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Impact of COVID-19 on Major Items of Export and Import in Bangladesh

Mitu Rani Roy[1]
Farin Haider Borsha[2]
Sefatul Karim[3]

Abstract

Though Readymade Garment (RMG) export constitutes about 85% of our total export earnings, Bangladesh is extremely affected as most of its export destinations are badly hurt by COVID-19. This paper has used time series quarterly data from 2011 to 2019 on three export variables and five import variables using snowball sampling technique. This study has employed both a linear (ARIMA) and non-linear (Holt-Winters, Single and Double exponential) model for forecasting the future export and import trends. The findings of forecasted result have shown a drastic fall of export, because of worldwide lockdown, order cancellations, etc., whereas the import forecasted result has shown that the amount of import will decrease slightly but not drastically. This paper has suggested that the RMG sector should increase their production efficiency by adopting modern technology, machinery, efficient labor so that the production cost as well as the amount of import will decrease.

Keywords: RMG, COVID-19, Snowball sampling technique, linear forecasting and non-linear forecasting

1. Introduction

A sustained large trade deficit has been a common phenomenon for the economy of Bangladesh due to weak domestic production base, heavy import dependency, undiversified export basket along with a relatively large size of population. In 2019, trade deficit reached US$15.4 billion which is estimated to be about 5% of the country's GDP due to a substantially higher import payment than export receipts (BB, 2020). However, the recent devastation of the global economy by the

[1] Former student, Department of Economics, Jagannath University, Dhaka-1100, Bangladesh. E-mail: mituroybd44@gmail.com
[2] Former student, Department of Economics, Jagannath University, Dhaka-1100, Bangladesh. E-mail: borshahaider17@gmail.com
[3] Former student, Department of Economics, Jagannath University, Dhaka-1100, Bangladesh. E-mail: sefatulkarimpranto.jnu@gmail.com

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unprecedented COVID-19 pandemic is posing additional challenges to the country's trade performance in the coming years with the border closure, lock-down, shipment problem, etc. Now the question arises as the governments across the world enforced lockdowns to inhibit the expansion of Covid-19, what will be the impact on the world's economies, especially for Bangladesh for which the export destinations faced the hardest hit. The lion's share of Bangladesh's export is confined to the top ten export destinations and they are USA (20%), Germany (15%), UK (11%), Spain (6%), France (6%), Italy (4%), Canada (3%), Japan (3%), the Netherlands (2%) and Belgium (2%) (EPB, 2020). Surprisingly, almost all of our top ten export destinations are ahead in death toll and the infection rate. Bangladesh RMG constitutes about woven (43%), knitwear (42%), whereas other made-up textile articles constitute (3%). Bangladesh's top ten import destinations are China (22%), India (13%), Japan (9%) Singapore (9%), South Korea (7%), USA (6%), Malaysia (6%), Taiwan (5%), Hong Kong (5%) and Indonesia (4%) (BB, 2020). This paper has taken five import variables which constitute about 40% of total import and are highly demanded raw materials for producing the mentioned export commodity. The economy of Bangladesh is being affected due to COVID-19 with both domestic disruptions and poor interconnectedness with the global economy (Khatun, 2020). In order to attain better growth in the economy of a country, modeling and forecasting is the most important tool nowadays (Alfaki & Masih, 2015). As a consequence it has always been a challenge for national trade policy makers to identify the trend of import and export, and to defy the gap between these two (Farooqi, 2014).

This paper has mainly focused on impact of COVID-19 on major items of export and import in Bangladesh, and has tried to forecast the post COVID-19 situation for export and import. To analyze this new phenomenon more intensely, single export and import variable based analysis have been conducted to give a vivid picture for the upcoming years. Economic models can be used to reveal the consequences of pandemics (Baldwin & Weder, 2020). By taking recent data on account and applying economic model both linear (ARIMA) and non-linear (Holt-Winters, Single and Double exponential) this paper aims to reflect on the consequences of COVID-19 on the major items of export and import. It is considered crucial at this moment since the recession in the country is expected to be short-lived than the global financial crisis of 2008 (IMF, 2020). The duration matters greatly for Bangladesh because her economic fate is closely tied to the fate of countries that enable the two R's: Readymade garments (RMG) and Remittance. Again Baldwin and Weder (2020) identified in their research that all major economies like G7 countries who jointly share 65% of the manufacturing of the world, 60% of the world's demand and supply (GDP), and 41% of world exports have been heavily affected by the pandemic and other countries will also affected by these. So it's very important to forecast the future trend of our major items of export and import and to take policies based on them. In this analysis, the study has taken top ten export and import destinations and top three export and the top five import commodity as variables. The main objective of this paper is to forecast and analyze the future trend

of the major items of export and import by using time series data and by applying both linear and non-linear analysis. The remainder of the paper is organized as follows. Following introduction, Section 2 reviews relevant literature. Data sources and methodological aspects are discussed in Section 3. The results of this study are reported in Section 4 and Section 5, while Section 6 draws conclusion and policy recommendations.

2. Literature Review

Very few studies showed the impact of COVID-19 on the major items of export and import. For scrutinizing the impact of COVID-19, this study analyzed the papers that mainly focused on the export and import condition of the whole world, especially Sub-Saharan Africa (SSA) and on Bangladesh.

Kassa (2020) analyzed that the economy of Sub-Saharan Africa (SSA) had already experienced contraction in trade and production, collapse in commodity prices, economic vulnerabilities, supply disruptions, collapse in RMG sector, etc. due to COVID-19 and it will be more devastated if this crisis prolongs.

One study showed the global impact of COVID-19 on the gross domestic product (GDP) and trade and used the Computable General Equilibrium (CGE) model. In this paper, they showed that global GDP is expected to decline by below 2%, while developing countries and high-income countries GDP is expected to decline by 2.5% and 1.9% respectively. They also showed that East Asia and Pacific (EAP) countries will face more GDP losses in this pandemic and exports at the global level expected to decline by 2.5% (Maliszewska et al., 2020).

World Trade Organization (2020) applied the CGE model with three recovery scenarios (V, U and L-shaped) and autoregressive distributed lag (ARDL) equations to show the global trade and GDP. The results showed that, there will be fall in trade by 5%, 9% and 11% in V, U and L-shaped scenarios respectively and GDP by 8%, 17% and 20% respectively. The results have further estimated that the condition of both trade and GDP will be more severe if COVID-19 exist longer.

We explored the literatures showing the impact of COVID-19 on major items of export and import on Bangladesh. One study showed that Bangladesh had already faced a lot of export order cancellation, domestic and international border closures, which actually create the ripple effect in Bangladesh economy and will lessen both of its export and import. The paper showed that Bangladesh will experience about 4 billion USD loss at the end of the last quarter of 2020 (Amit, 2020).

A closer look on Bangladesh by an empirical study of Lalon (2020) showed the possible impacts of economic crisis in the country due to COVID-19. This paper used descriptive analysis and showed that Bangladesh has already faced a lot of challenges such as the falling trend in remittances, RMG, consumer demand, the increase in trade deficit, etc. creating a huge problem for Bangladesh. This paper has suggested that, Bangladesh can defeat this pandemic by two ways; firstly, the country should maintain social distance, follow the shifting system of formal and

informal job industries and achieve hard immunity. Secondly, financial support from the government should be given to the affected formal and informal job industries.

Another empirical study showed the impact of COVID-19 on socio-economic perspective of Bangladesh. This paper based on descriptive study and showed that in every sector like social, economic, industrial, agriculture, service, health, etc., COVID-19 put a lot of pressure. In industrial sector export and import shown drastic fall. The paper also addressed some challenges like social safety, health care facilities, awareness, poverty, etc. and recommended to solve these problems (Begum et al., 2020). In this vein, Alam et al. (2020) developed a conceptual review of economic growth in Bangladesh. This study based on descriptive study and revealed that in all sector COVID-19 has significant impact. This paper showed that the export of goods decreased by 26% in February, 2020 than in January and import also decreased by 12% that are coming from Chittagong Port.

The above explained literatures mainly focus on the GDP and trade on the Sub-Saharan Africa, the world economies and particularly on the economy of Bangladesh and depicting ambiguous effects on the export and import. Therefore, this study can move forward the investigation to forecast and analyze the future trend of the major items of export and import in Bangladesh. The contribution of this paper will help all to know how the COVID-19 may impact the export and import inflow by affecting its determinants. This paper will mainly provide the micro base analysis and forecast, which is rarely done in Bangladesh.

3. Methodology

3.1 Data Sources

For this study export data (quarterly) has been collected from Bangladesh Export Promotion Bureau (EPB) based on available data from year 2011 to 2019. In this analysis the major export items includes woven, knit and other made-up textile articles. Also, import data (quarterly) has been collected from Bangladesh Bank based on available data from the second quarter of 2010 to 2019. Import items includes cotton, machinery and mechanical appliances, mineral fuels and mineral oils, man-made filaments and the knitted or crocheted fabrics. Both export and import data are the summation of top ten export and import destinations from year 2011 to 2019 and the second quarter of 2010 to 2019 respectively.

3.2 Model Specification

This paper has divided the forecasting part into two analyses which are very famous in the forecasting model. One is linear and another is non-linear. In linear analysis the study has used Autoregressive Integrated Moving Average (ARIMA) model and in non-linear the study has used three analyses (Holt-Winters No Seasonal, Single Exponential and Double Exponential). This study has forecasted the export items (woven, knit and other made-up textile articles variables) as well as import items (cotton, machinery and mechanical appliances, mineral fuels, mineral oils, man-made filaments, knitted or crocheted fabrics variables).

3.2.1 Linear Analysis

Box-Jenkins method (ARIMA) has been applied for linear forecasting.

Autoregressive integrated moving average ARIMA Model (p, d, q): The general formula of Autoregressive Integrated Moving Average Models (ARIMA) is written as:

$$y_t = \phi_1 y t_{-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + \cdots + d y_{t-p-d} + \varepsilon_t - p_1 \varepsilon_{t-1} - p_2 \varepsilon_{t-2} - \cdots - p_q \varepsilon_{t-q} \quad (1)$$

Where, y_t= dependent variable at time t.

y_{t-1}, y_{t-2} , … , y_{t-p} = dependent variable at time lags $t-1,\ t-2,\ \ldots,\ t-p$ respectively.

ϕ_1: coefficients to be estimated, as i=1,2,3,….,p , $-1 < \phi_p < 1$

ε_t: the series of random errors, where, $\varepsilon_t \approx N(0, \sigma_\varepsilon^2)$

$\varepsilon_{t-1}, \varepsilon_{t-2}, \ldots . \varepsilon_{t-q}$ = errors in previous time periods that are incorporated in the response y_t.

ε_{t-q}= lags of random errors (MA).

p_i = parameters of moving average model. q = degree model

3.2.2 Non-Linear Analysis

Holt-winters no seasonal: This method is appropriate for the series with a linear time trend and multiplicative seasonal variation. The smoothed series is y_t given by,

$$y_{t+k} = (a + bk)c_{t+k} \quad (2)$$

Where, a = permanent component (intercept)

b = trend

C_t = multiplicative seasonal factor

Single exponential: This single exponential smoothing method is appropriate for series that move randomly above and below a constant mean with no trend nor seasonal patterns. The smoothed series y_t of y_t is computed recursively, by evaluating:

$$y_t = \alpha y_t + (1-\alpha) y_{t-1} \quad (3)$$

Where, $0 < \alpha \leq 1$ is the damping (or smoothing) factor. The smaller is the , the smoother is the y_t series.

Double exponential: This method applies the single smoothing method twice (using the same parameter) and is appropriate for series with a linear trend. Double smoothing of a series y is defined by the recursions:

$$s_t = \alpha y_t + (1-\alpha) s_{t-1} \quad (4)$$

$$D_t = \alpha s_t + (1-\alpha) D_{t-1} \quad (5)$$

Where, s is the single smoothed series and D is the double smoothed series.

4. Results

4.1 Summary of Descriptive Statistics

This study has used the time series export data from 2011 to 2019 (quarterly) and is measured in terms of crore US dollar. There are some missing data in export

where the study manipulated the data by averaging the above and the below quarter of the missing data. Also, the time series import data has been taken from 2010 second quarter to 2019 and is measured in terms of thousand US dollar. Here, the unit of measurement of export and import is different as we analyze export and import differently by forecasting their future trends and both are mutually independent.

Table 1: Summary of descriptive statistics for export variables

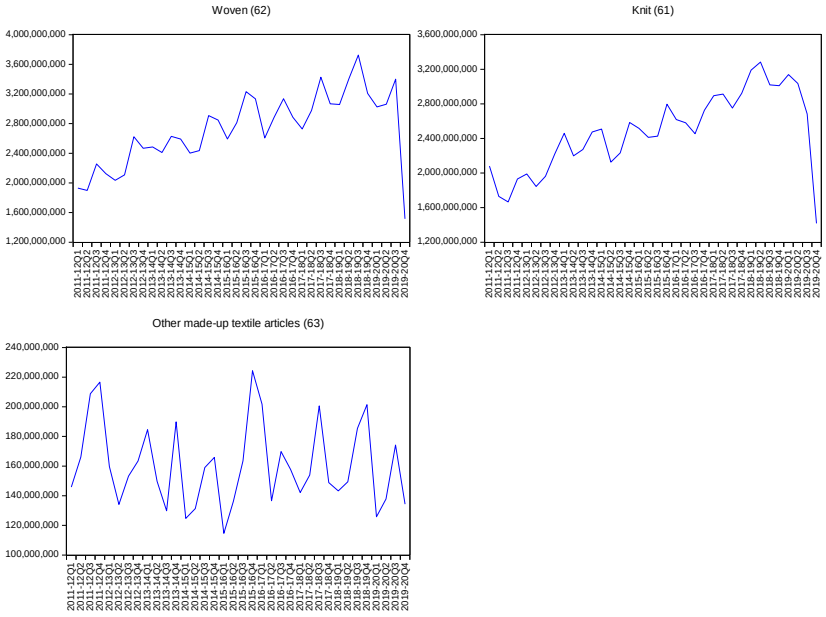
Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	kurtosis
Woven (62)	2.73	2.77	3.73	1.52	4.94	-0.30	2.70
Knit (61)	2.47	2.49	3.28	1.42	4.61	-0.27	2.39
Other textile articles (63)	1.61	1.56	2.24	1.15	2.81	0.60	2.47

Source: Author's calculation

Notes: All export variables are in crore term and in two-digit form of the harmonized system

Table 1 reports summary statistics of the export variables used in the study. Woven ranges from 3.73 to 1.52 crore US dollar. Knit ranges from 3.28 to 1.42 crore US dollar. Other made-up textile articles range from 2.24 to 1.15 crore US dollar. From this descriptive statistics, the largest export earnings are coming from woven (3.73 crore US dollar) compared to knit and other made-up textile articles. On the other hand, other made-up textile article is the lowest earning of about 1.15 crore US dollar.

Figure 1: Time series plots of export variables (2011-2019)



Source: Author's calculation

As shown in Figure 1, it is evident that woven, knit and other made-up textile articles are showing a fluctuation over time till 2019-20Q3 and it decreases in 2019-20Q4, which is actually the initial period of COVID-19 (April-June, 2020). One of the reasons of falling in woven, knit and other made-up textile articles is the cancellation of the orders of export commodity (khan, 2020). Another is the transportation or shipment problems in which the commodity could not reach its destination and at the same time the exporters did not receive their payments (Raihan, 2020). The shut-down of many export industries during the initial COVID-19 period is another reason.

4.2 Unit Root Test and Its Result (Export)

Table 2: Unit root test result (export)

Variables	Level			First Difference		
	ADF	**PP**	**KPSS**	**ADF**	**PP**	**KPSS**
Woven (62)	-1.7215	-2.4399	0.6015*	-1.6383***	-4.4846*	0.3435*
Knit (61)	-1.929***	-0.6037	0.5912*	-2.8232*	-2.8570*	0.2845*
Other textile articles (63)	-5.4461*	-4.8962*	0.1622*	-7.7607*	-14.562*	0.3056*

Source: Author's calculation.

*Notes: All export variables are in two-digit form of the harmonized system and *, **, ***denotes the significance at the 1%, 5% and 10% level. ADF (Augmented Dicky-Fuller), PP(Philips-Perron) and KPSS (Kwiatkowski-Phillips-Schmidt-Shin) tests*

The statistical hypothesis results obtained by performing the ADF, PP and KPSS tests are shown in table 2. The ADF and PP hypothesis tests are based on the null hypothesis taking the time series data of woven, knit and other made-up textile articles which has a unit root whereas the KPSS hypothesis test is based on the null hypothesis that the time series data of woven, knit and other made-up textile articles are stationary. Both knit and woven variables pass the stationarity result of ADF and KPSS in level, but not in the PP. Both knit and woven have stationarity at the first difference at all the ADF, PP and KPSS test. Whereas, other made-up textile articles variable passes the ADF, PP and KPSS test at both in level and in the first difference.

4.3 Model Estimation by Using the Linear Method (Export)

Annex Table A1 reports model estimation by using the linear method (export). In the linear model the study has selected automatic ARIMA. For woven, among the top 20 models, (4,1,2) is the best model because it has lower AIC value. In knit among the top 20 models (3,1,2) is the best model because it has lower AIC value. In other made-up textile articles among the top 20 models (1,0,2) is the best model because it has lower AIC value.

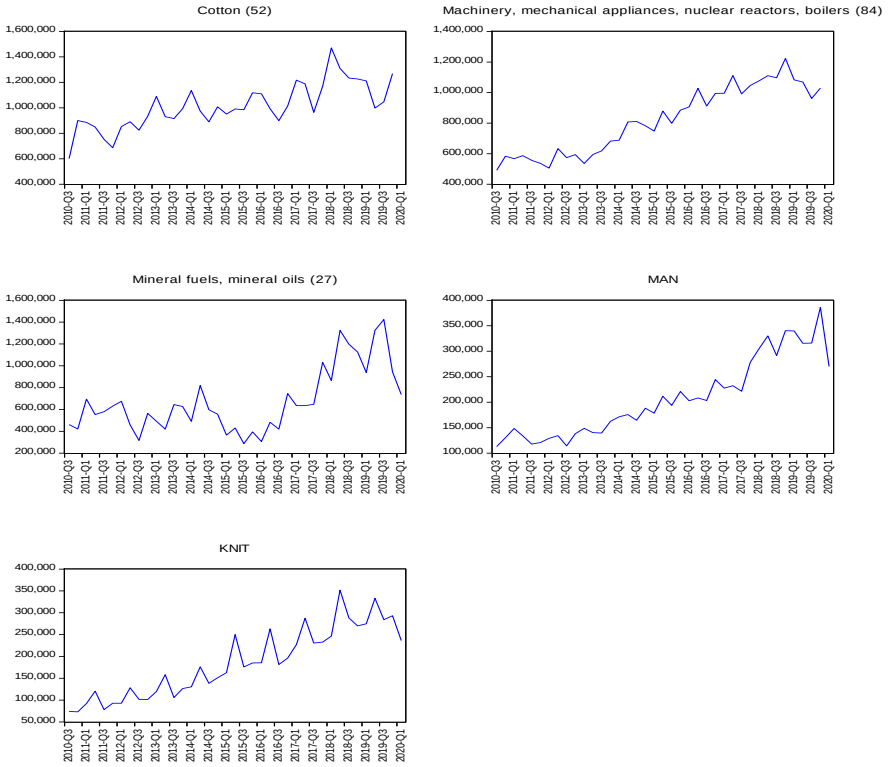
4.4 Model Estimation by Using the Non-Linear Method (Export)

In the non-linear forecast the study has taken the smoothing series, where Alpha is the smoothing parameter. Smaller values of alpha result in more smoothing of the forecast and also mean the exponentially smoothed series is much closer to the original. In woven forecast the smoothing value (alpha) of Holt-Winter, the single

and double exponential value is 0.06, 0.38 and 0.16 respectively. In knit forecast the smoothing value (alpha) of Holt-Winter, the single and double exponential value is 1, 0.99 and 0.51 respectively. In other textile articles forecast the smoothing value (alpha) of Holt-Winter, the single and double exponential value is 0.10, 0.01 and 0.09 respectively. Here among the three export variables woven and other textile articles have showed smoothness (small value of alpha) whereas knit is not as its value is very high.

Annex Table A2 reports summary statistics of the import variables used in the study. Cotton ranges from 1470995 to 600294 thousand US dollar. Machinery mechanical appliances ranges from 1223592 to 491909 thousand US dollar. Mineral fuel and mineral oil ranges from 1424760 to 286192 thousand US dollar. Man-made filaments ranges from 386448 to 112922 thousand US dollar. Knitted or crocheted fabrics ranges from 351941 to 73167 thousand US dollar. Among the five import variables, cotton is the highest and knitted or crocheted fabrics is the lowest amount of imported commodity.

Figure 2: Time series plots of import variables (2011-2019)



Source: Author's estimation

Figure 2 shows the import trends of last nine years. In the figure, the paper has clearly showed that the trends of imports are fluctuating till 2020Q3 but most of the

import variables are showing a declining trend in 2020Q4, which is the initial period of COVID-19. Day by day Bangladesh is becoming hugely dependent on import and the trade deficit condition of Bangladesh clearly depicts the true export and import condition of Bangladesh.

4.5 Results of the Unit Root Tests (Import)

The statistical hypothesis results obtained by performing the ADF, PP and KPSS tests are shown in Annex Table A3. The ADF and PP hypothesis tests are based on the null hypothesis that the time series data of cotton, machinery, mineral fuels, man-made filaments and knit fabrics has a unit root whereas the KPSS hypothesis test is based on the null hypothesis that the time series data of cotton, machinery, mineral fuels, man-made filaments and knitted fabrics are stationary. Cotton, machinery and man-made filaments are stationary at both level and the first difference in ADF, PP and KPSS tests, whereas mineral fuels and oils and knitted fabrics are stationarity at the first difference.

4.6 Model Estimation Using the Linear Method (Import)

Annex Table A4 reports model estimation by using the linear method (import). In cotton among the top 20 models, (2,1,4) is the best model because it has lower AIC value. In machinery, mechanical appliances, nuclear reactors, boilers among the top 20 models (1,1,3) is the best model because it has lower AIC value. In mineral fuels and mineral oils, among the top 20 models (1,0,4) is the best model because it has the lower AIC value. In man-made filaments among the top 20 models (3,1,1) is the best model because it has lower AIC value. In knitted or crocheted fabrics among the top 20 models (4,1,3) is the best model because it has lower AIC value.

4.7 Model Estimation Using the Non-Linear Method (Import)

In the non-linear forecast, the paper has taken the smoothing series where Alpha is the smoothing parameter. Smaller values of alpha result in more smoothing of the forecast and also mean the exponentially smoothed series is much closer to the original. In cotton forecast, the smoothing value (alpha) of Holt-Winter, the single and double exponential value is 0.37, 0.33 and 0.02 respectively. In machinery forecast, the smoothing value (alpha) of Holt-Winter, single and double exponential value is 0.55, 0.63 and 0.27 respectively. In mineral forecast the smoothing value (alpha) of Holt-Winter, the single and double exponential value is 0.60, 0.59 and 0.31 respectively. In man- made filament forecast the smoothing value (alpha) of Holt-Winter, the single and double exponential value is 0.34, 0.55 and 0.15 respectively. In knitted fabric forecast the smoothing value (alpha) of Holt-Winter, single and double exponential value is 0.17, 0.41 and 0.01 respectively. Here among the five import variables cotton, man-made filament and knitted fabric are smoother (small value of alpha) than machinery and mineral (relatively high value of alpha).

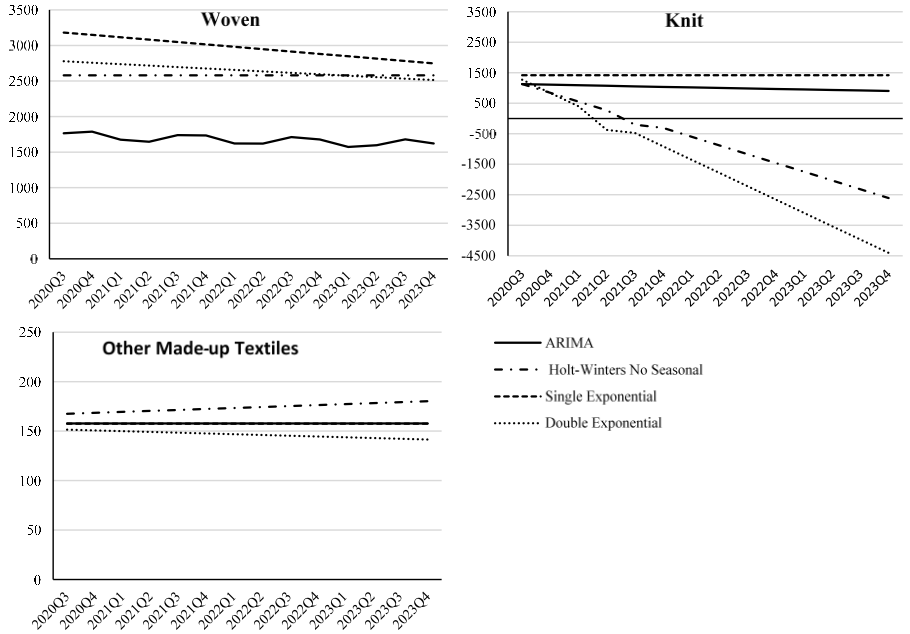
Annex Table A5 shows that the residuals from all equations pass the diagnostic tests in that they do not violate the standard assumptions of normality (Jarque–Bera tests), Q statistic (No Autocorrelation) and homoscedasticity (ARCH test). Both the

export and import variables have no autocorrelation problem and are homoscedastic. But there is some exception that some variables of both export and import are not normally distributed.

4.8 Export Forecast

In figure 3, both linear and non-linear forecasting have been shown. Here, we have converted our forecasted export values in million US dollar. In woven export ARIMA forecast shows the lowest result, where Holt-Winters is higher and both single and double exponential show almost same results. For better comparison the paper has taken 2020Q3 real value of woven from both the Bangladesh Bank and Export Promotion Bureau of top ten export destinations and the values are 2874.35 million US dollar and 5459.32 million US dollar respectively. There is a clear huge difference between the Bangladesh Bank and Export Promotion Bureau data and it is because of the order cancellation. As we know, the Export Promotion Bureau records only orders but not the final exported amount. Whereas Bangladesh Bank records the final export

Figure-3: Linear and non-linear forecast of export variables (in million US$)



Source: Author's estimation

amount. So, in this vein we can say that, Bangladesh is facing huge export order cancellations and this is true for knit and other textile articles export. In this analysis, the ARIMA, Holt-Winter, single exponential and double exponential values for woven in 2020Q3 are 1764.73, 3181.78, 2580.35 and 2777.76 million respectively. The real value of the Bangladesh Bank of 2020Q3 is almost matched with Holt-

Winter, single and double exponential value and near to ARIMA. The real value of woven in 2020Q4 and 2021Q1 collected from Bangladesh Bank are 2584.96 and 2942.87 million respectively. The forecasted results in 2020Q4 and 2021Q1 are almost matched with the Holt-Winter, single and double exponential value and near to ARIMA. Up to 2023Q4 our forecasted results of woven export is fluctuating with slightly increasing and decreasing but not drastically. In knit export, both double exponential and Holt-Winters have shown decreasing trend where both ARIMA and single exponential have shown almost same results which are greater than Holt-Winters and double exponential. The real value of knit export taken from Bangladesh Bank in 2020Q3 is 3355.62 million. In our analysis, the knit forecast result is not so near. In both linear and non-linear analysis and also in the smoothing series the paper won't get any satisfactory result in knit that's why may be our result won't match with the real value. In other textile articles export Holt-Winters shown higher result, double exponential is lower and single exponential is in between them. The real value of 2020Q3 and 2020Q4 of other textile articles export is 187.67 and 206.66 million respectively. In this analysis, all of our forecast results are near to the real value.

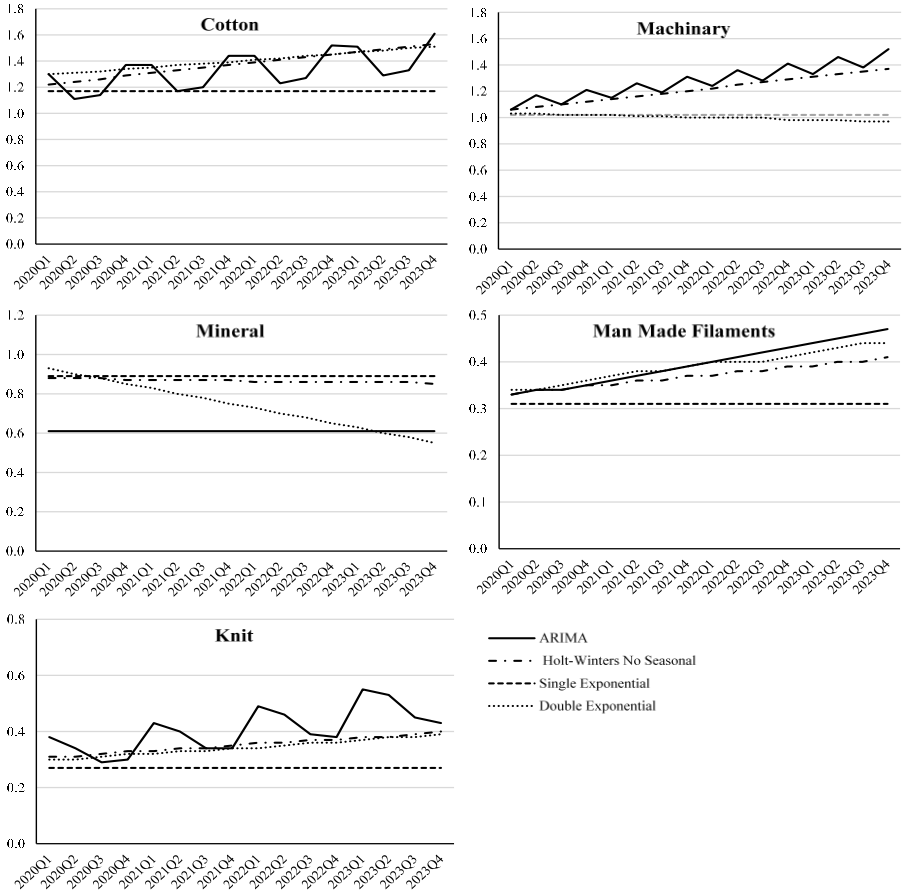
Here one of the reasons of falling export of woven and knit is that the top ten destinations are badly affected by COVID-19. Because of the lock-down, high infection and death rate and exterminatory effects of the COVID-19, most people in the affected country lost their jobs and have no income. As a result, their demands for export commodity have fallen and they consume less than previous (Raihan, 2020). Another reason is that most of the raw materials of export commodity production is imported from outside of the country. Since almost all of the world economies are in lockdown situation, global supply chain has been drastically impeded through labor shortage, raw material processing and shipment problems. Simultaneously, our economy faces the same problem in the field of importing raw materials, making production using them and then exporting these through shipment (LankaBangla, 2020).

4.9 Import Forecast

In figure 4, we have converted our forecasted import values in million US dollar. In cotton forecasting ARIMA is fluctuating and both the Holt-Winter and double exponential forecast have shown same result and single exponential has shown decreasing trend. In machinery forecasting both ARIMA and Holt-Winter result have shown increasing trend. In mineral forecasting double exponential result is decreasing and ARIMA shows lower value, where Holt-Winter and single exponential have shown almost same result. In man-made filament forecast all have shown increasing trend except single exponential. In knitted fabrics forecast ARIMA has shown fluctuating, whereas others have shown almost near results.

It shows higher dependency of Bangladesh on import. Cotton, machinery, filaments and knitted fabrics are highly demanded raw materials for export production and its increasing trend tells us that Bangladesh will be more dependent on importing of the above described commodities from abroad.

Figure 4: Linear and non-linear forecast of import variables (in million US$)



Source: Author's estimation

5. Discussion

In this analysis export forecast has shown drastic fall, especially in woven and knit. The main reason may be that except the two last quarter of woven and knit, all quarters have shown almost same value whereas the last two quarters have shown drastic decline, so the statistical result has been also falling. Whereas, other made up textile articles variable of export have been also falling slightly. There are many reasons for these. One of the reasons is that Bangladesh is relatively a small country to cope up with the shock of global trade. Bangladesh has been suffering from a long peevish drawback of the mounting amount of NPL (Non-Performing Loan) expected to be increased and small export enterprises have forced to close their firms as they are fully dependent on loan, which they may not repay in that pandemic situation. Other reasons are the supply chain problem (shipment), decrease in internal economic investment, weak banking sector (Raihan, 2020).

International Credit Rating, Moody, expects that the RMG sector in Bangladesh will recover by the end of the year, as demand recovers and supply chain shocks will overcome. The result contradicts with this paper result. IMF projects that the total export of Bangladesh in a quarter will be 7 billion. But our projection is contradicting to IMF projection because of the above reasons. Insiders interviewed suggest that if this COVID-19 pandemic continues to affect global supply chains, buyers' demand, and of course health and safety of workers, by Q4 2020, loss in export revenue could reach at USD 4 billion (Amit, 2020) and the forecast is similar to this paper result. Another paper showed that both domestic and international demands declined due to the outbreak and subsequent lockdown. Thus, producers responded by lowering output to minimize the loss, especially in the manufacturing sectors (Siddiquee et al., 2020). The result is similar to this paper's result. Another paper which is descriptive in nature showed that in industrial sector export and import showed drastic fall which is similar to this paper result (Begum et al., 2020). Further (Alam et al., 2020) showed that the export of goods decreased by 26% in February, 2020 than in January and import also decreased by 12% that were coming from Chittagong Port. This result depicts a clear fall in both export and import which is similar to this paper's result.

Here this paper has taken five import variables, which are constituting about 40% of total import for producing the mentioned export commodity and are directly linked to export. That means the materials that we import to produce the export materials. In cotton this study got the (2,1,4) ARIMA model. To take it as the base model, this study is forecasting the next four years import value. The forecasted import value of the first quarter of 2020 has shown declining trend than the immediate past quarter. Cotton, machinery, mechanical appliances and man-made filaments have shown the positive and increasing trend in the forecasted value whereas mineral fuels and oil have seen the same trend. Knitted fabrics has shown fluctuations over the forecasted value. All import variables are seen decreasing slightly but not drastically in the future as they are now affected by COVID-19. One of the possible reasons is that we are mostly importing from China where the COVID-19 was emerged but has no longer effect of COVID-19. China is more diversified now and exporting its product in everywhere. Trading Economies (2020) project that by the end of the 2020, total import amount of Bangladesh will be about ten billion, in where our five import variables amount will be about four billion. Our import forecasted result showed that by the end of the 2020 the import amount of five import variables will be 3.8 billion, which is close to the projections of trading economies. Further, (Rahman, 2020) showed that growth in import payments has been in the negative terrain (-2.2 percent growth in the first seven months of FY 2020) compared to the corresponding period of FY 2019, which is close to this study result.

6. Conclusion and Policy Recommendations

The main objective of this paper is to forecast and analyze the future trend of the major items of export and import by applying both linear and non-linear analysis.

This paper has used time series quarterly data from 2011 to 2019 for export and from 2010 to 2019 for import based on the Export Promotion Bureau and Bangladesh Bank available data set. The study has used both linear (ARIMA) and non-linear (Holt-Winters, Single and Double exponential) analysis for forecasting the future export and import trend. The unit root test by including ADF, PP and KPSS test have utilized to verify the stationary for all the variables. It is found that the export forecast has shown drastic fall, especially in woven and knit as the export destinations are severely affected. Furthermore, labor shortage, raw material processing and shipment problems are turned to be alarming beacon for Bangladesh. In financial year 2019-2020, RMG exports earning declined by 18.12 percent than the previous year. Whereas in Bangladesh, import forecast has shown that the amount of import will decrease slightly but not drastically. This is clearly depicting a huge trade deficit in the near future which may be a big challenge for our economy. Bangladesh has already faced trade deficit and if this continues, Bangladesh won't be able to become a middle income country, unable to achieve SDGs and many other targets and sink into countless debt.

To defeat this negative export trend in future, Bangladesh government should give huge incentives to the affected garments industry for at least 2 to 3 years. Although Bangladesh government has already declared some stimulating packages, it should continue these with equal and fair distribution. Bangladesh should set more trade agreements with less COVID-19 affected countries and expand new export destinations to cope up with the problem. Bangladesh government should concentrate more on Export Development Fund (EDF) and lower the interest rate of EDF. As export has shown the decreasing trend, Bangladesh export industry, mainly RMG, should increase their production efficiency by adopting modern technology, machinery, diversified export baskets Bangladesh should concentrate more on health and education investment to produce better labor so that the production cost will decrease. It may make the country more competitive in foreign markets and thus may convert export as more profitable venture. As shown in the import forecast, the import amount is increasing day by day compared to export and thus creating trade deficit. So Bangladesh should diversify its market by concentrating more on import substitution, investing in human resources, protecting the infant industry, imposing high tariff on import, providing stimulating packages for import substituting industries so that they can produce locally, etc.

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Annex

Table A1: Model estimation by using the linear method (export)

Variables	AR	I	MA	ARIMA
Woven (62)	4	1	2	(4,1,2)
Knit (61)	3	1	2	(3,1,2)
Other textile articles (63)	1	0	2	(1,0,2)

Source: Author's Calculation

Table A2: Summary of descriptive statistics for import variables

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	kurtosis
Cotton (52)	1012623	991975	1470995	600294	178101	0.2024	3.1621
Machinery (61)	818153	808666	1223592	491909	218792	0.0410	1.5899
Mineral oil, fuel (27)	671920	612235	1424760	286192	299667	1.0311	3.1932
Man-made filaments (54)	205742	190932	386448	112922	76199	0.7097	2.3897
Knitted fabrics (60)	183682	175872	351941	73167	79353	0.3588	1.9697

Source: Author's calculation

Note: All import variables are in two-digit form in the harmonized system

Table A3: Unit root test result (import)

Variables	Level			First Difference		
	ADF	PP	KPSS	ADF	PP	KPSS
Cotton (52)	-7.985*	-15.5054*	0.3401*	-7.7796*	-14.9157*	0.4889*
Machinery (61)	-10.243*	-10.693*	0.3013*	-7.9963*	-45.0693*	0.1980*
Mineral oil, fuel (27)	-2.8470	-2.8470	0.1538*	-7.96365*	-8.2399*	0.1953*
Man-made	-8.319*	-11.646*	0.3237*	-10.4987*	-20.9312*	0.2110*

Variables	Level			First Difference		
	ADF	PP	KPSS	ADF	PP	KPSS
filaments (54)						
Knitted fabrics (60)	-2.5695	-16.121*	0.2697*	-3.2257**	-30.1197*	0.1456*

Source: Author's calculation

*Notes: *, **and ***denotes the significance at the 1%, 5% and 10% level. ADF (Augmented Dicky-Fuller), PP(Philips-Perron) and KPSS(Kwiatkowski-Phillips-Schmidt-Shin) tests*

Table A4: Model estimation by using the linear method (import)

Variables	AR	I	MA	ARIMA
Cotton (52)	2	1	4	(2,1,4)
Machinery (61)	1	1	3	(1,1,3)
Mineral oil, fuel (27)	1	0	4	(1,0,4)
Man-made filaments (54)	3	1	1	(3,1,1)
Knitted fabrics (60)	4	1	3	(4,1,3)

Source: Author's Calculation

Table A5: Result of diagnostic checking (export and import)

	Export			Import				
	Woven (62)	Knit (61)	Other made-up textile articles (63)	Cotton (52)	Machinery (61)	Mineral oil, fuel (27)	Man-made filaments (54)	Knitted fabrics (60)
ARIMA	(2,1,4)	(0,1,3)	(1,0,2)	(2,1,4)	(1,1,3)	(1,0,4)	(3,1,1)	(4,1,3)
AR 1	-.1345		.5293	-.0061	-.9595	.6755	-1.2058	-.9538
AR 2	-.9992			-.9998	-.2908		-0.8315	-.9522
AR 3					-.3312		-0.6134	-.9983
MA 1	-.7469	.8057	-.4659	-.4809	.9996	-.1425	.8584	.3455
MA 2	1.9194	.2233	-.5340	.4904		.0585		.4247
MA 3	-.7469	-.5660		-.5096		.2105		.5847
MA 4	.9999			-.4998		.5126		-.4937
C	-.0059	-.0170	18.876	.01301	.0180	66025	.0241	.0332
Q	NO AC	NO AC	NO AC	NO AC	NO AC	NO AC	NO AC	NO AC
J-B Test	78.191	251.99	.3273***	.1264***	1.5519***	10.5017	5.2202**	0.6293***
ARCH	.8937***	.5399***	.9463***	.1290***	.5444***	0.5438***	0.0326***	1.1121***

Source: Author's calculation

*Note: *, **and ***denotes the significance at the 1%, 5% and 10% level*