. The significance of all outcomes is verified by F-statistics or their respective probabilities.

5. CONCLUSION AND POLICY RECOMMENDATION

This study has analyzed the long run impact of trade and investment on economic growth for BRICS countries using ARDL estimation strategy while controlling for other factors of tax revenues, debt services, Government consumptions, and food production. In our empirical outcomes in models 1 and 2, trade openness, gross capital formation, foreign investment, and debt services have shown positive association with economic growth while tax revenues and export earnings have surprisingly a negative impact on GDPPC. In both ARDL models, the negative coefficients of ECM term confirm the long run association.

Granger causality test show two way causation between foreign investment and government consumption, GDPPC and government consumption and debt services and government consumption in Table 5. Similarly, two way causation between trade and investment, tax revenue and food production have been found in Table 6 for BRICS countries.

Empirical outcomes suggest provision of sustainable friendly environment for foreign investment, more efficient use of funds by governments and highly focus on value added agricultural and manufacturing products' exports in order to maintain and raise GDPPC since trade, foreign investment, and government consumption are most significant positive indicators of economic growth in BRICS countries.

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