ISSN 2664-3413 (Print) 2664-3421 (Online)
Daffodil International University Journal of Business and Entrepreneurship, Vol. 12, No. 1, PP. 26-41, June 2019

BILATERAL TRADE GAP BETWEEN BANGLADESH AND SOUTH KOREA: THE REASONS AND THE REMEDIES

Md. Azizur Rahman[1], Sayedul Anam[2] and Md. Arif Hassan[3]

[1, 2 & 3]Daffodil International University
Email: anam.ged@daffodilvarsity.edu.bd (Corresponding Author)

Abstract: *The prime focus of this study is to investigate the bilateral trade gap between Bangladesh and South Korea. To find the bilateral trade gap at the outset this paper will investigate total exports and imports between South Korea and Bangladesh and then this study focuses on examining the determinants of total bilateral trade during the period from 1991 to 2020. The study also investigates the strategies through which two countries can improve their bilateral trade relation and can find amicable ways to minimize trade gap. Firstly, the findings reveal that bilateral trade gap increased during the study period of last 30 years. Secondly, the study identifies some determinants namely asymmetry of output, currency risk, comparative advantage and inconsistency of trade friendly environment which led to high bilateral trade gap between the two countries. Finally, this paper suggests some policy recommendations such as hedging of currency risk, increasing Foreign Direct Investment and Research & Development allocations, as well as to create scope for maintaining Gross Domestic Product growth and to increase bilateral cooperation through deliberation amongst high governmental officials and political leaders of the two countries. A model is also developed to forecast the bilateral trade between these two countries in the foreseeable future.*

Keywords: *Forecasting, Import, Export, Bilateral Trade*

1. Introduction

Trade liberalization has become more extensive during the last few decades, mostly in developing and transition economic countries. International trade occurs due to the apparent inadequacy of import, substitute based development strategies and the pressure of government trade policies of different countries. A bilateral trade is the exchange of products between two countries that facilitates trade, investment and economic stability by dropping or removing tariffs, export restraints, import quotas, and other trade barriers. It is evident that liberalization is a requirement of evolution from relatively closed economy to relatively open economies. According to Edwards, (1993); and Grossman & Helpman, (1991) most of the economists agree that open economies rise quicker than their counterparts do. Though most of the studies suggest a positive relation between international trade and economic growth, modern practices reveal that not all trade reorganization have been as booming as expected (Singh, 2010). Bangladesh is a developing country. It has lots of resources. However, due to the lack of capital, technology and proper utilization of our natural resources it is not possible to fulfill all the needs of the country. As a result, it has to depend on international trade. International trade helps a country to establish economic affiliation with other countries. International trade is an essential instrument for industrialization whilst access to foreign exchange is

indispensable for sustained economic development. Since the inception, Bangladesh has made several bilateral trade agreements with different countries. South Korea is one of them. South Korea had recognized Bangladesh in May 1972, within six months of our victory in the War of Independence. Formally the diplomatic relationship between Bangladesh and South Korea were launched on 21-07-1973. Since then, they are maintaining healthy collaboration in trade and investment, technology transfer, human resource development and employment, education and cultural exchange. When South Korea started giving foreign aid, they became significant development collaborator of Bangladesh. South Korea aided Bangladesh in different development fields like energy, telecommunications, education, transportation and HR development. South Korea has now emerged as a major player in the Asian trade because of the fast growth of international trade. For this reason bilateral trade flows between Korea and Bangladesh increased massively. South Korea has a comparative advantage in manufacturing that led to a large amount of imports compared to exports to South Korea by Bangladesh. As a result, the trade balance has got worse and it created a big trade deficit for Bangladesh. This paper derives a model to forecast the future trade deficit and gap between Bangladesh and South Korea. Moreover it finds the reasons and factors for which trade deficits are increasing over the years under study. Therefore to recover the trade deficit and ensure a strong trade relation in future with South Korea, it is obvious for Bangladesh to further strengthen the local ability and invest more in sophisticated and costly goods.

2. Determinants of Bilateral Trade: Evidence Prior to 20th Century.

Firstly, trade determinants are used in a new and up-to-date data set of bilateral trade and other variables of economy from Bangladesh and South Korea. Secondly, it covers the bilateral trading interaction of variables that are substitute for a big data set of bilateral information of previous and post twentieth century information. In this study the most important determinants for bilateral trade are considered briefly. In some empirical studies before 20^{th} century, the main determinants of bilateral trade gave emphasis on distance (Srivastava & Green, 1986). According to Srivastava and Green (1986) bilateral trade and its intensity mainly depends on distance between two countries. Likewise, in our research on bilateral trade determinants we found some studies (Beckerman, 1956; Linnemann, 1966; Smith, 1964; Yeates, 1969) which concluded that countries geographically adjacent to each other are more likely to be involved in bilateral trade. However, ever since Tinbergen (1962) used gravity model very first time to evaluate bilateral trade relationship. After that, this approach has been used successfully by researchers to examine the determinants of bilateral trade flows (Beckerman, 1956; Brada & Mendez, 1983; Drysdale & Garnaut, 1982). Therefore, gravity model and its variation has come into front line with a limited nature of bilateral relation based on trade and distance (Alcaly, 1967; Black, 1971). Nonetheless, it was found that country's bilateral trade relationship largely depends on distance amongst different countries. Moreover, some empirical studies focused on more factors than distance in determining trade relations among nations. According to Linnemann (1966), bilateral and/or international trade significantly depends on GNP, Countries Population, distance and bilateral predilection trade factors. Furthermore, volume of export and imports between two

countries are highly related with countries GNP and distance (Linnemann, 1966). Empirical studies confirm the positive and significant impact of market size on the importing and exporting countries' bilateral trade flows (Bergstrand, 1985; Geraci & Prewo, 1977; Srivastava & Green, 1986). The market size of the importing country indicates its capability to absorb imports; the market size of the exporting country reflects its capability to manufacture products needed by foreign customers. While large home markets are conducive to export of goods produced under increasing returns of scale, small home markets are conducive to export of goods produced under constant returns of scale (Keesing, 1968). The market size of a country also reflects its stage of economic development, and thus its pattern of demand. Trade is more intensive between countries with similar economic structure as in developed countries(Laird, 1967). The log-linear equation typically seeks to explain trade flows between two countries by considering economic factors that can either accelerate or retard these flows.

3. Determinants of Bilateral Trade: Evidence Subsequent to 20th Century.

After 20th century, an irregularity of output growth was found while comparing any two states. Asymmetry or irregularity in output growth is a symbol of demand shocks and potentially the changes in demand have significant impact on international trade. Export increases in one country represents a high aggregate demand on another country (Walti, 2005). Theory of optimum currency originates the asymmetry of output growth (Baxter & Kouparitsas, 2006; De Groot, Linders, Rietveld, &Subramanian, 2004; Filippini & Molini, 2003; McKinnon, 2002; Nguyen & Vo, 2017). Harmonization of trade and business cycle were also highlighted in the previous literature works (Inklaar, Jong-A-Pin, & De Haan, 2008; Nguyen & Vo, 2017; Wang, Wei, & Liu, 2010). Less synchronization between two countries business cycles are the result of higher asymmetric shocks (Babetskii, 2005). Therefore, output growth asymmetry potentially plays a vital role in bilateral trade. On the other hand, the output shock is calculated as the difference between two years shock which varies in the log of GDP. A high dissimilarity of output growth was found between the two countries when the value of this variable is high (Larraín B & Tavares, 2003). in particular, volatility in exchange rate is a form of insecurity that harmfully affect the flows of international trade (Poon, Choong, & Habibullah, 2005). Moreover, according to Nguyen and Vo (2017), differentiating the export product structure can make a comparative advantage in promoting international trade. Figueiredo, Lima, and Schaur (2016) found motivation as the inconclusive evidence involving trade determinants.

Al Mamun and Nath (2005) scrutinized the relation between export and economic growth in Bangladesh using a time series evidences. They used quarterly data from 1976 to2003 for the study and found that export and industrial production were co integrated. Moreover, there was a long-run unidirectional causality from exports to growth in Bangladesh that was found in the result of error correction model (ECM). Chaudhary, Shirazi, and Choudhary (2007) investigated trade policy and economic growth for Bangladesh. Co-integration and multivariate Granger Causality test was used for the period of 1973 to 2002. The outcome strongly supported a long-run relationship amongst

three variables in Bangladesh. It showed the feedback effects of export and output growth along with imports and output growth in short-run. However, Gazi, Sarker, and Hossain (2014) point out some issues, limitations and prospects of India-Bangladesh bilateral trade and recommend some policy measures to recover the trade deficit. Still, there is no such research paper on Bangladesh-South Korea bilateral trade. This paper derives a model to forecast the future trade deficit and gap between Bangladesh and South Korea. Moreover it finds the reasons and factors for which trade deficits are increasing over the years. Thus, to recover the trade gap and sustain a strong trade relation with South Korea in future, it is essential for Bangladesh to reinforce the domestic capacity and invest more in costly and sophisticated goods.

4. Methodology

4.1 Time Series Analysis

ARIMA model is used to perform forecasting. The time series models used in this paper are briefly described. An important parametric family of stationary time series is the Autoregressive Moving Average (ARMA) process and it plays a key role in the modeling of time series data. When a time series is not stationary, usually differencing operations are applied at the appropriate lag in order to achieve stationary. The mean is usually subtracted and an ARMA model is fitted to the data set. A stationary zero mean ARMA (p,q) model is defined as (Brockwell and Davis, 2002) a sequence of random variables $\{X_t\}$ which satisfy, $X_t - \phi_1 X_{t-1} - ..... - \phi_p X_{t-p} = Z_t + \theta_1 Z_{t-1} + ... + \theta_q Z_{t-q}$ for every t and where $\{Z_t\}$ is a sequence of uncorrelated random variables with zero mean and constant varianceσ^2. A process is said to be an ARMA process with mean μ, if $\{X_t - \mu\}$ is an ARMA (p, q) process. A process is called an ARMA (p, d, q) process if d is a nonnegative integer such that $(1-B)^d X_t$ is an ARMA (p, q) process and where B is the usual backward shift operator.

$E(\xi_t / \xi_u, u \lhd t) = 0,\ t \in z$

This model selection also includes the Akaike Information Criterion (AIC), Corrected Akaike Information Criterion (AICC), and Bayesian Information criterion (BIC). The AIC statistic is defined as, $AIC = -2 \ln L + 2(p+q+1)$, where L is the Gaussian Likelihood for an ARMA (p, q) process. On the other hand, the AICC statistic is defined as,

$$AICC = -2 \ln L + \frac{2(p+q+1)n}{(n-p-q-2)}.$$

Since, the AICC criterion has a more extreme penalty than the AIC statistics; it would counteract fitting very large models. The Bayes Information Criterion (BIC) is given by,

BIC= -2 (Log likelihood) +p log (n).

In general, BIC penalizes models with more parameters more strongly than AIC.

5. Results and Discussion

All the data used in this research are collected from the 'South Korea Customs Service' (http://customs.go.kr). In this study, we want to forecast the bilateral trade statistics of Bangladesh and Republic of Korea (S. Korea). The main export items are Agri-products, Frozen Food, Leather, Chemicals, Jute goods, Raw jute, Woven garments, and Knitwear. Import items includes boats and floating structures, Iron and steel, Ships, Paper and paperboard, articles of paper pulp, machinery and mechanical appliances, Plastics and articles thereof, plastering materials, paperboard, Salt, lime and cement, Nuclear reactor, boilers, parts, Zinc and articles, television image and sound recorders, Electrical machinery and equipment and parts, sound recorders and reproducers, and reproducers and parts and accessories of such articles, Cotton (all types), Organic chemicals, Aluminum and articles thereof, Man-made staple fibers, cotton yarn / thread and cotton fabrics, Man-made filaments; strip and the link of man-made textile materials, Knitted or crocheted fabrics, iron and steel, Special woven fabrics, apparel and clothing accessories, not knitted or crocheted, tufted textile fabrics, trimmings, lace, tapestries, embroidery and so on. The yearly data of export and import are given in table-1.

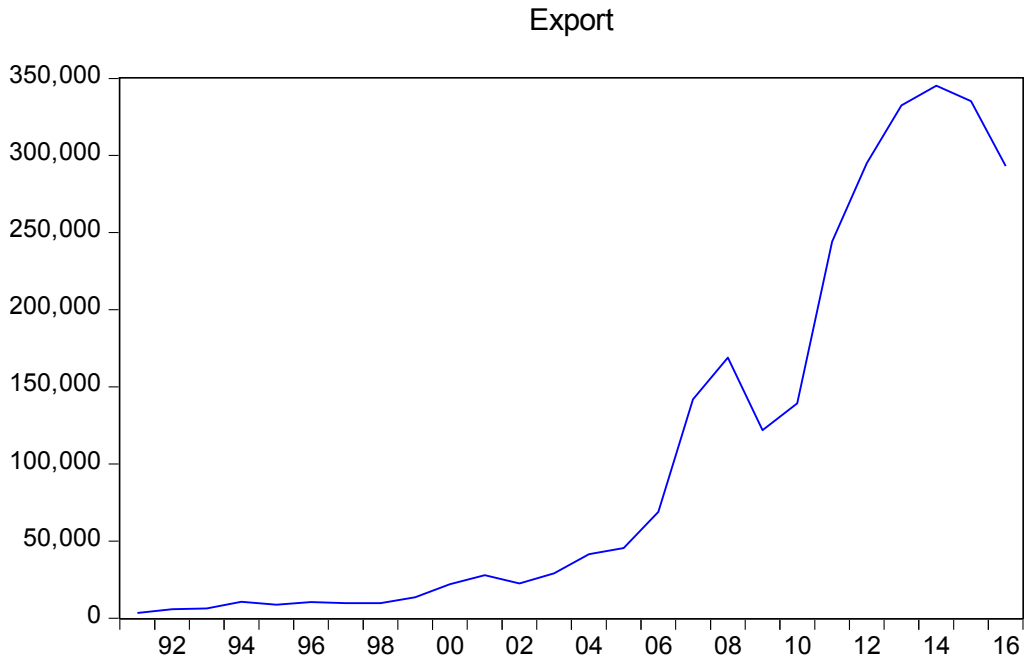
Table-1: Yearly Export Import data ($, '000')

Year	Export	Import	Year	Export	Import
2016	293,111	1,158,421	2003	29,072	544,073
2015	335,263	1,208,794	2002	22,437	505,668
2014	345,309	1,235,935	2001	27,774	654,786
2013	332,478	1,427,204	2000	22,057	626,194
2012	295,048	1,458,891	1999	13,498	509,416
2011	244,204	1,627,620	1998	9,692	500,984
2010	139,301	1,554,316	1997	9,697	587,724
2009	121,944	1,063,847	1996	10,514	517,649
2008	169,034	1,095,016	1995	8,656	567,654
2007	141,820	611,524	1994	10,627	452,378
2006	68,894	648,315	1993	6,325	366,818
2005	45,495	611,136	1992	5,806	332,620
2004	41,500	620,474	1991	3,370	290,716

5.1 Forecasting Bilateral Export

The time graph of export is given fig-1.

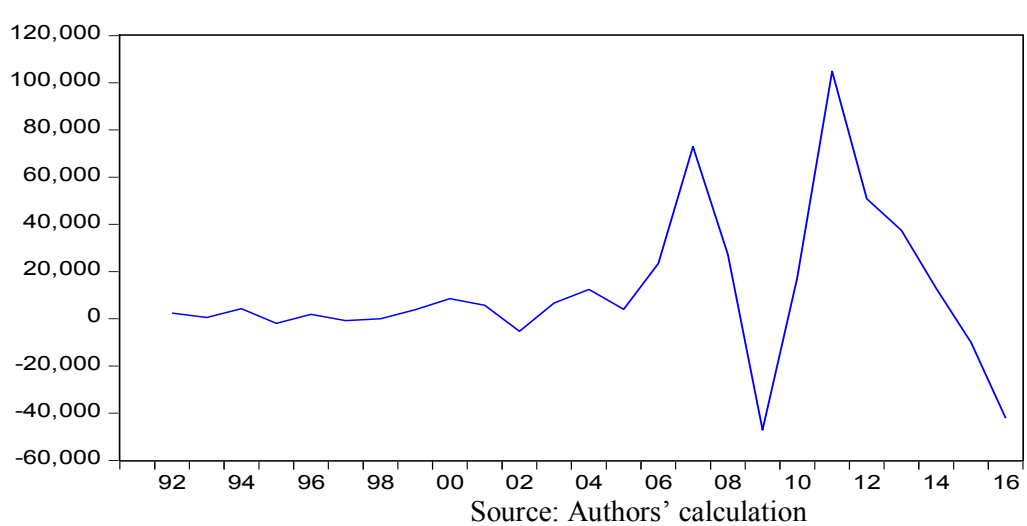
Figure 1: Time graph of export data.



Source: Authors' calculation

In time series analysis it is required that data is to be stationary. From the above graph it is found that the data is not stationary. Hence the data are differenced once at lag1 and the plot is shown in Figure-2.

Figure 2: Lag-1 of export data



Source: Authors' calculation

In lag1, the ADF value is 0.521703 which is less than 3.831511, hence failed to reject null hypothesis at 0.01 critical levels (shown in table-2).

Table-2: Lag-1 table of export data

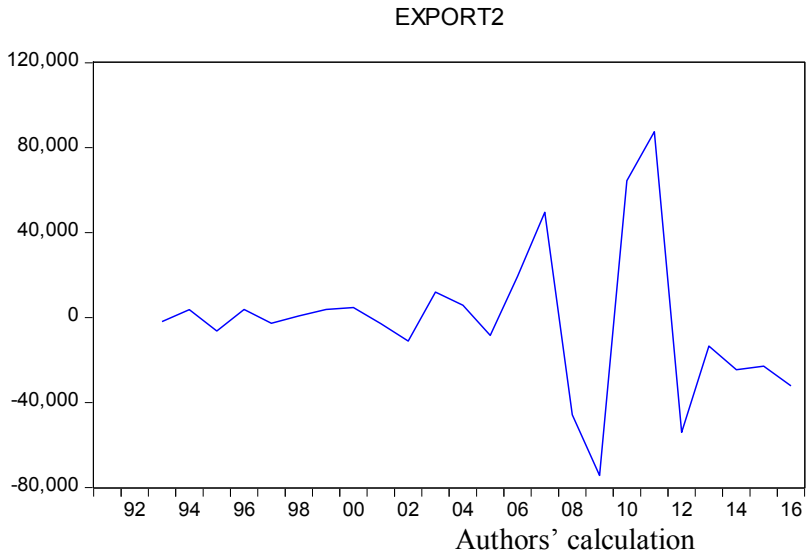
Null Hypothesis: D(EXPORT) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, max lag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.521703	0.9828
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.

Afterward, the study tested ADF once more and it results 5.277342 is quite higher than 3.831511 at 0.01 critical level. Thus the study rejects the null hypothesis. Graph as well as table is shown in table-3 and figure-3. Lastly, it is being established that data set is stationary in lag2.

Figure 3: Graph of export data at lag-2.



Authors' calculation

Table-3: Lag-2 table of export data

Null Hypothesis: EXPORT2 has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.277342	0.0005
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

Based on the stationary data set, we have run correlogram to determine AR order and MA order. As ACF and PACF have to plot out number of significantly high spike. From Table-4, it is identifiable that only one spike is found significantly high in PCF and one spike is found in ACF i.e. it portrait p=1; q=1 [means AR (1); MA (1)].

Table-4: Correlogram table for ACF and PCF

Date: 11/25/17 Time: 06:18
Sample: 1991 2016
Included observations: 24

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.009	0.009	0.0020	0.964
		2	-0.600	-0.600	10.224	0.006
		3	0.052	0.102	10.305	0.016
		4	0.291	-0.119	12.940	0.012
		5	-0.171	-0.150	13.899	0.016
		6	-0.065	0.123	14.046	0.029
		7	0.176	-0.044	15.177	0.034
		8	0.005	0.068	15.177	0.056
		9	-0.149	-0.035	16.096	0.065
		10	-0.014	-0.063	16.104	0.097
		11	0.030	-0.074	16.149	0.136
		12	-0.009	-0.043	16.153	0.184

Subsequently, the stationary data set is ready to run an ARIMA to find out the regression coefficient which is shown in Table-5.

Table-5: Regression Co-efficient

Dependent Variable: EXPORT
Method: ARMA Maximum Likelihood (BFGS)
Date: 11/25/17 Time: 07:28
Sample: 1991 2016
Included observations: 26
Convergence achieved after 13 iterations
Coefficient covariance computed using outer product of gradients

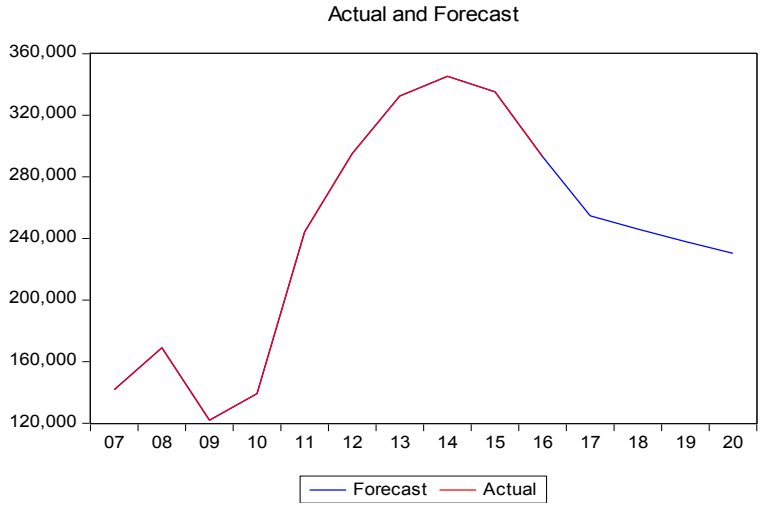
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	118610.7	120315.6	0.985830	0.3349
AR(1)	0.936505	0.096599	9.694754	0.0000
MA(1)	0.752680	0.178776	4.210187	0.0004
SIGMASQ	6.36E+08	1.80E+08	3.526335	0.0019

R-squared	0.956244	Mean dependent var	105881.8
Adjusted R-squared	0.950277	S.D. dependent var	122989.2
S.E. of regression	27424.97	Akaike info criterion	23.57074
Sum squared resid	1.65E+10	Schwarz criterion	23.76429
Log likelihood	-302.4196	Hannan-Quinn criter.	23.62647
F-statistic	160.2614	Durbin-Watson stat	1.640710
Prob(F-statistic)	0.000000		

Therefore, the fitted ARIMA (1, 2, 1) model and the forecasting graph (Fig-4) can be expressed as follows:

$$Y_t = 118610.7 + 0.936505 Y_{t-1} - 0.752680 u_t$$

Figure 4: Forecasted graph

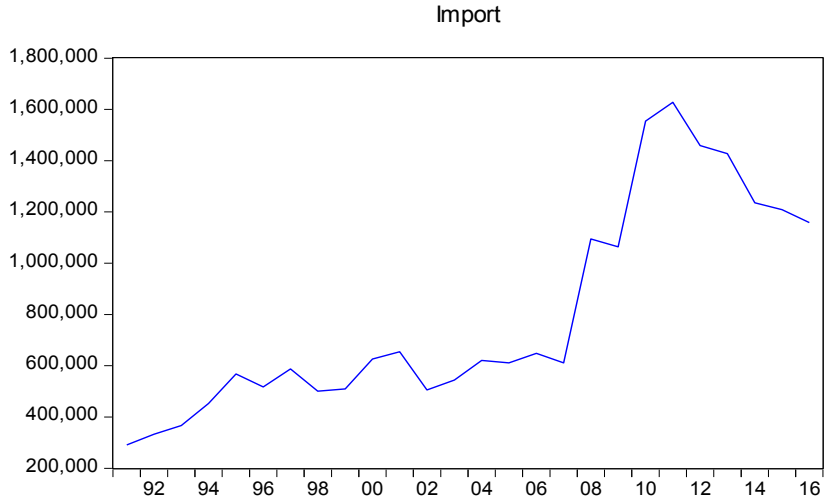


Authors' calculation

5.2 Forecasted Bilateral Import:

The time graph of export is given in fig-5.

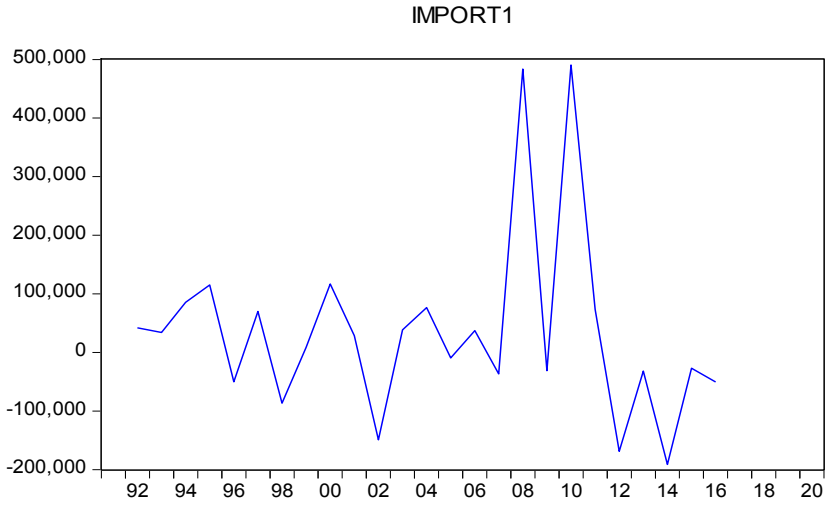
Figure 5: Time graph of import data



Source: Authors' calculation

In time series analysis it is required that data is to be stationary. From the above graph it is found that the data is not stationary. Hence the data are differenced once at lag1 and the plot is shown in Figure-6.

Figure 6: Lag-1 of import data.



Source: Authors' calculation

In lag1, the ADF value is 5.028047 which is greater than 3.737853, hence reject null hypothesis at 0.01 critical level (shown in table-6). It is being recognized that data set is stationary in lag1.

Table-6: Lag-1 table of import data

Null Hypothesis: IMPORT1 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.028047	0.0005
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Based on the stationary data set, we have run correlogram to determine AR order and MA order. As ACF and PACF have to plot out number of significantly high spike. From the data shown in Table-7, it is identifiable that only two spikes are found significantly high in PCF and three spikes are found in ACF i.e. it portrait p=2; q=3 [means AR (2); MA (3)].

Table-7: Correlogram table for ACF and PCF

Date: 11/25/17 Time: 06:57
Sample: 1991 2020
Included observations: 25

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.075	-0.075	0.1570	0.692
		2	0.265	0.261	2.2227	0.329
		3	-0.056	-0.024	2.3197	0.509
		4	-0.241	-0.340	4.1876	0.381
		5	-0.075	-0.102	4.3768	0.497
		6	-0.301	-0.174	7.5911	0.270
		7	0.001	-0.012	7.5912	0.370
		8	-0.162	-0.137	8.6374	0.374
		9	0.002	-0.113	8.6376	0.471
		10	0.015	-0.077	8.6479	0.566
		11	0.054	0.009	8.7901	0.641
		12	-0.133	-0.333	9.7098	0.641

Subsequently, the stationary data set is ready to run an ARIMA to find out the regression coefficient which is shown in Table-8.

Table 8: Regression Co-efficient.

Dependent Variable: DLOG(IMPORT)
Method: ARMA Maximum Likelihood (BFGS)
Date: 11/25/17 Time: 07:02
Sample: 1992 2016
Included observations: 25
Convergence achieved after 143 iterations
Coefficient covariance computed using outer product of gradients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.059512	0.005357	11.11007	0.0000
AR(1)	1.796682	0.082361	21.81459	0.0000
AR(2)	-0.985983	0.037132	-26.55330	0.0000
MA(1)	-2.940658	24.93168	-0.117949	0.9074
MA(2)	2.940578	30.24454	0.097227	0.9236
MA(3)	-0.999919	18.94533	-0.052779	0.9585
SIGMASQ	0.010136	1.829670	0.005540	0.9956

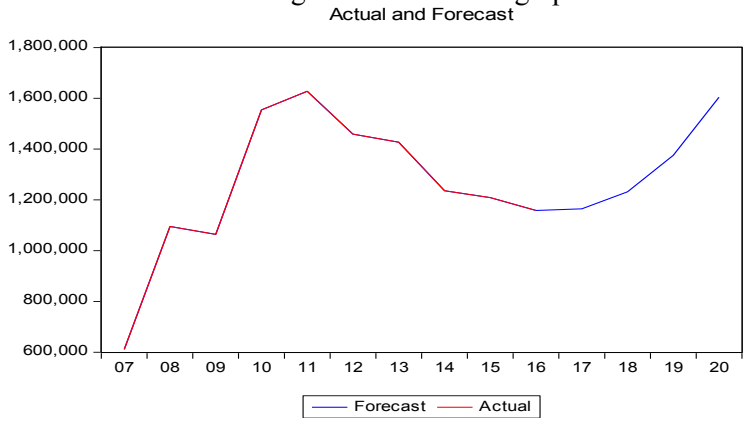
R-squared	0.666521	Mean dependent var	0.055299
Adjusted R-squared	0.555362	S.D. dependent var	0.177932
S.E. of regression	0.118647	Akaike info criterion	-0.621511
Sum squared resid	0.253390	Schwarz criterion	-0.280226
Log likelihood	14.76889	Hannan-Quinn criter.	-0.526853
F-statistic	5.996082	Durbin-Watson stat	1.948178
Prob(F-statistic)	0.001377		

Inverted AR Roots	.90-.42i	.90+.42i	
Inverted MA Roots	1.00	.97-.24i	.97+.24i

Hence, the fitted ARIMA (2, 1, 3) model and the forecasting graph (Fig-7) can be stated as follows:

$$Y_t = 0.059512 + 1.796682Y_{t-1} - 0.985983Y_{t-2} - 2.940658u_t + 2.940578u_{t-1} - 0.999919u_{t-2}$$

Figure 7: Forecasted graph



Therefore, the combined forecasting value and graph are shown in table-9 and figure-8 respectively.

Table-9: Forecasted value of export and import

Year	Export	Import	Year	Export	Import
2020	230399.1	1604382	2005	45,495	611,136
2019	237978.3	1375638	2004	41,500	620,474
2018	246071.5	1232017	2003	29,072	544,073
2017	254713.4	1164520	2002	22,437	505,668
2016	293,111	1,158,421	2001	27,774	654,786
2015	335,263	1,208,794	2000	22,057	626,194
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2009	121,944	1,063,847	1994	10,627	452,378
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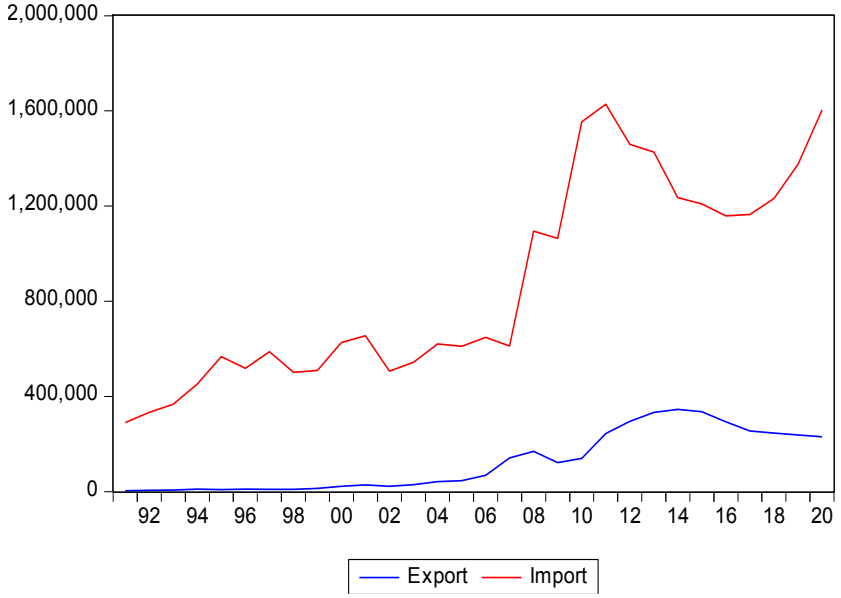
Figure 8: Forecasted graph of export and import



Source: Authors' calculation

6. Recommendations and Conclusion

Trade liberalization became more extensive during the last few decades, mostly amongst developing and transition economic countries. The apparent lack of import substitution based development strategies and pressure of government trade policies of different nations causes international trade. A bilateral trade is the exchange of products between two countries that facilitates trade, investment and economic stability by dropping or removing tariffs, export restraints, import quotas, and other trade barriers. In this study we have examined the trade gap between Bangladesh and South Korea and made a forecasting model for future. In analysis part, firstly we have tested data stationary. And then, based on the stationary data set, we have run correlogram to determine AR order and MA order. As ACF and PACF have to plot out number of significantly high spike. From the data shown in Table-7, it is identifiable that only two spikes are found significantly high in PCF and three spikes are found in ACF i.e. it portraits p=2; q=3 [means AR (2); MA (3)]. Subsequently, the stationary data set is ready to run an ARIMA to find out the regression coefficient and the fitted ARIMA (2, 1, 3) model and the forecasting graph (Fig-7) can be stated with forecasted coefficient. According to our forecasted result it can be concluded that forecasted export will be $246071.5, $237978.3 and $230399.1 in 2018, 2019 and 2020 respectively. On the other hand, forecasted import is showing upward trend from $1232017 to $1604382 in forecasted year 2018 and 2020. According to the graph shown in figure-8, trade gap is forecasted to increase between Bangladesh and South Korea and it is going to widen the bilateral trade gap.

After thorough analysis we can say that bilateral trade is determined by the differences between institutional characteristics of trading partners. Similarly, asymmetry of output growth in determining international trade shows the important role of bilateral trade in different countries (Nguyen & Vo, 2017). Besides, Nguyen and Vo (2017) suggested to use a common currency although exchange rate volatility did not always forecast bilateral trade and need to evade currency risk to reduce the import from South Korea. Comparative advantage is also considered as a significant factor to minimize bilateral trade gap (Filippini & Molini, 2003). Transportation costs are also considered as one the prime factors of trade gap in Asian countries (Wang et al., 2010). Likewise, according to Wang et al., (2010), policymakers should be conscious to create new trade, increase Foreign Direct Investment (FDI) & allocate more R&D budget to create asymmetry of total quality output and to maintain GDP growth to enhance import of the country so that the total bilateral trade gap can be minimized. Last but not the least, the government should create more free trade zone as well as investment friendly environment and arrange some corporate road shows by which trust of foreign traders will be increased. This study will certainly help the export-import trader and government to build up bilateral trade relationship with South Korea. Moreover, the study will significantly help foreign trade practitioners and academic researchers to forecast bilateral import-export business in upcoming days.

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