

Impact of export and import on value addition of ready-made garments sector in Bangladesh

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Abstract. Bangladesh has achieved the prestigious second place among the biggest textile exporters countries. The paper's main objective was to explore the relationship between value addition from ready-made garments with export and import from that sector. The study further focused on the influence of previous exports, imports, and value addition on the current value addition. The study was based on three time series variables, namely export, import, and value addition from ready-made garments of Bangladesh, using data from the Bangladesh Central Bank (Bangladesh Bank) for the years 1994

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to 2020. The time series variables exhibited the unit root problem and were converted to stationary after the first difference, checked by Augmented Dickey-Fuller (ADF) Test. The multiple linear regression model illustrated, on the one hand, a highly significant and positive relationship between value addition and export, on the other hand, a highly significant and negative relationship between value addition and import for the ready-made garments in Bangladesh. Moreover, the paper used the Vector Autoregression (VAR) model to explore the influences of lag values of those three variables on value addition. The results suggested that causation among the variables was significant in the short run, but insignificant in the long run. In conclusion, Bangladesh's ready-made garment industry plays an important role in the economy, and it is prudent to expand manufacturing with more value addition in the future.

Keywords: value addition, export, import, ready-made garments, Bangladesh

JEL Classification: C22, F17, G32

1. INTRODUCTION

Bangladesh has achieved the prestige of being the second biggest textile exporter and one of the leading textile manufacturers in the world (Khan & Ullah, 2017). The ready-made garment (RMG) sector is a prominent contributor to GDP growth, employment generation, and foreign currency inflow in Bangladesh. The Statistics of Bangladesh Garment Manufacturers and Exporters Association (BGMEA, 2020) reported that the RMG sector contributed around 83% of total export earnings with a value of over \$30.61 billion in 2017-2018. Moreover, RMG and the corresponding textile industry generated around 4.5 million domestic jobs in 2018 (Akter, 2019). There is no doubt that the RMG sector contributes significantly more to the Bangladeshi economy than other economic sectors therefore, more attention should be drawn to ensuring the long-term sustainability of such an important sector.

The importance of value-added in the RMG sector is undeniable, as it explains why companies can sell their products for more than they cost to produce. Furthermore, adding values provides consumers with an incentive to make purchases and domestic and foreign enterprises, as well as entrepreneurs, invest their capital in the sector to increase companies' revenue and prestige in the long run (Hoq et al., 2012; Murthy & Madhava Naidu, 2012). The value addition of RMG export during the last seven fiscal years (FY) was above 60% and it reached 64.33% during the 2019 FY (Bangladesh Bank, 2020). In a very broad sense, the value addition to apparel export implies a fair percentage, as it still depends on imported raw materials and accessories, such as cotton, yarns, fabrics, and other raw materials (Rahman et al., 2017). The manufacturing of the primary and intermediate products is linked with capital-intensive industries and the USA, China, the European Union, and Bangladesh import the majority of such production globally (Mehtar, 2020). Nevertheless, the RMG sector requires developed backward linkage industries and Bangladesh ought to consider the competition in terms of its neighbouring countries, for instance, India, Pakistan, China, Vietnam and Thailand. According to Habib (2016), these nearby countries had more robust backward

linkage support (utilization of domestically produced yarns and fabrics). Thus, there has been a gradual increase in RMG production and capturing foreign market demands through exports.

The objectives of the paper are to explore the relationship between value addition from ready-made garments with export and import from that sector and how the current value addition could be influenced by the previous exports, imports, and value addition. Researchers tried to find out the answers to the following research questions: (a) What is the relationship between RMG Value Addition (VA) with RMG Export (EX)? (b) What is the relationship between RMG Value Addition (VA) with RMG Import (IM)? (c) How is the current year's RMG Value Addition (VA) associated with the previous year's EX, IM, and VA?

The multiple linear regression model illustrated a highly significant and positive relationship between value addition and export on one side; however, there was a highly significant and negative relationship between value addition and import for the ready-made garments in Bangladesh. Finally, the paper concluded by postulating the Vector Autoregression (VAR) model to explore the influences of lag values of those three variables on value addition. The chapters had been designed in five sections, such as the problem statement, research objectives, research questions as well as hypothesis had been explained in the introduction, the second section contained problem formulation by reviewing the literature of other experts, unsolved issues, and formulation of the problem solved in this paper, the third section accommodated the description and verification of the method, then section four demonstrated the results and finally discussion and conclusion.

2. LITERATURE REVIEW

2.1. An overview of RMG value addition

The value addition from the RMG sector of Bangladesh was demonstrated by a trifling number of papers, typically, Dowlah (1998) explained the contribution of the RMG sector and how it added value connecting with the effects of the Agreement on Textiles and Clothing (ATC) of the Uruguay Round under GATT 1994, low price of Bangladesh apparel products attracted export in the global market (Berik & van der Meulen Rodgers, 2009), how entrepreneurs contributed to stimulate RMG value addition (Shoma, 2017), the value addition was higher than human resource in Bangladesh between 2013 and 2017 (Chowdhury et al., 2018), and geographical diversification created an opportunity for creating value in the RMG sector in Bangladesh (Hossian et al., 2019). Although Bangladesh's RMG sector has a crucial and dominating role in the world market, the research areas on prospective value addition and future growth have been ignored by researchers. Other competitive neighbouring countries, for instance, Pakistan has a significant amount of research work on the Pakistani RMG sector's value creation (Ahmed, 2008; Hanif & Jafri, 2008; Khan & Khan, 2010; Kazmi & Takala, 2014; Ahmad & Mohammad, 2019; Javed & Atif, 2019), the export value of Iranian textile was insignificant with a constant trend (Shafaei, 2009), India with an expectation to capture the global market by increasing number of units into value addition fields (Chavan, 2001), on the other hand, Kelegama (2009) recommended to high value-added products in Sri Lanka. One significant finding was from the study of Wan Ahmad et al. (2007), refereeing the textile industry as a "waste saving" industry. While these nations also implied very insignificant creating value through exports.

The textile or ready-made garment sector of these economies is in a vulnerable situation due to several internal socio-economic crises, such as scarcity of raw materials, devaluation of the local currency, excessive external debt, and political instability. However, researchers understood the revitalization of the sector and contributed studies on how to increase the export of the textile and apparel industry, backward linkage production through domestic raw materials, and structural changes. Part of the studies was based on empirical analysis by running through time-series data and preparing a forecast. There was an identical case in Bangladesh regarding the availability of data on value addition.

2.2. Time series analysis from RMG data

There were only a few papers on determining the relationship among different factors in the garments sector, such as garments labour productivity, export earning, export competitiveness, economic growth, textile sector, and CO2 emission (Islam, 2020). We found regarding Bangladesh's RMG export and economic growth that the autoregressive distributed lag model was used to interpret the direction level of those two variables. The results illustrate that RMG export had significantly improved the economic growth rate both in the short and long run. Moreover, there were other papers found in the determination of measuring associations of the RMG sector and other factors, such as labour productivity, export competitiveness, economic growth and textile industries, environmental impacts from textile and clothing industries, and so on. The studies were conducted from the neighbouring Asian countries of Bangladesh, for instance, India, China, Egypt, Pakistan, Indonesia, and Vietnam.

Table 1

Literature of causality relationship regarding different textile-related industrial variables. Source: own research

Author (s)	Data	Study area/ region	Method	Findings
(Dhiman & Sharma, 2019)	Secondary data (1991 to 2017) include the Ministry of Commerce, Government of India (GoI); Ministry of Textiles, GoI; Monthly Statistics of Foreign Trade and others.	India	Johansen and Juselius test Granger causality test Vector Error Correction Model (VECM)	No long-run or short-run causality runs from the independent variable (labour productivity) to the dependent variable (Export competitiveness).
(Islam, 2020)	Time series annual data (1986 to 2018) from the World Bank (2019).	Bangladesh	Autoregressive Distributed Lag (ADRL)	The RMG export earning significantly improves the economic growth rate both in the short run and long run.
(Torayah, 2011)	Secondary sources, from 1980-to 2008	Egypt	Cointegration analysis and Error Correction Model (ECM)	Long-run circular causality between manufactured exports textile and economic growth.
(Haseeb et al., 2020)	Quarterly data of the percentage of manufacturing covered by the Textile and Clothing sector and CO2 per capita from the period 1990–to 2018.	China, India, Pakistan, Indonesia, and Vietnam	Innovative Quantile-on-Quantile (QQ) regression and Granger causality in quantile methods	Significant asymmetric behaviour in the quantiles of textile and clothing industry on the quantiles of CO2 emission in the considered economies.
(Khaliji et al., 2020)	Time series data from 1972-to 2006	Pakistan	Regression Analysis	Pakistan was dependent on low value-added textile export products since 2006 and it caused Pakistan less competitive in the world.
(Mehtar, 2020)	Annual reports of companies (from 2003 to 2016)	Pakistan	Descriptive statistical models and multiple linear regression models	Devaluation of domestic currency encouraged textile value addition. Large-scale investment was required to increase value addition.

Source: own compilation

2.3. A proposition for further research on long term sustainability and causality issues

Feil et al. (2019) studied a literature review of high impact factor papers from 1998 to 2018; while, and it was found that around 30 indicators can be used to measure an industrial sustainability trend. The endogenous and exogenous environment of the industry, and social and economic factors are significant indicators to measure the industry's longevity. Also, Trianni et al. (2019) illustrated 18 indicators to measure industrial sustainability from 26 small and medium manufacturing enterprises across Germany and Italy. Economic, social and environmental pillars are discussed for the measurement of sustainability in Trianni et al. (2019), Chang et al. (2018), Epstein et al. (2017), and Erol et al. (2009). Besides, environmental management practice and company performance indicators, such as financial, operational, innovation, environmental and social, had been given importance by Chen (2015). Chowdhury et al. (2019) mentioned sustainable energy consumption in Bangladesh's industrial sector by employing energy, exergy and sustainability analyses. For instance, numerous indicators had been determined: sustainability index, depletion number, energetic renewable share, cumulative exergy loss, and non-renewable energetic share to establish a connection between exergy analysis and sustainability of the industrial sector.

Roos et al. (2016) studied the sustainability issues of the Swedish apparel sector and used a life cycle assessment-based approach where interventions appeared sufficient to set the environmental target; however, it was difficult to measure social sustainability due to lack of data. Kumar and Chowdhury (2020) also used the life cycle assessment approach to measure the environmental impacts of textile products. Connell and Kozar (2014) discussed the knowledge and attitudes of consumers regarding the production, consumption, and distribution of clothing.

Researchers tried to solve the following hypothesis integrated RMG export (EX), RMG Import (IM), and RMG Value Addition (VA).

Hypothesis 1: VA has a positive relationship with EX because the higher EX will add value and it turns vigorous performance of the firms. It strengthens the percentage share of GDP growth and incites internal production.

Hypothesis 2: There is a negative relationship between VA and IM as the higher IM reduces VA. The business firms require extensive expenses for purchasing backward linkage products, intermediate goods or raw materials, transaction costs of imports, tariffs, and others. It is prescribed to produce these domestically and possibly intra industry or intra firm production.

Hypothesis 3: The prevailing value addition of the RMG sector is positively related to lag period export $EX(t-1)$, and value addition $VA(t-1)$ but negatively related to previous import $IM(t-1)$. The interpretation of this hypothesis would be that present $VA(t)$ is stimulated by previous periods $EX(t-1)$ and $VA(t-1)$.

3. METHODOLOGY

3.1. Data

The data was collected from the Central Bank of Bangladesh, called the Bangladesh Bank. There reveal hardly any sources providing the time series data for RMG value addition. The data set was available for the period from 1994 to 2020. We used the merchandise exports from Readymade Garments (including Knit Wear & Hosiery) and the importation of textile-related intermediate products from abroad (cotton, yarn, textile, and articles thereof for the Garments sector). The value addition from the RMG sector was derived by subtracting the export for RMG and import for RMG production.

3.2. Methods

To recall our objective, the study focused on the affiliation of value-added with export and import and how the VA was associated to lag period export, import, and itself for the ready-made garments of Bangladesh. Whilst the time series data was tested for stationary. The time series variables (EX, IM, and VA) were transformed to logarithmic form, respectively, Ln (EX), Ln (IM), and Ln (VA), and checked for stationery by using the Augmented Dickey-Fuller (ADF) test at the base level. While it does not stationary at the base level, it requires to differentiate by orders to resolve the unit root problem and it would be ready for estimating the multiple linear regression model and vector autoregression. In the methodology, we try to discuss the formulas and models we used in our analysis (table 4 illustrated the results which were more details of the methodology formula).

3.3. Time series properties and identification of the unit root problem

According to Shresta and Bhatta (2018), time-series data is termed stationary if its value tends to return to its long-run average value and it must follow three essential criteria, suppose to a time series variable Y_t , such as:

The mean value of the time-series data is constant.

$$E(Y_t) = E(Y_{t-s}) = \mu, \text{ for some } s > 0 \quad (1)$$

The variance of the time series data is also constant.

$$Var(Y_t) = Var(Y_{t-s}) = \sigma_y^2 \quad (2)$$

There is no seasonality of the data set. That means the pattern or cycle of the data must not repeat regularly over time.

$$Cov(Y_t, Y_{t-s}) = \gamma_s \quad (3)$$

Where,

$E(Y_t)$ = Expected value of Y at period t.

Var = Variance, the variation or spread of Y_t from $E(Y_t)$

Cov = Covariance, the joint variation of Y_t and Y_{t-s}

Y_{t-s} = Lag of Y up to period $t - s$

If a time series variable does not pursue the characteristics, it is called non-stationary time-series, and it is said to have a unit root.

3.4. Model 1: Multiple linear regression model

The multiple linear regression model allows various terms in a mean function rather than having only one intercept and one slope in a simple linear regression model (Weisberg, 2005) or an extension of ordinary least-squares (OLS) regression because the multiple regression model contains more than one explanatory variable. It is a sophisticated way to demonstrate the macroeconomic relationship between one dependent variable and several explanatory variables. For instance, it was applied to measure the consequences of macroeconomic variables on the RMG export growth in Bangladesh (Shimu, & Islam, 2018), and the determinants associated with the location of a manufacturing industry (Spiegelman, 1968).

Since the time-series data set of EX, IM and VA had a unit root problem and it had been solved after the first difference, we postulated our multiple linear regression model as follows:

$$d.Ln(VA) = \alpha + \beta_1 d.Ln(EX) + \beta_2 d.Ln(IM) + u_t \quad (4)$$

where, $d.Ln(VA)$ = first difference of log value addition of RMG sector

$d.Ln(EX)$ = first difference of log export of RMG sector

$d.Ln(IM)$ = first difference of log import of RMG sector

α = intercept of the model

β = coefficients

u_t = error term

Model 2: Specification of the VAR Model

Vector Autoregressive (VAR) model accedes to the relationship between multiple quantities which change over time. In essence, it acknowledges the feedback or reverses causality among the dependent and independent regressors applying their past values. There is no exogenous variable but all the regressors are assumed endogenous in a general VAR model. The determination of appropriate lag length is a crucial part of VAR modelling (Shresta & Bhatta, 2018). In our estimation, we used Akaike Information Criteria (AIC) and the VAR Model of the three variables, respectively are $d.Ln(EX)$, $d.Ln(IM)$ and $d.Ln(VA)$ is as follows:

$$d.Ln(VA)_t = \vartheta + \sum_{i=1}^{k-1} \beta_i d.Ln(EX)_{t-i} + \sum_{j=1}^{k-1} \varphi_j d.Ln(IM)_{t-j} + \sum_{m=1}^{k-1} \phi_m d.Ln(VA)_{t-m} + U_{1t} \quad (5)$$

Therefore, the dependent variables in the VAR model are a function of its lag values and other variables' lag values in the model.

Where,

$K-1$ = the lag length is reduced by 1.

$\beta_i, \varphi_j, \phi_m$ = short-run dynamic coefficient of the models for the adjustment of long-run equilibrium.

U_{1t} = the stochastic error terms.

$d.Ln(EX)_t$ = the log value of RMG export at the period t.

$d.Ln(IM)_t$ = the log value for purchasing textile products from abroad at the period t.

$d.Ln(VA)_t$ = the log value of RMG value added at the period t.

4. EMPIRICAL RESULTS AND DISCUSSION

In this section, the results are demonstrated by using (R studio, R version 4.0.3, 2020-10-10) and the tools for discussion about the core results were descriptive statistics, checking the stationary characteristics, derivation of the multiple linear regression model, and vector autoregression. Finally, the reliability checks are conducted.

4.1. Descriptive statistics

Table 2

Summary statistics (Domestic Currency in Bangladesh, Taka in 10 Million).

Variables	Minimum	Median	Mean	Maximum	Obs
EX	5646	51891	75739	212357	27
IM	4324	23013	32007	84271	27
VA	1322	28878	43732	128086	27
Ln(EX)	8.639	10.857	10.693	12.266	27
Ln(IM)	8.372	10.044	9.976	11.342	27
Ln(VA)	7.187	10.271	9.957	11.760	27

Source: own calculation from the Bangladesh Bank (2020)

The descriptive statistics imply that there is a huge gap between the maximum and minimum values for each variable (EX, IM, and VA). Besides, the mean and median values are non-identical. That means the expansion of the RMG sector is a recent phenomenon, for instance, the highest export, import, and value addition was in 2019 before the covid-19 pandemic. The moving average trend explained that after 2012 the value addition became robust although the export growth was attractive to be appeared (Appendix A1).

4.2. Unit root problem

To remove the unit root problem of EX, IM, and VA, we use the logarithm of each variable. The plot diagram suggests there is a unit root for each variable (Appendix A2) as well as table 2.

Table 3

The Augmented Dickey-Fuller test

Time series variable	Dickey-Fuller value	Optimum order	Lag	p-value	Decision on stationarity
Ln (EX)	-0.25838	1		0.9855	Non-stationary
Ln (IM)	-1.4079	1		0.7985	Non-stationary
Ln (VA)	-0.20129	1		0.988	Non-stationary
d. Ln (EX)	-4.0267	1		0.02232	Stationary
d. Ln (IM)	-3.78	1		0.03715	Stationary
d. Ln (VA)	-5.0963	1		0.01	Stationary

Note: d. denotes the difference

Source: own calculation

The Augmented Dickey-Fuller (ADF) test also suggests that there is a non-stationary trend at the base level of each time series variable, and the optimum lag selection criteria are determined by the Akaike information criterion (AIC); the smaller the lag, the more fit for the data set (Ivanov & Kilian, 2005). The diagrams (2-7) in Appendix A2 and A3 represented the transformation of non-stationary time series data into stationary which was conceivable after the first differences.

4.3. Estimations of the Models and Discussions

Table 4 illustrated two models, the multiple linear regression model, and the vector autoregressive model. Firstly, the dependent variable d.Ln(VA) had positively related to d.Ln(EX) and negatively related to d.Ln(IM). That means value addition of the RMG sector in Bangladesh has directly connected to the export of apparel products, greater value addition is prescribed from the export of garments products abroad while the import of garments accessories is discouraged for a healthy value addition trend. The results are significant in both cases of export and import. Moreover, the overall model 1 is also significant with a highly fitted R-square value (0.9343).

The second model for vector autoregression suggests an identical direction as like multiple linear regression model with a highly significant value of the coefficients. However, the d.Ln(VA) is insignificantly related to its lag values, such as d.Ln(EX) t-1, d.Ln(IM) t-1 and d.Ln(VA) t-1. The overall VAR model is also significant with a highly fitted R-square value (0.9449). The implication of the results represents that in the short run the result is significant but in the long run the results are insignificant. In the short and long run, both models have approximately identical significance levels and directions for d.Ln(EX) and d.Ln(IM).

Table 4

Estimation results of regressed variable d.Ln(VA)

Variable	Model 1	Model 2
Intercept	-0.00313 [-0.238]	-0.002157 [-0.117]
d.Ln(EX)	2.09095*** [16.89]	2.190559*** [13.980]
d.Ln(IM)	-0.98756*** [-9.650]	-1.075660*** [-8.771]
d.Ln(EX) t-1		-0.195362 [-0.422]
d.Ln(IM) t-1		-0.042106 [-0.166]
d.Ln(VA) t-1		0.143571 [0.689]
F-Value	163.5***	65.17***
R-Square	0.9343	0.9449
Obs.	26	25
White-Test	0.09786	0.5729

Note: *, **, and *** are the significant level at 10%, 5% and 1%, respectively

Source: own calculation

The normality test of the model was done by the Jarque-Bera normality test and plot diagram of residuals, the result suggests the models are normally distributed and White-Test results depict not very small values, so we cannot reject the null hypothesis of constant variance of residuals. The Augmented Dickey-Fuller test removes autocorrelation from the series after the first difference of each variable and variables become stationary (Table.3).

The paper's main objective is to explore the relationship between value addition from ready-made garments with export and import from that sector. The study objective further focused on how the current value addition could be contributed by the previous exports, imports, and value addition. From the objectives, it is obvious that the present study would focus a wider investigation on the value addition of the Bangladesh RMG sector as it had very scant attention before. On the other hand, the scientific literature got eminent exercise on RMG growth, contribution to GDP and Export earnings by Mia and Akter (2019), Adnan, Rakib and Rahman (2015), Rahman and Siddiqui (2015), Akterujjaman (2013), Hossain (2012) and Berik and Rodgers (2009), challenges in working places, women empowerment, and other social issues by Islam, Rakib & Adnan (2016), Adnan, Rakib, & Rahman (2015), Hossain (2012).

On one hand, value-added by the RMG sector of Bangladesh had been less refereed by researchers, on the other hand, the unavailability of time series data from prominent secondary sources was found, like Bangladesh Garments Manufacturers and Exporters Association (BGMEA), Bangladesh Knitwear Manufacturers Exporters Association (BKMEA), and Economic Review of Bangladesh. Eventually, Bangladesh Bank (2020) data had compiled both periods wise export of RMG and import of cotton, yarn, textile, and articles thereof for the Garments sector. The value-added had been determined by the subtraction of export and import of RMG in the present paper. The results imply in the present study significant in the short run and exhibit insignificant causation among the variables in the long run. While Islam (2020) identified that RMG export earnings significantly improve economic growth rates in both the short and long run, Torayeh (2011) found that long-run circular causality between manufactured exports textile and economic growth was important, and Mehar (2020) ended up finding that large-scale investment

was required to increase value addition. It is undeniably a crucial component for Bangladesh, but there are evidence to guide policymakers in understanding the importance of being cautious about the sustainability of the value addition in future. As a result, Bangladesh's ready-made garment industry plays an important role in the economy, and it is prudent to expand manufacturing with more value addition in the future.

5. CONCLUSION

Undoubtedly, the ready-made garment sector is one of the lifelines of Bangladesh's economy. Intensive care is required for the development of value addition, export, and import substitution. It is a matter of concern that this sector must need to flourish for a more extended period. Therefore, a solid revision is required to be implemented by the policymakers for the overall structural development of the RMG sector in Bangladesh.

The study tried to interpret the time series data and there was found unit root problem and solved after the first difference. The multiple linear regression model illustrated a highly significant and positive relationship between value addition and export on one side; however, there was a highly significant and negative relationship between value addition and import for the ready-made garments in Bangladesh. Finally, the paper concluded by postulating the Vector Autoregression (VAR) model to explore the influences of lag values of those three variables on value addition. Nevertheless, the VAR estimates of $d.Ln(VA)$ are insignificant with the lag values of $d.Ln(EX)$ t-1, $d.Ln(IM)$ t-1 and $d.Ln(VA)$ t-1. The implication of the results represents that in the short run the result is significant but in the long run the results have insignificant causality among the variables. Hence, Bangladesh's ready-made garment has an indicative role in the economy, and it ought to be prudent in elaborating the manufacturing with greater value addition in the future.

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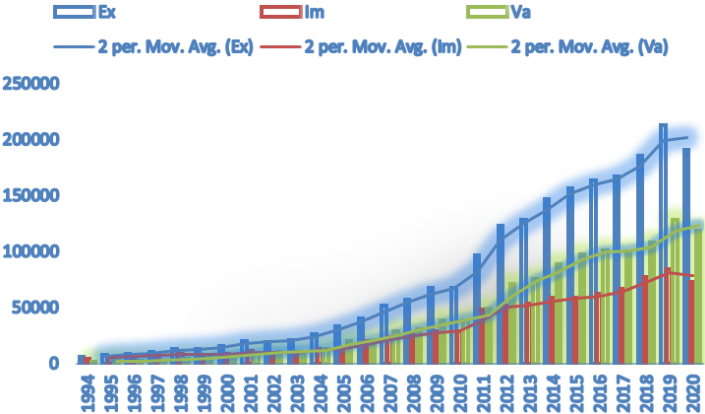
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APPENDIX

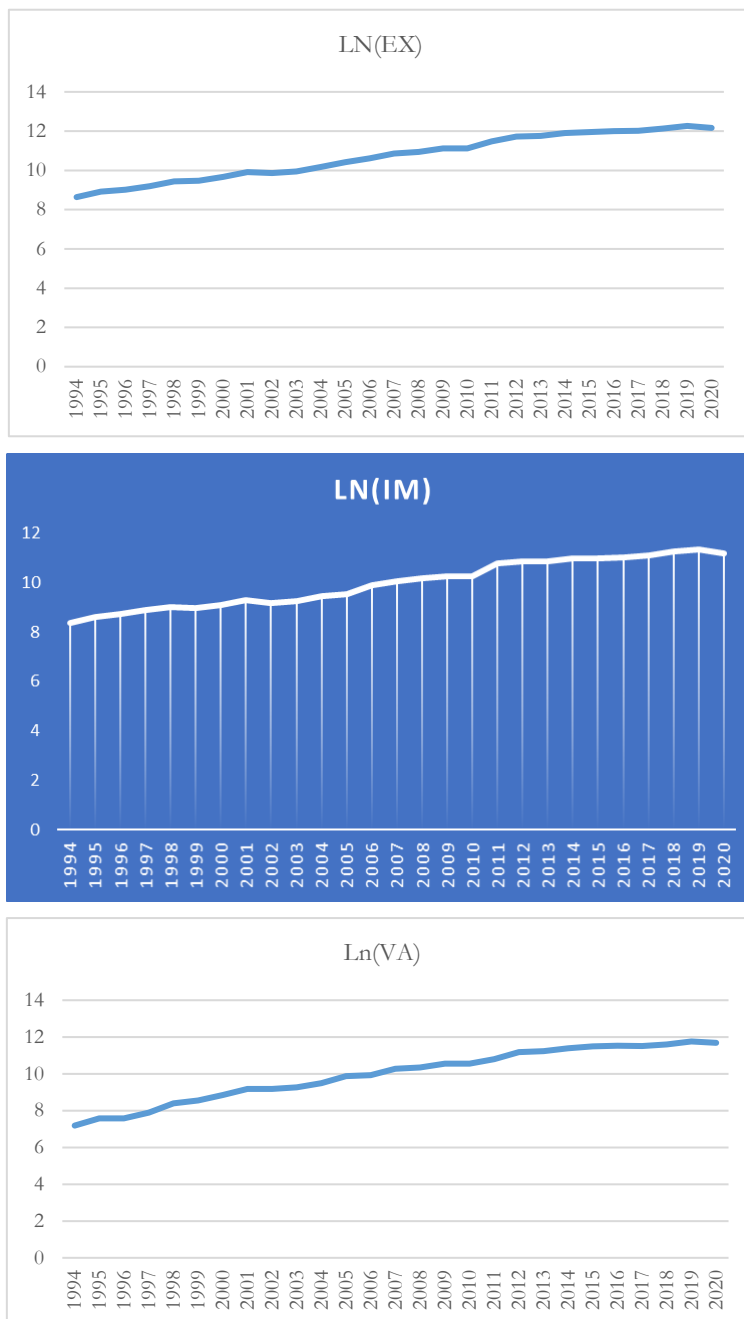
APPENDIX A1

The trend of export, import, and value addition of Bangladesh RMG sector between 1994 and 2020 (Authors' estimation from the Bangladesh Bank, 2020).



APPENDIX A2

The non-stationary trend export, import, and value addition of Bangladesh RMG sector between 1994 and 2020 (Bangladesh Bank, 2020).



APPENDIX A3

The stationary export, import, and value addition after the first difference of Bangladesh RMG sector between 1994 and 2020 (Bangladesh Bank, 2020).

