Trade Openness and Its Effect on Selected Macroeconomic Variables of Senegal from 1986 To 2018

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***Abstract:** This study evaluated the effect of Trade openness on Senegalese National Savings, Gross Fixed Capital Formations and Gross Domestic Product from 1986 to 2019, using time series data. Doornik-Hansen Test of Normality was used to test for normal distribution among the variables and the stationarity test was carried out using ADF Test and PP Test. The models were subjected to residual and stability tests of LM, heteroskedasticity serial correlation and Ramsey Reset Specification test. The long run and short run relationship among the selected variables were carried out using bond test and ARDL respectively, while the formulated hypotheses were tested using Pairwise Granger Causality Test. The result revealed that Trade openness has no effect on the variables under study. That means that export capacity of Senegal did not increase her economic performance. For the country of Senegal to benefit from trade liberalization, there is need for reform in her trade and fiscal policy.*

Keywords; Trade openness, Gross Fixed Capital Formation and National Savings.

INTRODUCTION

Senegal is a country in West Africa that is bordered by Mauritania in the north, Mali to the east, Guinea to the southeast, and Guinea-Bissau to the southwest. The country has an estimated population of about 15 millio and covers a land area of almost 197,000 square kilometers (76,000 sq mi). Senegal is predominantly rural, and with limited natural resources. The economy gains most of its foreign exchange from fish, phosphates, groundnuts, tourism, and services. The fishing industry contributes to Government revenue through different agreements. Since 1986, the country has ranked first in exports of fish, groundnut and phosphate, and they accounts for about one third of the value of foreign sales. However, the sector is facing serious disequilibrum both in resource exploitation and market supply as serious risk of local market supply shortages looms ahead because fishing efforts shifted from locally consumed species to export-oriented ones due to export liberation granted by Lomé Agreement which instituted a customs duties exemption to most products originating from Africa Caribbean and Pacific (ACP) countries (Hussein, 2002). This brought about a significant fall in trade barriers across many Sub-Saharan African countries, all in an attempt to boost exports and foster economic growth (Musibau, 2009).

Import restriction policy is one of the major economic policies being used by both developed and developing nation. It is always the desire of the monetary authorities for their nations to export more than they import. Except few exporting nations like China, one of the major objectives of the monetary policy of other nations is mainly centred on correction of balance of payment deficit, or achievement of balance of Payment equilibrium. The balance of payment accounts of course hardly balances without loan support. The balance of payment support loans are obtained from international financial institution like International Monetary Fund. The repayment of those loans on their own is not seen as problems because they are obtained at a concessional rate, but the conditions attached to those credit facilities such as removal of trade restriction for Africa Caribbean and Pacific initiated by World Trade Organisation as seen in the Lome agreement with Senegal are the bases of argument among the scholars. To Hussein (2002), Musibau (2009) and Andrew (2000) trade liberalization brought a favourable result while Cheickh and ISRA (2012) and Nabil, Fatou, John and Bernard (2005) had a different opinion. To that effect, this study seeks to evaluate the effect of trade openness on National Savings of Senegal; to examine the effect of trade openness on Gross fixed capital formation of Senegal and to evaluate the effect of trade openness on GDP of Senegal. The researcher hypothesised that Trade openness has no significant effect on national savings of Senegal; Trade openness has no significant effect on Gross fixed Capital formation of Senegal and Trade openness has no significant effect on GDP of Senegal

Conceptual Review

In this study, trade openness is seen as the product of countries export and import divided by gross domestic product. Hafiz, W.K., Saira, B., Nimrah, H., Arooj, M. and Khizra, M. (2016), see trade openness as a measure trade intensity calculated as total imports as percentage of GDP.

Pigka-Balanike (2016) on attempt to differentiate trade liberalization from trade openness said that "trade liberalization includes policy measures to increase trade openness while increased trade openness is usually considered as an increase in the size of a country's traded

sectors in relation to total output". The theory of trade liberalization is highly centred on the theory of comparative cost advantage developed by David Ricardo, Andrew (2000). The comparative cost advantage theory emphasized on nations specializing in the production of those goods they have comparative advantages in their production and import those goods they have comparative disadvantages in their production. But the question remains unanswered for developing nations that have comparative disadvantages in the production of most demanding goods. Is it economical for them not to apply import restriction strategy in order to discourage importation and boost the local industries' production capacity?

Empirical Review of Related Literature

The problem of trade liberalization and its effects among developing nations has drawn attention of several researchers. So in order to obtain other peoples opinion on the related matter, few literatures were reviewed and summarized below.

Hafiz, W.K., Saira, B., Nimrah, H., Arooj, M. and Khizra, M. (2016) studied the relationship between trade openness and economic growth among different countries from 1980 to 2010 using secondary data collected from World Bank. The result revealed that trade openness has a significant relationship with economic growth.

Pigka-Balanike (2016) examined the relationship between trade openness and economic growth among 71 developing countries from 1990-2005 using Solow growth model and panel data analysis. The result showed that trade liberalization has a positive and significant effect on economic growth, except among Sub-Saharan region.

Fenira (2015) through trade index comparative analysis, argues that trade policy liberalization have slightly contributed to increase in economic growth among 82 developing countries using trade ratio as a variable of interest

Breen (2012) investigated the truth in the assertion that IMF policies are driven by the powerful states which intervene to align policy with their preferences, stating that many have argued that the United States uses its position as the Fund's largest shareholder to achieve its foreign policy objectives. As a result, a substantial volume of literature argues and presents evidence to support the claim that IMF decisions faithfully reflect US interests. His findings extend these claims that the United States uses its position as the Fund's largest shareholder to achieve its foreign policy objectives. He suggested that IMF agreements contain fewer binding conditions when a suspension of IMF lending plausibly would impose greater hardship on creditor country banks and exporters.

Cheickh and ISRA (2012) studied the effect of full liberalization and potential implementation of economic partnership agreement (EPA) between European Union and ECOWAS. The results show that the EPA scenario seems to be more beneficial in term of welfare variation than the full liberalization scenario. While the classical indicators studied did not seem to reduce poverty.

Musibau (2009) examined the response of merchandise export to real exchange rate-based trade liberalization in Sub-Saharan Africa nations between 1980 and 2005 using time series cross- section technique. The findings revealed that trade liberalization can stimulate export performance indirectly. Again, evidence revealed that a more competitive and stable real effective exchange rate can stimulate export performance.

Dennis (2008) assessed the effectiveness of Millennium Challenge Account in addressing a distressing paradox of developing countries not getting many trillions of dollars being giving to them as foreign aid support. He observed that the efforts of Millennium Challenge Account appear to have provided few or no benefits to the intended aid recipients, but have generously lined the pockets of corrupt government officials. He suggested an approach that emphasizes the careful selection of aid recipients, rather than the imposition of restrictive conditions on how the aid may be used.

Dennis and Zuckerman (2006) described the impact of World Bank and International Monetary Fund (IMF) policy-based loans on people's lives, especially on women, i.e. loans to developing countries that require governments to reform economic, financial and trade policies. They said that these reforms also known as loan conditionality, generally bypass local democratic processes and contribute to the feminization of poverty. They highlighted four reforms often tied to World Bank and IMF policy-based loans that intensify gender inequality and undermine the ability of women and girls to break out of poverty as privatization; decreased government spending; trade and labour market reforms; and financial sector reforms. They concluded that policy-based loans often help creditors more than women and men in developing countries because governments of the recipient countries are forced to use these loans to repay old debts incurred under dubious circumstances. Loan conditionality tend to benefit foreign companies by opening up markets at the expense of local industries and working women and men.

Nabil, Fatou, John and Bernard (2005) studied the potential poverty and inequality effects of a complete tariff removal in Senegal using an integrated sequential dynamic computable general equilibrium model. The outcomes indicated small short run negative impacts in terms of welfare and poverty, while in the long run, growth effects captured by the model brought an expansion of the industrial and services sectors and substantial poverty decreases. However, the decomposition of the results shows that the contribution of the redistribution component to poverty alleviation is negative.

Andrew (2000) contended based on growth theorists that while opening an economy to trade may not provide the desired quick fix; the removal or relaxation of quantitative import and export restrictions and lowering of tariffs would result in increased exports and growth.

METHODOLOGY

This study employed an *ex-post facto* research technique in evaluating the effect of trade openness on selected macroeconomic variables of Senegal. The study made use of secondary data only. The data for analysis were collected from the data bank of World Bank for various years. The period of study covers from 1986 to 2018. 1986 was chosen as the base year because most developing nations including Senegal adopted Structural Adjustment programme in that year.

Doornik-Hansen Test of Normality was used to test for normal distribution among the variables. The stationarity test was carried out using ADF Test and PP Test, while the models were subjected to residual and stability tests of serial correlation using LM, heteroskedasticity and Ramsey Reset Specification test. The long run and short run relationship among the selected variables were carried out using bond test and ARDL, while the formulated hypotheses were tested using Pairwise Granger Causality Test. The models of this study are presented as follows

Model one: $Y_1 = \beta_o + \beta_1 x1 + \mu_t$
Model two: $Y_2 = \gamma_o + \gamma_1 x1 + \varepsilon_t$
Model three: $Y_3 = \alpha_o + \alpha_1 x1 + \xi_t$
Model one: $LNSS_t = \beta_o + (\beta_1 LTOS) + \mu_t$
Model two: $LGFCFS_t = \gamma_o + (\gamma_1 LTOS) + \varepsilon_t$
Model three: $LGDPS_t = \alpha_o + (\alpha_1 LTOS) + \xi_t$

Explanation of the variables:
LTOS = Log Trade Openness of Senegal
LNSS = log National Savings of Senegal
LGFCFS = log Gross Fixed Capital Formation of Senegal
LGDPS = log Gross Domestic Product of Senegal

DATA PRESENTATION AND ANALYSIS

Tabled 6.3; Selected macroeconomic data of Senegal

Year	Trade Openness (%)	Total Exports ($ Million)	Total Imports ($ Million)	Gross Fixed Capital Formation ($ Million)	National Savings ($ Million)	Gross Domestic Product ($ Million)
1986	24.42	62.5	961.0	568.2	824.2	4,189.8
1987	21.52	60.6	1,024.0	767.1	263.1	5,040.7
1988	22.85	59.1	1,080.0	848.9	933.9	4,985.2
1989	26.26	69.3	1,221.0	827.0	689.9	4,913.1
1990	22.66	76.1	1,219.0	1,028.6	913.2	5,716.6
1991	22.13	70.1	1,173.0	1,016.1	126.4	5,617.2
1992	18.34	67.3	1,034.0	1,134.5	188.4	6,004.9
1993	20.39	70.7	1,087.0	1,031.5	243.8	5,678.8
1994	28.40	79.1	1,022.0	826.5	203.1	3,877.2
1995	30.98	99.3	1,412.0	923.5	389.5	4,878.7
1996	30.30	98.8	1,436.0	1,025.7	395.2	5,065.8
1997	30.94	90.5	1,335.0	910.8	506.1	4,672.5
1998	30.85	96.8	1,455.0	1,163.0	565.4	5,030.3
1999	32.40	102.7	1,564.0	1,150.8	626.8	5,144.0
2000	52.12	920.0	1,519.0	1,047.8	646.0	4,679.6
2001	56.03	1,003.0	1,730.0	1,108.4	678.5	4,877.6
2002	56.71	1,067.0	1,958.0	1,323.8	627.5	5,333.9
2003	53.18	1,257.0	2,390.9	1,475.6	1,133.4	6,859.0
2004	54.14	1,509.0	2,839.1	1,787.1	1,264.3	8,031.3
2005	58.30	1,578.1	3,497.7	2,031.1	1,388.8	8,707.0
2006	56.26	1,594.0	3,671.0	2,447.4	1,425.3	9,358.7
2007	58.00	1,673.9	4,871.4	2,950.5	1,966.9	11,284.6
2008	64.77	2,170.5	6,527.6	3,604.0	2,294.2	13,428.5
2009	52.54	2,017.4	4,712.0	2,944.3	1,965.6	12,809.0
2010	53.67	2,161.1	4,782.2	2,875.2	2,258.3	12,937.3
2011	58.81	2,541.7	5,909.0	3,522.0	2,514.6	14,368.3
2012	63.13	2,531.7	6,434.2	3,350.7	2,602.7	14,202.4
2013	62.21	2,661.0	6,552.2	3,767.6	2,528.9	14,811.0
2014	60.44	2,750.2	6,502.6	3,921.7	2,445.1	15,309.0

2015	60.30	2,611.7	5,595.4	3,514.0	2,441.7	13,610.0
2016	54.98	2,640.3	5,478.0	3,818.3	2,528.5	14,765.5
2017	56.58	4,598.1	7,504.7	4,952.1	4,304.2	22,965.2
2018	57.36	5,272.4	8,707.2	6,020.9	4,304.2	24,519.1

Source: World Bank; www.worldbank.org

Table 1 presents the relevant data for the various variables of interest. The variables are the GDP, NS, GFCF, and Trade openness of Senegalese economy. Trade openness is the product of total export and total import divided by GDP, thus

the inclusion of total export and total import in the variables of interest.

Empirical Results

Table 2: Summary of Descriptive Statistics

	NS	**GFCF**	**GDP**	**TRO**
Mean	1399.627	2111.658	9202.176	43.99909
Median	933.9000	1323.800	6004.900	53.18000
Maximum	4304.200	6020.900	24519.10	64.77000
Minimum	126.4000	568.2000	3877.200	18.34000
Std. Dev.	1129.196	1423.081	5448.820	16.29515
Skewness	0.982744	0.924648	1.179233	-0.321643
Kurtosis	3.334894	2.937615	3.740028	1.353453
Jarque-Bera	5.466030	4.707708	8.401259	4.296785
Probability	0.065023	0.095002	0.014986	0.116672
Sum	46187.70	69684.70	303671.8	1451.970
Sum Sq. Dev.	40802651	64805109	9.50E+08	8497.023
Observations	33	33	33	33

Source: E-views 10.0

Table 3: Doornik-Hansen Test of Normality

Variables	**Doornik-Hansen Test Statistic**	**P-value**
NS	8.63860	0.01331
GFCF	10.2385	0.00598
GDP	13.0772	0.00144
TRO	18.8917	0.00000

Source: Output Data from Gretl

Summary of Descriptive Statistics

The first step we took in the data analysis was the determination of the descriptive characteristic of the variables as summarized in Table 1. The mean of the data are 1399.7 for NS, 2111.66 for GFCF, 9202.18 for GDP and 43.99 for TRO, while the median are 933.9 for NS, 1323.8 for GFCF, 6004.9 for GDP and 53.18 for TRO. The maximum and minimum values are 4304.2 and 126.4 for NS, 6020.9 and 568.2 for GFCF, 24519.1 and 3877.2 for GDP and 64.77 and 18.34 for TRO. The standard deviations are 1129.20, 1423.08, 5448.82 and 16.29 respectively for NS,

GFCF, GDP and TRO. From the Skewness statistics NS, GFCF and GDP were positively skewed towards normality. With inferences from the Jarque-Bera statistics, only GDP was normally distributed thus leading to the use of another form of normality testing through Doornik-Hansen approach. From the output of the Doornik-Hansen test of normality in table 3, it is clear that all the variables followed normal distribution, hence our trust in the output of the analysis.

Unit Root Test

Table 4: ADF Test Result

Variables	**ADF Test Statistic**	**Test Critical Value at 1%**	**Test Critical Value at 5%**	**Remark**
NS	-6.723864 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
GFCF	-3.702731 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
GDP	-4.545263 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
TRO	-5.405954 (0.00)*	-3.661661	-2.960411	1(1)/Stationary

Source: E-views 10.0

1(1) represents stationarity first difference

Note: The optimal lag for ADF test is selected based on the Akaike Info Criteria (AIC), p-values are in parentheses where (*) and (**) denotes significance at 1% and 5% respectively.

Table 5: PP Test Result

Variables	PP Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
NS	-6.723864 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
GFCF	-3.702731 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
GDP	-4.545263 (0.00)*	-3.661661	-2.960411	1(1)/Stationary
TRO	-5.405954 (0.00)*	-3.661661	-2.960411	1(1)/Stationary

Source: E-views 10.0

1(0) and 1(1) represent level and first difference stationarity respectively

Note: In determining the truncation lag for PP test, the spectral estimation method selected is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denotes significance at 1% and 5% respectively. Residual and Stability Test

The Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) were the unit root test utilized to check the stationarity of the variables. With the result of the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) in Tables 4 and 5, it is inferred that the variables are stationary and have no defect capable of affecting the outcome of the study with regard to analysis carried out.

Residual and Stability Test

Table 6: Serial Correlation LM Test

Models Estimated	F-statistic	P-value
NS →TRO	0.846165	0.4401
GFCF → TRO	2.045929	0.1488
GDP → TRO	2.142344	0.1402

Source: E-views 10.0

Table 7: Heteroskedasticity Test

Models Estimated	F-statistic	P-value
NS →TRO	0.652739	0.5281
GFCF → TRO	0.689702	0.4131
GDP → TRO	0.474058	0.4970

Source: E-views 10.0

Table 8: Ramsey Reset Specification

Models Estimated	F-statistic	Df	P-value
NS →TRO	0.352651	(1, 28)	0.5574
GFCF → TRO	1.755783	(1, 28)	0.1959
GDP → TRO	0.054395	(1, 24)	0.8176

Source: E-views 10.0

Residual and Stability Test

In line with classical linear regression assumptions in econometric, the models were subjected to residual and stability tests of serial correlation LM (Table 6), heteroskedasticity (Table 7) and Ramsey Reset Specification test (Table 8). These p-values of all the f-statistics for the entire model are insignificant at 5% level of significance. This is suggests that the models have no problem of serial correlation LM, heteroskedasticity and Ramsey Reset Specification.

Long Run Relationship

Table 9: Bound Test

	NS	GFCF	GDP
F-Statistic	1.545544	3.653815	3.824363
Lower Bound @ 5% Critical Value Bound	3.62	3.62	3.62
Upper Bound @ 5% Critical Value Bound	4.16	4.16	4.16

Source: E-views 10.0

The long run relationship between national savings, gross fixed capital formation, gross domestic product and trade openness in Senegal was actualized using the bound test approach. A look at the f-statistic for the three estimated models in Table 9 provided evidence that the upper bound value of 4.16 is higher than the f-statistics of 1.55, 3.65 and 3.82 respectively for national savings, gross fixed capital formation and gross domestic product. From this result, there is no long run relationship that existed between national savings, gross fixed capital formation, gross domestic product and trade openness in Senegal. For that reason, the further determination of the nature of the long run relationship as well as the error correction mechanism are halted.

ARDL Relationship

Table 10: ARDL Ordinary Relationship

Variables	NS		GFCF		GDP	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
TRO	9.085180	0.1708	3.697387	0.5336	25.71351	0.2873
C	-224.9474	0.3307	-109.8833	0.5736	-912.4485	0.3097
Adjusted R-squared	0.870376		0.936338		0.926887	
F-statistic	105.0770		228.9735		92.91193	
Prob(F-statistic)	0.00000		0.00000		0.00000	
Durbin-Watson stat	2.341773		1.641402		1.809986	

Source: E-views 10.0

The ARDL was the technique adopted in estimating the ordinary relationship between the variables of interest as against the traditional Ordinary Least Square (OLS) approach. The choice is on the fact that the ARDL framework helps in curbing the issue of autocorrelation in a model, especially in the event that there is only one independent variable in the model. In Table 10, trade openness was positively but insignificantly related with national savings, gross fixed capital formation and gross domestic product in Senegal. This points to the fact that whenever there is a percent increase in trade openness, national savings, gross fixed capital formation and gross domestic product would rise by a margin of 9.08, 3.69 and 25.71 respectively. The coefficient of the adjusted R-squared gives an insight that 87.04%, 93.63% and 92.69% fluctuation respectively in national savings, gross fixed capital formation and gross domestic product were attributed to changes in trade openness. With estimation done by the ARDL approach, the Durbin Watson statistics of 2.34, 1.64 and 1.81 are within the acceptable range of no autocorrelation in the models.

Effect Determination
Re-statement and test of the formulated hypotheses
The formulated hypotheses are restated here in both null and alternate form

1. *H0 Trade openness has no significant effect on national savings of Senegal*
   Hi Trade openness has significant effect on national savings of Senegal
2. *H0 Trade openness has no significant effect on Gross fixed Capital formation of Senegal*
   Hi Trade openness has significant effect on Gross fixed Capital formation of Senegal
3. *H0 Trade openness has no significant effect on GDP of Senegal*
   Hi Trade openness has significant effect on GDP of Senegal

Table 11: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
TRO does not Granger Cause NS	32	1.10690	0.3014	No Causality
NS does not Granger Cause TRO		0.00705	0.9336	No Causality
TRO does not Granger Cause GFCF	32	0.06159	0.8057	No Causality
GFCF does not Granger Cause TRO		0.02300	0.8805	No Causality
TRO does not Granger Cause GDP	32	0.57333	0.4550	No Causality
GDP does not Granger Cause TRO		0.01361	0.9071	No Causality

Source: E-views 10.0

The determination of the effect of trade openness on national savings, gross fixed capital formation and gross domestic product was evaluated by the pair wise granger causality test. This study finds this tool more superior compared to the traditional Ordinary Least Square (OLS) approach on the argument that it has capability of determining the influence a variable has on the other. As shown in Table 10, there is no causal relationship between national savings, gross fixed capital formation, gross domestic product and trade openness. Causality does not flow from either direction at 5% level of significance.

CONCLUSION AND RECOMMENDATION
From the result of the analysis, it was clear that in Senegal trade openness has no significant relationship with national savings, gross fixed capital formation and gross domestic product. Again, national savings, gross fixed capital formation and gross domestic product are not significantly affected by trade openness. That means that the export capacity of Senegal did not reflect in her economic performance. In order words, removal of trade restriction increased the export capacity of the country without affecting the country's economy positively. Without any doubt, one of the major reasons why government places restrictions on their boarders is to generate revenue which will aid in economic development. If the country of Senegal will benefit from trade liberalization, then there is need for change in her trade and fiscal policy. Protectionism policy is needed to boost domestic industry's performance and cub excess exportation that can create scarcity at the domestic market. But that should be done with prudency to avoid excess or multiple tax system. Never the less, the importance of free tax zone in real sector should not be neglected. Again the fiscal policy should be geared towards infrastructural development that can boost investment and savings.

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