International Journal of Arts and Social Science www.ijassjournal.com
ISSN: 2581-7922,
Volume 3 Issue 3, May-June 2020.

Analysis of Causal Relationship among Economic Growth, Import, Export and Remittance: A Comparative Study between Bangladesh and India

[1]Afrina Akter Mishu, [2]Shanjida Chowdhury, [3]Nurul Mohammad Zayed
[1]*Assistant Professor, Department of Statistics, Comilla University, Cumilla, Bangladesh*
[2]*Assistant Professor, Department of General Educational Development, Daffodil International University, Dhaka, Bangladesh*
[3]*Assistant Professor & Head, Department of Real Estate, Daffodil International University,*

Abstract: *Using time-series data from 1976 to 2016, this paper intends to investigate the relationship among export, remittance, GDP growth and import for Bangladesh and India. By applying the Granger causality test along with a VAR model, the study explored that remittances growth and economic growth are positively correlated in Bangladesh. For Bangladesh, causal nexus is unidirectional where for India's economic growth affected growth in remittances.*

Keywords: Export, import, remittance, economic growth, Bangladesh, India

I. Introduction

In the past decade or so, there have been 5% and above GDP growth in Bangladesh, because of the increase in imports, remittance, and exports. In 1990, the total trade to GDP ratio was 17.6%, and then it increased to 29.4 % in 2002 (World Bank, 2005). Export growth was mostly regarded as the primary determinant of an economy's growth in production and employment. Discussions have also been made about the foreign currency made available by export earnings facilities, the import of capital goods, which in turn increases an economy's production capacity. It is thought that economies of scale and technological progress are caused by export competition (Ramos, 2011). The policy regime jumped to export-promotion from import submission since 1980. Tariffs reduced marginally along with quota that was abolished gradually. On export commodities, as a form of tax exemption, the financial incentive is provided. For the reason of attracting FDI and export promotion, exclusive EPZs are established. To foreign firms operating in EPZ, there are separate facilities to preference and tax exemption. The state has also seen shifts in its composition of exports — from primary products to manufacturing goods (Love and Chandra, 2005). Remittance is another major source of Bangladesh's foreign income. Unskilled and semi-skilled workers from Bangladesh send large amounts of foreign currency, sometimes even exceeding export earnings. A variety of analytical work to explore the link between Bangladesh's exports and development has been conducted. However, there is little work that has taken into account the effect of imports and remittances on economic growth. Especially no comparative study was undertaken to investigate the relationship among export, remittance, GDP growth , and import for Bangladesh and India.

II. Literature Review

Any countries rapidity of economic development depends largely on import, export, and remittance. Alkhateeb et al. (2016) stated that there are a variety of channels like comparative advantage, exchange of new ideas, and

production process through which exports can process of economic growth. Al-Mamun and Nath (2005) examined that there is a long-run causality from exports to growth in Bangladesh. However, there is a close relation between imports and economic growth in many countries. Many developing countries import commodities from industrially developed countries. Depending upon the types, imports may have either a positive or negative impact on economic growth. Study of Achchuthan, (2013) recognized that upsurge in imports causes the growth rate to increase. Also, Fan & Nie (2013), Rahman & Shahbaz (2013) and Bas (2009) concluded that providing better quality intermediate goods rise in imports also leads to an increase in export. Jongwanich (2007) discovers that in Asia and Pacific countries remittances have a positive but marginal impact on economic growth. Job in Middle-east is one of the major sources of remittance inflow for Bangladesh as it has provided great scope for Bangladeshi workers for employment as well as contribute to economic growth. In the era of Globalization, Bangladeshi workers are now working in countries including Saudi Arabia, UAE, Qatar, Kuwait, Oman, Malaysia, USA, UK, Italy, and South Africa and so on. Jannat et al. (2020) research show the major factors shaping Bangladesh's economic growth trend. Their research findings found that gross national income, export products, import commodities, foreign direct investment, workforce, remittance compensation, receiving remittances are associated with gross domestic product. Also, the study of Akhter 2015 that based on the secondary data, discloses that the effect of export on economic growth found positive and in the case of import there exist an opposite scenario. In the case of India, the study of Singh and Mehra (2014) based on time series analysis found that remittances play an important role in economic growth. A similar result is also found for Bangladesh (Sarkar et al. 2018). But there is a controversy because another study of Sutradhar(2020) conducted research using four countries data and found in the case of Bangladesh, Pakistan and Sri Lanka there is a negative effect of remittances on economic growth. Contrariwise, remittances have a positive impact on economic growth in India. In India study of Mehta (2015) in his study establish the evidence of unidirectional causality leading from GDP to Export. The result caroused that GDP does not lead to Import and Import does not lead to GDP. The researcher also originated an indication of unidirectional causality running from Export to Import.

III. Methodology

Time series data were used over 40 years from 1976-2016. Data on remittance are collected from Bangladesh Economic Review (2005). The data used in the analysis is in logarithmic form. This transformation will reduce the heteroscedasticity problem, as log transformation compresses the measurement scale of the variables (Gujrati, 1995). Export, import and remittance are converted into real terms using the implicit GDP deflator. Since, data on import and export price index are not available for the whole length of the time series used in this paper, we used the implicit GDP deflator to obtain the real values of the variables under consideration. To check stationary ADF test and PP test were employed. Also, we analyze lag selection for performing parsimonious VAR model so that over-fitted model cannot be occurred. Furthermore, we analyze Johansen co-integration and Impulse response function to analyze the responses with GDP. Finally we test granger causality for India and Bangladesh.

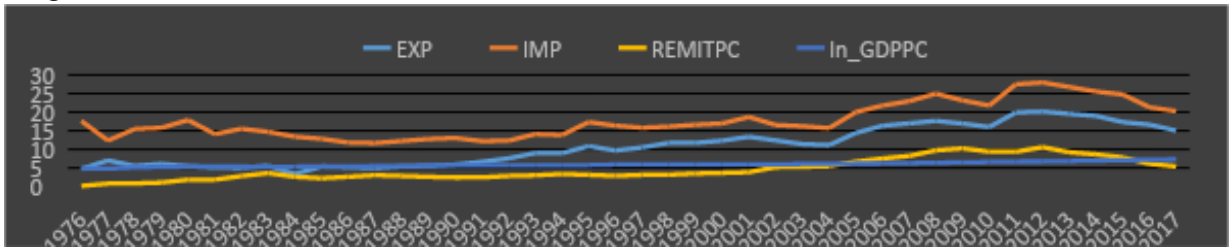

Figure 1: Economic growth, Exports, Import and Remittance in Bangladesh.

Model Selection:
Johansen co-integration test

The Johansen ML technique provides a series of tests that can be used to evaluate the number of co-integration vectors. The product of two matrices: $\pi = \alpha\beta'$ ……..(1)

The matrix β gives the co-integrating vectors, while α is adjustment parameter. The two statistics are:

$$\lambda_{Trace}(r) = -T\sum_{i=r+1}^{g} in(1-\hat{\lambda}_i)$$

$$\lambda_{Max}(r, r+1) = -T\ln(1-\hat{\lambda}_{r+1}) \quad \text{……..} \quad (2)$$

Where $\hat{\lambda}_i$ is the estimated value for the *i*th ordered eigenvalue from the π matrix. The standard approach to the Johansen ML procedure is to first calculate the Trace and Maximum Eigenvalue statistics, then compare these to the appropriate critical values. Another model used is VAR model which treated all the variables in the model as endogenous. Although the Granger causality test is a good way to examine the relationship between variables in a VAR model, it does not provide any answers to whether there is a positive or negative relationship between our study variables. Variance decomposition determines how much of the forecast error variance for any variable in a system, is explained by innovations to each explanatory variable, over a series of time horizons.

IV. Results and Discussions

Analysis on Bangladesh:

Table 1: Summary of Economic growth, Exports, Import and Remittance in Bangladesh

Characteristics	GDP1	EXP1	IMP1	REM1
Mean	5.955886	10.81383	17.59704	4.580431
Median	5.956396	10.69250	16.29816	3.310350
Maximum	7.324169	20.16159	27.94933	10.58794
Minimum	4.858333	3.396255	11.69775	0.185441
Std. Dev.	0.616756	5.186071	4.729490	2.916297
Skewness	0.497997	0.324041	0.719654	0.690692
Kurtosis	2.533146	1.733272	2.406375	2.239747
Jarque-Bera statistic	2.117423	3.543066	4.242000	4.350857
Probability	0.346903	0.170072	0.119912	0.113559
Sum	250.1472	454.1809	739.0755	192.3781
Sum Sq. Dev.	15.59591	1102.709	917.0909	348.6963
Observations	42	42	42	42

Source: Estimated.

Our first analysis is to display mean, median, maxima, minima, and other basic information. For solving heteroscedasticity, we consider natural logarithm for GDP per capita. As mean of export and import are far away from GDP per capita (GDP1) and remittance inflows (REM1), so as to standard deviation. For normality, we supposed a null hypothesis of rejecting normal distribution for each variable. All variables are not normal at a 5% level of significance. Also, skewness is ranging from 0.324 to 0.719. So, it concludes that all variables are negatively skewed. Furthermore, kurtosis is quietly moving from 2, except export (EXP1). For performing time series analysis, we check stationary through ADF and PP tests. In the case of Bangladesh, all variables are stationary art first difference but non-stationary at the level.

Table 2: Check stationary through ADF and PP test

	PP							
	RE1	GDP1	EXBD	IMP1	d(RE1)	d(GDP1)	d(EXBD)	d(IMP1)
With Constant	-1.573	1.015	-1.0166	-1.2697	-4.5049	-5.4629	-6.5637	-7.6179
	0.487	0.996	0.7385	0.6345	0.0008	0	0	0
	n0	n0	n0	n0	***	***	***	***
With Constant & Trend	-1.4089	-0.7704	-1.9571	-2.7625	-4.6121	-5.3874	-6.4768	-7.4805
	0.8434	0.9602	0.6066	0.2187	0.0035	0.0004	0	0
	n0	n0	n0	n0	***	***	***	***
	ADF							
With Constant	-2.0716	1.0879	-1.0166	-1.3174	-2.7073	-5.3969	-6.5637	-2.4552
	0.2567	0.9968	0.7385	0.6125	0.0838	0.0001	0	0.1356
	n0	n0	n0	n0	*	***	***	n0
With Constant & Trend	-4.2908	-0.5376	-1.9571	-1.7462	-1.214	-5.3874	-6.4768	-1.5694
	0.0091	0.9775	0.6066	0.7116	0.8932	0.0004	0	0.7827
	***	n0	n0	n0	n0	***	***	n0

Source: Estimated.

After unit root testing, our next target is taking parsimonious lag for VAR model and our VAR model has 2 optimal lag.

VAR Lag Order Selection Criteria						
Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-253.608	NA	6.418	13.211	13.381	13.271
1	-89.8025	285.609	0.003	5.631	6.4841*	5.936
2	-68.2111	33.217*	0.003*	5.344*	6.879	5.895*
3	-59.4676	11.658	0.003	5.716	7.934	6.512

Table 3: VAR Lag Order Selection Criteria

Source: Estimated.

For choosing better lag we follow, the maximum lag selection criteria of several criterion. In this aspect LR FPE and AIC suggest that optimum lag is 2.

Table 4: Johansen co-integration test for study variable.

No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value	p-value	Eigenvalue	Trace statistic	Critical Value	p-value
None *	0.594677	61.83708	40.17493	**0.0001**	0.594677	35.21979	24.15921	**0.0011**
At most1 *	0.348816	26.61728	24.27596	**0.0249**	0.348816	16.72959	17.79730	0.0718
At most2	0.175742	9.887697	12.32090	0.1236	0.175742	7.537613	11.22480	0.2063
At most3	0.058479	2.350084	4.129906	0.1479	0.058479	2.350084	4.129906	0.1479

Source: Estimated.

For Johansen co-integration, we assess both trace statistic and Max Eigen value for considering null hypothesis. But Eigen value rejects second null hypothesis. For both case, we reject null hypothesis that there is no co-integrated equation. So, there is a significant relationship in long term of GDP and export, import and remittance.

Table 5: Granger Causality test among economic growth, export, import and remittance.

Null Hypothesis:	Observation	F-Statistic	Prob.
EXBD does not Granger Cause GDP1	40	6.37235	**0.0044**
GDP1 does not Granger Cause EXBD		0.24563	0.7835
IMP1 does not Granger Cause GDP1	40	4.67981	**0.0158**
GDP1 does not Granger Cause IMP1		0.07780	0.9253
RE1 does not Granger Cause GDP1	40	2.37308	0.108
GDP1 does not Granger Cause RE1		0.20989	0.8117
IMP1 does not Granger Cause EXBD	40	3.90064	**0.0296**
EXBD does not Granger Cause IMP1		3.70388	**0.0347**
RE1 does not Granger Cause EXBD	40	0.92637	0.4055
EXBD does not Granger Cause RE1		3.13557	0.0559
RE1 does not Granger Cause IMP1	40	2.00693	0.1496
IMP1 does not Granger Cause RE1		2.28510	0.1167

Source: Estimated.

For causality under Engle and granger, there is a null hypothesis-based test. As it reveals that there is a unidirectional causal relationship export to GDP, import to GDP while bidirectional causality with import and export. So, we can conclude that export and import can causes to GDP or it can be explained through export and import. Also, import and export can causes bidirectional causal relationship.

Analysis on India

Table 6: Summary of Economic growth, Exports, Import and Remittance in India

	GDP2	EXIND	IMP2	REM2
Mean	6.209494	12.97320	15.06016	2.138367
Median	5.997821	10.88046	12.10948	2.270675
Maximum	7.571524	25.43086	31.25929	4.210550
Minimum	5.071466	5.250811	6.182804	0.633807
Std. Dev.	0.702346	6.816728	8.097339	1.088864
Skewness	0.562505	0.491072	0.679626	0.149038
Kurtosis	2.065719	1.726288	1.986092	1.575419
Jarque-Bera	3.742422	4.527163	5.032256	3.706992
Probability	0.153937	0.103977	0.080772	0.156688
Sum	260.7988	544.8742	632.5267	89.81140
Sum Sq. Dev.	20.22489	1905.179	2688.243	48.61063
Observations	42	42	42	42

Source: Estimated.

Table 6 represents the Summary of Economic growth, Exports, Import and Remittance in India
For performing time series analysis, we check stationary through ADF and PP test. In case of India, all variables are stationary art first difference but non-stationary at level.

Table 7: Checking stationarity through ADF and PP test

PP		**REM2**	**GDP2**	**EXIND**	**IMP2**	**d(REM2)**	**d(GDP2)**	**d(EXIND)**	**d(IMP2)**
With Constant	t-Statistic	-1.4174	0.3198	-0.7191	-0.9552	-7.0777	-5.7547	-6.5174	-4.9958
	Prob.	0.5645	0.9766	0.8306	0.7601	0	0	0	0.0002
		n0	n0	n0	n0	***	***	***	***
With Constant & Trend	t-Statistic	-1.7203	-1.1446	-1.9239	-1.6995	-7.0948	-5.8275	-6.4418	-4.9417
	Prob.	0.724	0.9085	0.624	0.7335	0	0.0001	0	0.0014
		n0	n0	n0	n0	***	***	***	***
ADF		REM2	GDP2	EXIND	IMP2	d(REM2)	d(GDP2)	d(EXIND)	d(IMP2)
With Constant	t-Statistic	-1.4472	0.4852	-0.6441	-0.8399	-1.5994	-5.7271	-2.8041	-4.9866
	Prob.	0.5499	0.9842	0.8493	0.7969	0.4716	0	0.0693	0.0002
		n0	n0	n0	n0	n0	***	*	***
With Constant & Trend	t-Statisti	-2.811	-0.879	-2.412	-3.088	-1.3849	-5.8154	-2.3192	-4.9323

	c	4	8	1	4				
	Prob.	0.2032	0.9487	0.3674	0.1247	0.8468	0.0001	0.4119	0.0014
		n0	n0	n0	n0	n0	***	n0	***

Source: Estimated.

After unit root testing, our next target is taking parsimonious lag for VAR model. In this dataset, maximum information criteria proposed that there are 2 optimal lag. So, we can conclude that our VAR model has 2 optimal lag.

Table 8: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-218.3832	NA	0.792705	11.11916	11.28805	11.18023
1	-70.33631	259.0821*	0.001081*	4.516816	5.361255*	4.822138*
2	-54.20588	25.00216	0.001103	4.510294*	6.030286	5.059875

Source: Estimated.

For choosing better lag we follow, the maximum lag selection criteria of several criterion. In this aspect LR FPE and AIC suggest that optimum lag is 1.

Table 9: Johansen co-integration test for study variable in India.

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.505762	44.47812	40.17493	0.0174	0.505762	27.48481	24.15921	0.0171
At most 1	0.247474	16.99331	24.27596	0.3117	0.247474	11.08848	17.79730	0.3774
At most 2	0.084067	5.904834	12.32090	0.4477	0.084067	3.424665	11.22480	0.7207
At most 3	0.061614	2.480170	4.129906	0.1362	0.061614	2.480170	4.129906	0.1362

Source: Estimated.

For Johansen co-integration, we reject null hypothesis and conclude that there relies on at least one co-integrated equation of study variables. So, there is a possibility with certain of having long run relationship of GDP with export, import and remittance.

Table 10: Granger Causality test among economic growth, export, import and remittance.

Null Hypothesis:	Obs	F-Statistic	Prob.
EXP2 does not Granger Cause GDP2	40	3.57672	0.0386
GDP2 does not Granger Cause EXP2		4.55371	0.0175
IMP2 does not Granger Cause GDP2	40	1.66454	0.2039

GDP2 does not Granger Cause IMP2		6.82683	0.0031
REM2 does not Granger Cause GDP2	40	2.61463	0.0874
GDP2 does not Granger Cause REM2		1.04089	0.3638
IMP2 does not Granger Cause EXP2	40	0.80955	0.4532
EXP2 does not Granger Cause IMP2		1.49446	0.2383
REM2 does not Granger Cause EXP2	40	2.21538	0.1242
EXP2 does not Granger Cause REM2		2.52752	0.0943
REM2 does not Granger Cause IMP2	40	3.42513	0.0438
IMP2 does not Granger Cause REM2		3.79288	0.0323

Source: Estimated.

For causality under Engle and granger, there is a null hypothesis-based test. As it reveals that there is a unidirectional causal relationship GDP to import while bidirectional causality with import and export, export to GDP and import to remittance. So, export can cause bidirectionally with GDP. Also, import can cause remittance bidirectionally. So, economic scenario is much stable for remittance with export and GDP.

Conclusion & Policy Recommendations

Both Bangladesh and India have two countries that are adjacent, are associated for man economic dependency and trade in less tax. For Bangladesh, we would like to exhibit the unit root test, Johansen co-integration and VAR model. In this test, all variables are stationary at first difference. Also, there was found at least one co-integration equation in Johansen co-integration. Again, Granger causality enables us in revealing significant cause for import and export. Also, we enable responses for both India and Bangladesh along with impulse response function. Whereas in case of India, other than Granger Causality all results are significant. For India, there were many causalities found in bi-directional and helped us understand that there is a significant cause for too many variables. As a result, for Bangladesh trade of export and import is significant.

References

[1.] Achchuthan, S. (2013). "Export, Import, and Economic Growth: Evidence from Sri Lanka", Journal of Economics and Sustainable Development, 4(9), 147-55.

[2.] Akhter, M. (2015). The Impact of Export and Import on Economic Growth in Bangladesh. World Vision, 9(1).

[3.] Fan, K., & Nie, G. (2013). "Study on China's Import and Export Growth Rate Based on VAR Model", In Proceedings of the 2nd International Conference on Green Communications and Networks 2012 (GCN 2012): Volume 2 (pp. 295-304). Springer Berlin Heidelberg.

[4.] Bas, M. (2009), "Trade, foreign inputs and firms' decisions: Theory and evidence", CEPI1 Worlang Paper Series, 35.

[5.] Jannat, F., Miah, M. R., Faruk, M.O. & Alam, S.(2020). Empirical Analysis of Factors Influencing Economic Growth Rate in Bangladesh. International Journal of Business and Economics Research , 9(2): 78-82
[6.] Jongwanich, J. (2007), "Workers' Remittances, Economic Growth and Poverty in Developing Asia and the Pacific Countries", UNESCAP Working Paper, WP/07/01.
[7.] The World Bank, (2005). Bangladesh Growth and Export Competitiveness, Report No. 31394-BD, Poverty Reduction and Economic Management Sector Unit, South Asia Region
[8.] Ramos, F.F.R (2001). Exports, imports, and economic growth in Portugal: evidence from causality and co-integration analysis, Journal of Economic Modeling, Vol.18, pp.613-623
[9.] Alkhateeb, T. T. Y., Mahmood, H., & Sultan, Z. A. (2016). The relationship between exports and economic growth in Saudi Arabia. *Asian Social Science*, *12*(4), 117.
[10.] Mamun, K. A. Al and Nath, H. K. (2005). Export-led growth in Bangladesh: a time series analysis, Applied Economics Letters, Vol.12, Issues 6, pp.361 –364
[11.] Rahman, M. M., & Shahbaz, M. (2013). Do imports and foreign capital inflows lead economic growth? Cointegration and causality analysis in Pakistan. *South Asia Economic Journal*, *14*(1), 59-81.
[12.] Bangladesh Economic Review, Ministry of Finance, various issues.2005.
[13.] Love, J and Chandra, R. (2005). Testing export-led growth in Bangladesh in a multivariate VAR framework, Journal of Asian Economics, Vol. 15, Issue 6, pp.1155-1168
[14.] Singh, T. and Mehra, D.M. (2014). Remittances and Economic Growth in India: A Time Series Analysis. Pacific Business Review International, 6(10).
[15.] Mehta, D. S. N. (2015). The Dynamics of Relationship between Exports, Import and Economic Growth in India. International Journal of Research in Humanities & Soc. Sciences,3(7).
[16.] Sarkar, M.S.K., Rahman, M. Z., Islam, M.M., Sikdar, M.M.H., & Khan, A. B. (2018). Relationship between Remittance and Economic Growth: Evidence from Bangladesh. American Journal of Trade and Policy, 5(1).
[17.] Sutradhar, S. R. (2020). The impact of remittances on economic growth in Bangladesh, India, Pakistan and Sri Lanka. *International Journal of Economic Policy Studies*, *14*(1), 275-295.
[18.] Gujrati, D. (1995). Basic Econometrics, 3rd Edition, McGraw-Hill