

The Impact of Covid– 19 Pandemic on Apparel Exports: Evidence from Sri Lanka

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Abstract: The apparel sector plays a vital role in the Sri Lankan economy as the largest net foreign exchange earner, and employment generator. During the COVID-19 pandemic, the industry's production and exporting activities came under severe stress due to supply and demand shocks. This research aims at assessing the impact of COVID-19 on apparel exports by employing a standard Gravity equation framework on data related to 20 major destinations of Sri Lanka's apparel exports. Data was extracted from a number of national and international data sources such as the Department of Census and Statistics of Sri Lanka and World Integrated Trade Solution. The findings indicated the triple effects of COVID-19 pandemic on apparel exports. First, the overall impact of the pandemic on the apparel industry was substantial. Second, the severity of the pandemic in the destination country had a significantly negative impact on apparel exports. However, the severity of the pandemic in Sri Lanka had no impact indicating the industry was resilient to the pandemic. In other words, the demand-side impact was greater than the supply side impact. Finally, in terms of apparel product categories women apparel exports declined drastically compared to other apparel and textile exports. With respect to other standard variables in the gravity model, partner country market size and level of development, movement in real exchange rate, economic performance of the exporting country and trade openness influence significant to apparel exports in Sri Lanka, was taken into account.

Keywords: COVID– 19, Apparel Exports, Gravity Model, Sri Lanka

JEL classification: I18, F14, C13

INTRODUCTION

The global textiles and apparel industry forms a sizable share of total world trade and is one of the fastest-growing industries¹. The textile and apparel industry is divided into two key segments: textile and fabric production and processing of these fabrics into clothing and other accessories. The rise

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in disposable incomes, technological development, globalisation, favourable demographic transition, and change in consumer behaviour were some of the factors that contributed to the growth of the global apparel industry during the last few decades². The textile and apparel industry is known as a labour-intensive industry and its manufacturing facilities continue shifting to low labour cost destinations (ILO, 2014).

The textile and apparel industry plays a key role in the economy of Sri Lanka, contributing to manufacturing production, employment, and exports. Textile and apparel industry began to grow significantly in the late 1980s and early 1990s partly due to the Multi-Fibre Agreement under the World Trade Organization. In subsequent years, in terms of its contribution to industrial production, foreign exchange earnings, foreign direct investment and direct and indirect employment generation, Sri Lanka's textile and apparel industry emerged as a key economic driver. As the country's largest industry, it accounts for over 46 per cent of total exports, provides over 300,000 people with direct employment opportunities and 600,000 people with indirect employment opportunities. In particular, the industry provides a substantial number of employment opportunities for women³.

The global COVID-19 pandemic and the associated economic recession have wreaked havoc on international trade and, in particular, the textile and apparel industry in two ways, namely demand and supply side shocks (Baldwin and Tomiura, 2020). In the context of textile and apparel trade, the demand-side impacts of the COVID-19 pandemic are twofold, namely practical and human psychological impacts. The COVID-19 induced social distancing measures restrict all types of public engagements and mobility. In such a context, consumers' demand for apparel products declined dramatically largely because of limited access and/or space for consumption. On the other hand, there is a human psychology behind consumers' purchasing practices at a time of a pandemic. In particular, the uncertainty surrounding the pandemic influenced consumers to postpone purchases of products such as textile and apparel which became largely non-essentials in an environment where social distancing measures were adopted. On the supply-side, supply chain disruptions due to lockdowns and social distancing measures adopted during the pandemic had a sizable impact on the production, export and product trade.

In the above context, the main objective of this study was to address the following research questions. First, what was the impact of the COVID-19 pandemic on Sri Lanka's apparel exports? Second, was the impact of COVID-19 pandemic on apparel exports homogenous across different apparel product categories such as men's wear, women's wear, baby wear,

and the others? This study confined itself to apparel exports given their predominance in total textile and apparel exports.

LITERATURE REVIEW

Impact of Covid-19 on international trade flows started emerging in recent months and it is quite difficult to draw either theoretical insights or empirical evidence from the past events due to the very nature of the current pandemic. Hence, this study largely concentrated on literature published recently on the impact of Covid-19 on international trade. Saif *et al.* (2021) introduced a conceptual model in capturing the impact of Covid-19, arguing that the existing theoretical models in the field of international trade lacked capacities to capture the effect arising from a global-level pandemic such as Covid-19. The authors emphasised three main channels through which Covid-19 affects the international trade flows in the short to medium run; namely financial, technological, and policy shocks.

The authors argued that Covid-19 related lockdown measures affected financial positions of firms, households, and the government. In particular, informal small and medium size businesses in some industries such as tourism, recreation, and hospitality find it difficult to maintain their financial positions and as a result, such businesses are forced to close down their businesses either fully or partially. Households often cut down their expenditure due to decline in wages and/or loss of employment and income earning opportunities although they receive some lump-sum from the government. Finally, governments find it difficult to maintain fiscal deficits at an optimal level since their expenditures overrun the revenues. The governments need to finance Covid-19 preventive measures as well as support businesses and households affected by the pandemic; however, they find it harder to collect sufficient revenues through taxation. Saif *et al.* (2021) concluded that Covid-19 financial downturn has an adverse effect on export flows.

With respect to technological shocks, Saif *et al.* (2021) highlighted the pandemic induced digitalisation and the utilisation of information and communication technology (ICT). Households, firms, and governments utilised ICT in accessing and delivering goods and services during the pandemic⁴. Both large corporate as well as small and medium firms adopted cutting-edge technology in exploiting the opportunities for marketing, branding, and advertising to a wider population. In addition, both the public and private sector adopted new technological innovations in enabling their workers to perform duties from home. These and other productivity-enhancing technologies may have a positive impact on exports, in particular, of advanced and emerging economies. Saif *et al.* (2021) pointed out that the

preventive and safety policies, including closures, shutdowns, lockdowns, restriction on movement, import and export bans and social distancing measures caused policy shocks which may affect immediately all economic activities. Moreover, policy changes include some of the fiscal and monetary policy measures adopted by governments to support both businesses and households could also affect trade flows. According to Saif *et al.* (2021), it could be expected that Covid-19 related restrictions and policy changes have a negative effect on trade openness that could badly affect exports of developing countries.

Baldwin and Tomiura (2020) argued that the Covid-19 pandemic resulted in both supply and demand shocks to the world economy. First, restrictions on movements and lockdowns disrupted the production and distribution related activities thereby having supply shocks. In addition, quarantine measures and infection of the virus resulted in some workers being absent at the workplaces. On the demand side, restrictions on mobility and closure of businesses prevented households, businesses and governments from purchasing goods and services. Although governments increased some health and welfare related expenditure, such expenses were much smaller compared to the reduction in private aggregate demand. Hence, Baldwin and Tomiura (2020) argued that both supply and demand shocks affected trade flows negatively. The authors argued that the size of the impact could be somewhat larger compared to any of the previous pandemics due to a few reasons. First, Covid-19 pandemic has affected major economies, whereas most previous pandemics, witnessed during the post-second world war, largely affected economically less advantageous countries. Second, the pandemic has resulted in disruptions to supply networks around the world. More importantly, pandemic has affected demand-side as well, resulting in reduction of aggregate demand for products and services by households, businesses and government. These supply and demand shocks inevitably lead to a slowdown in international trade flows. Baldwin and Tomiura (2020) proposed to employ a gravity model based analytical framework to capture the impact of Covid-19.

In the traditional gravity model framework, the GDP of partner countries and of the reporting country is entered into the regression model as independent variables. Through this tool, it is possible to capture the supply shock effect using the reporting country GDP, while demand shock related effect can be captured via the GDP of reporting countries. Using the gravity model framework, Kazunobu and Hiroshi (2020) examined the impact of Covid-19 on exports of 26 countries across two time-periods: January-March 2019 and January-March 2020. The authors introduced Covid-19 cases and deaths of reporting countries and partner countries into the regression

model to capture the impact of Covid-19 on export flows, since quarterly GDP figures were not released at the time the study was undertaken. Among other things, the authors found that Covid-19 has negatively affected exports of developing countries. The negative effects are particularly prevalent in the textile, footwear, and plastic industries. The authors have also observed that the COVID-19 burden in exporters' neighbouring countries has a positive effect on exports, indicating a substitution effect in exporting. In contrast, with respect to agriculture commodities, the authors found a positive effect of importers' COVID-19 burden on trade. This indicates that importers' COVID-19 burden promotes exports of essential goods to affected countries. Similarly, the United Nations Conference on Trade and Development (2020) also found that exports from developing countries declined due to Covid-19 pandemic.

Adegun (2014) investigated the impact of the Ebola virus disease (EVD) on the economy of West Africa through trade channels. The study stated that the viral outbreak has had a significant negative impact on agriculture and mining exports. This was largely due to the fact that regions/countries heavily affected by EVD were the main agriculture and mining producers⁵. The production and shipment of agriculture and mining products have been affected by labour mobility issues as well as the difficulty of getting commodities to ports due to quarantine rules. Furthermore, farmers also abandoned agricultural activities while those who engaged in farming activities witnessed labour shortage due to quarantine and family migration. One clear conclusion of the above study was that Ebola pandemic had affected West Africa as a supply shock. As explained by World Bank (2014), as much as 80-90 per cent of the total economic impact of the epidemics is caused due to behavioural changes. Abban (2021) examined the effect of EVD on intra-regional trade in West Africa by employing the Poisson Pseudo Maximum Likelihood method to estimate the augmented gravity model of international trade. The results show that, in West Africa, EVD has been demonstrated to have a negative and statistically significant impact on trade flows. According to the study, the EVD decreased export shares of affected nations to intra-regional partners by twofold, and ECOWAS membership doubled trade levels indicating that trade within trade agreements (bilateral/ multilateral) was more resilient to the global trade collapses. However, it was found that regional trade agreements provided more stability in the face of the global shocks (Nicita & Saygili, 2021). Moreover, Sumo (2019) also found similar results indicating there were severe disruptions in the movement of goods, as well as a drop in the output of Liberia's main export commodities.

Liu *et al.* (2021) used a gravity-model approach to examine how COVID-19 pandemic (represented as the number of deaths per capita) and COVID-

19 induced government measures (expressed as an index of the stringency of lockdowns) affected countries' imports from China in 2020. The study found that, in comparison to pre-pandemic conditions, a country with the highest number of deaths, in terms of per thousand inhabitants, would witness a 13 per cent decrease in Chinese imports. Similarly, increasing the amount of lockdown stringency from zero to maximum would result in a 17.6 per cent decrease in Chinese imports. Accordingly, these results imply that a country's own COVID-19 deaths and lockdowns greatly reduced its imports from China, indicating that the pandemic's negative demand effects outweighed the pandemic's negative supply effects.

By using the standard global computable general equilibrium model Maliszewska *et al.* (2020) examined how to simulate the potential impact of COVID-19 on gross domestic product and trade. The findings indicated that the trade shocks incurred due to COVID-19 could be analysed under four scenarios: (a) the supply shock reduces GDP by reducing employment, (b) transportation and transaction costs in foreign trade rise due to additional inspections, reduced hours of operation, road closures, and border closures, resulting in higher transport costs, (c) a sharp decline in international tourism, and (d) a drop in private consumption.

Using time-series and cross-country data from January 2020 to December 2020, Wei and Xu (2021) evaluated the influence of the COVID-19 pandemic on exports and imports in China, Japan, and South Korea. The study found that even though China, Japan, and South Korea have very similar industrial structures, there is heterogeneity in the impact of the pandemic on imports and exports in each country.

The COVID-19 epidemic hit hard on the apparel industry due to its characteristics such as labour-intensive nature. The industry is integrated backward and forward with countries around the world. Chakraborty and Biswas (2020) conducted a study of text analysis using the Natural Language Processing technique (NLP) to find out the imminent effects of COVID-19 on the textile and apparel industry supply chain. Accordingly, changes in aggregate demand, a sluggish global economy, the closure of manufacturing outlets, and production shutdowns due to COVID-19 epidemic have generated worldwide structural supply shocks

Moreover, Castañeda Navarrete *et al.* (2021) conducted a descriptive analysis to analyse and characterise disruptions in the global apparel value chain caused by the COVID-19 epidemic, with an emphasis on how developing countries have been affected. He also came up with the same results while highlighting some facts as follows. The pandemic has severely disrupted the global textile and apparel value chain, owing to the direct effects of disease on manufacturing workers, the lower output

of materials used to fabricate clothing such as cloth, thread, etc, and reduced demand apparel in high-income countries. On the other hand, profits, wages, job stability, and employee safety are all suffering disproportionately in developing countries. Conversely, some researchers have focused on the reasons for the decline in demand for apparel and the change in demand patterns under the COVID-19 effect. By analysing a total of 68,511 relevant tweets from January 1, 2020, to September 31, 2020, Liu *et al.* (2021) conducted an exploratory study to provide a picture of consumers' apparel consumption evolution throughout the pandemic crisis. The analysis demonstrated that the consumers' day to day life and routine consumption have been severely disturbed by the pandemic lockdown and social distancing mandates. Moreover, Vladimirova *et al.* (2021) examined changes in apparel purchase methods during COVID-19 in nine countries and authors concluded that demand had fallen throughout the pandemic because during the COVID-19 lock-downs, consumers significantly reduced their spending on fashion, clothing, shoes, and fashion accessories as a 'non-essential' category of consumer goods. This reduction in spending on apparel is mainly attributed to a reduction in disposable income on non-essential goods and inflation in a pandemic time. As a result, consumers altered their purchasing habits in response to enhanced well-being and financial gains from (forced) reduced consumption.

METHODOLOGY AND DATA

Model Specification

This study employed a gravity model regression approach in examining the impact of COVID-19 pandemic on Sri Lanka's apparel export flows. The gravity model postulates that volume of bilateral trade depends on countries' economic sizes and the distance between them. The basic gravity model in cross-sectional dimension is as follows:

$$X_{ij} = \frac{Y_i Y_j}{T_{ij}} \quad (1)$$

Where X_{ij} represents the value of export (or trade) from nation i to country j ; Y_i and Y_j represent the GDP for country i and country j , respectively; T_{ij} represents the trade cost between two countries, which includes factors such as distance, adjacency, and policy. The model predicts that there is a positive relationship between the bilateral trade flows and countries' economic masses and a negative relationship with the distance between them. Based on the simple Gravity model framework, following

regression specification was considered in examining the impact of COVID-19 pandemic on Sri Lanka's apparel exports:

$$\ln TAEX_{i,j,t} = \beta_0 + \beta_1 \ln GDP_{j,t} + \beta_2 \ln GDP_{i,t} + \beta_3 \ln PCGDP_{j,t} + \beta_4 \ln RER_{j,t} - \beta_5 DEATH_{j,t} - \beta_6 DEATH_{i,t} - \beta_7 DIS_{i,j,t} + \beta_8 IIP_{i,t} + \beta_9 \ln TRO_{j,i,t} + \varepsilon_{i,j} \quad (2)$$

In addition to the three basic variables – partner country GDP and GDP per capita, exporter's GDP, and distance between the two countries – of the original Gravity framework, a number of other traditionally employed covariates, along with COVID-19 related variables, were considered in model (2). Sri Lanka's textile and exports to a partner country is the dependent variable of the model; i.e. apparel export to j^{th} partner country in t^{th} period. For this study, two apparel-specific product categories were considered; namely articles of apparel and accessories, knit or crochet (HS 61) and articles of apparel and accessories, not knit or crochet (HS 62)⁶. Data on quarterly export of apparel was extracted from the Export Development Board of Sri Lanka for the period of 2010-2021.

Previous studies have indicated that a pandemic has both demand and supply side shocks on export flows. This study considered a set of indicators to represent the severity of the pandemic and it was found that the number of COVID-19 deaths was a good candidate. Accordingly, COVID-19 deaths reported for the exporter and partners ($DEATH_{j,t}$ and $DEATH_{i,t}$) were introduced into the model to capture the impact of the COVID-19 pandemic on apparel exports. It was assumed that parameters attached to both variables were negative. Data for COVID-19 deaths was extracted from the world meters database.

Distance is one of key variables in the Gravity regression model and it broadly captures the transportation costs involved in international trade. A number of studies have consistently found that there is a negative relationship between the distance between the two trading partners and the volume of trade. Data related to distance was extracted from CEPII global database. According to Dornbusch (1988) and Hooper and Marquez (1993), partner country overall purchasing power, often represented by partner country GDP, and production capacity of the exporter, often represented by exporting country GDP, are critical in determining the volume of exports in a country. Hence, it is expected that the parameters representing partner country GDP and exporter GDP are assumed to be positive in eq. 2. Additionally, GDP per capita of the partner country was considered since it captures the consumers' purchasing power which was identified in the literature as one of the key determinants of the demand

for foreign products. GDP per capita of partner countries, measured in purchasing power terms, was introduced as an additional explanatory variable and it is expected that the associated parameters are positive in the regression model. Data related to GDP, and GDP per capita were extracted from the OECD database. Relative price of foreign products is also one of the important factors determining the demand for foreign products (Dornbusch, 1988; Hooper & Marquez, 1993). In our model real exchange rate was employed in capturing relative price differentials between the exporting and importing countries. Data for real exchange rate was extracted from the IMF financial statistics database. In most countries, export sector performance is closely associated with the performance of the industrial sector. Industrial sector specific production shocks, including technological improvement, could affect manufacturing export products such as apparel. Hence, industrial production index was introduced into the model as an explanatory variable to capture any supply side constraints in apparel exports and quarterly data for industrial production index was extracted from the Department of Census and Statistics.

Finally, trade openness was used as a proxy for the extent of trade restrictions between Sri Lanka and the trading partner. The sum of total exports and imports as a proportion of Sri Lanka's GDP was used to calculate trade openness as presented below in equation (3).

$$\text{Trade openness} = \frac{X_{sl,it} + M_{i,sl,t}}{GDP_{sl,t}} \quad (3)$$

where, $X_{sl,it}$ is the export from Sri Lanka to a particular trading partner, $M_{i,sl,t}$ is the import from a trading partner to Sri Lanka and $GDP_{sl,t}$ is the GDP of Sri Lanka. Increased trade openness suggests less trade barriers between Sri Lanka and the rest of the world. As a result, a positive association between trade openness and the export for textiles and apparel is expected. GDP data was taken from the Central Bank of Sri Lanka while trade data was taken from ITC trade map.

ESTIMATION AND DISCUSSION

Textile and apparel industry accounts for nearly 10 per cent of Sri Lanka's gross domestic product and its exports represent nearly half of the total merchandise exports of the country. More importantly, it provides around one million direct and indirect employment opportunities which are predominantly occupied by female unskilled workers. Moreover, the sector has been able to attract a sizable share of total foreign direct investment inflows to Sri Lanka over the years. Apparel exports have increased their earnings from US\$ 3,964 million to US\$ 5,577 million in 2019. However,

Table 1: Correlation among Variables

Variable	$\ln\text{TAEX}_{ijt}$	$\ln\text{GDP}_{jt}$	$\ln\text{GDP}_{it}$	$\ln\text{PCGDP}_{jt}$	$\ln\text{PCGDP}_{it}$	$\ln\text{RER}_{jt}$	DIS_{ij}	DEATH_{it}	DEATH_{jt}	IIP_{it}	$\ln\text{TRO}_{jt}$
$\ln\text{TAEX}_{ijt}$	1.000										
$\ln\text{GDP}_{jt}$	0.437	1.000									
$\ln\text{GDP}_{it}$	0.195	0.081	1.000								
$\ln\text{PCGDP}_{jt}$	0.238	-0.440	0.055	1.000							
$\ln\text{RER}_{jt}$	0.424	-0.179	0.084	0.393	1.000						
DIS_{ij}	0.205	0.390	0.002	0.074	0.389	1.000					
DEATH_{jt}	0.117	0.176	0.147	-0.087	0.021	0.058	1.000				
DEATH_{it}	0.050	0.045	0.205	0.008	0.055	0.015	0.178	1.000			
IIP_{it}	0.022	-0.020	-0.035	-0.013	-0.047	-0.0006	-0.200	-0.236	1.000		
$\ln\text{TRO}_{jt}$	-0.266	-0.713	0.009	0.267	0.074	-0.367	-0.101	-0.033	0.028	1.000	

Note: TAEX=apparel exports, GDP=gross domestic products, PCGDP=per capita GDP, RER=real exchange rate, DIS=distance, DEATH=COVID-19 infected deaths, IIP=index of industrial production, TRO=trade openness, \ln stands for natural logarithm while $i, j,$ and t stand for exporter, partner, and time period respectively.

Source: Author's estimation

apparel exports declined to US\$ 4,406 million in 2020, largely due to the demand and supply side shocks associated with the COVID-19 pandemic. The United States, the United Kingdom and Italy, and Germany have been the major apparel export destinations. Sri Lanka's apparel exports consist of women's wear (47 per cent), men's wear (19 per cent), baby wear (4 per cent), and other wear (30 per cent).

Table 1 reports data on correlation coefficients among variables of interest. Contrary to the theoretical expectation, there is a positive relationship between COVID-19 deaths (in both exporting countries as well as importing countries) and apparel exports. In other words, there is no unconditional evidence supporting high COVID-19 deaths, either at home or abroad, leading to lower exports. Hence, it is required to examine this relationship while controlling export flow for its traditional determinants. The association between apparel exports and each one of traditional explanatory variables, except distance, seems to appear with the correct sign. The distance is a key variable in the Gravity model and, generally, a negative correlation is expected between volume of exports and distance. Contrary to the expectation, the correlation between volume of exports and distance appears to be positive. A larger share of Sri Lanka's apparel exports flow to North America and European countries, while flow of exports to Asian countries remain relatively low. Hence, it is natural to expect a positive relationship between apparel exports and distance where the other factors are not controlled for.

Table 2 reports results on the determinants of apparel exports of Sri Lanka for the period of 2010-2021. The dependent variable is log of apparel exports while main variable of interest is COVID-19 deaths; separately considered in the context of Sri Lanka and her major destinations of apparel exports. As discussed in the methodology section, it is expected that the number of COVID-19 deaths may capture the severity of the pandemic, i.e. restrictive social distancing measures that ultimately caused both demand and supply side shocks, on export flows⁷. Accordingly, it is assumed that COVID-19 deaths of the exporter captures the supply side impacts while COVID-19 deaths of the partner country represent the demand-side shocks on exports.

The estimated coefficient of the COVID-19 death of a partner country (DEATH_{jt}) is negative and statistically significant at conventional level of significance across all the estimators. The results indicate that every 10,000 COVID-19 deaths in trade partner countries lead to a drop of Sri Lanka's apparel exports by around 2 per cent. Above results imply that Sri Lanka's apparel exports were negatively affected by demand-side shocks. In other words, demand for Sri Lanka's apparel products declined during the

Table 2: Impact of COVID-19 on Apparel Exports

<i>Dependent variable: log of apparel exports</i>			
	<i>OLS</i>	<i>Fixed Effects</i>	<i>Random Effects</i>
Constant	-17.317*** (2.323)	-3.364 (12.673)	-18.115*** (2.382)
lnGDPj	1.163*** (0.039)	0.043 (0.754)	0.932*** (0.149)
lnGDPi	0.509*** (0.233)	1.190*** (0.364)	0.928*** (0.139)
lnGDPPCj	0.741*** (0.032)	1.901** (0.791)	0.917*** (0.170)
lnRERji	0.393*** (0.014)	0.0427 (0.152)	0.129** (0.069)
lnDISTij	-0.137*** (0.007)	-0.044 (0.048)	-0.042 (0.038)
DEATHj	-0.002** (0.001)	-0.002*** (0.001)	-0.002** (0.0001)
DEATHi	-0.022 (0.032)	-0.006 (0.051)	-0.001 (0.013)
IIPi	0.004*** (0.001)	0.002** (0.001)	0.003*** (0.001)
lnTOj	0.002*** (0.0003)	0.004** (0.002)	0.004*** (0.001)
R2	0.66	0.50	0.54
N	938	938	938

Note: TAEX=apparel exports, GDP=gross domestic products, PCGDP=per capita GDP, RER=real exchange rate, DIS=distance, DEATH=COVID-19 infected deaths, IIP=index of industrial production, TO=trade openness, ln stands for natural logarithm while i, j, and t stand for exporter, partner, and time period respectively. In table 2, *, **, and *** indicate that the estimated coefficient is statistically significant at 10%, 5%, and 1% respectively.

pandemic period. Sri Lanka's four major apparel exporters, namely the United States, United Kingdom, Italy, and Germany, were among the top 10 worst-affected countries of the pandemic and each country imposed restrictive social distancing measures, such as school closures, restrictions on travel, mass gatherings and commercial activities, during the pandemic period (Mathieu *et al.*, 2020). These measures largely restricted people's social engagements resulting in less demand for apparel products.

The decline in apparel exports, following COVID-19 pandemic, could also be traced using the Stringency Index that measures the degree of lockdown regulations used to manage the outbreak by limiting people's social consequences⁸. The index is constructed using data on school and

university closures, public transportation and workspace closures, public event cancellations, gathering limits, internal movement restrictions, and directives to confine at home (Ritchie *et al.*, 2022). Figure 1 depicts the relationship between the Stringency Index of selected countries and Sri Lanka’s apparel exports to those destinations, namely the United States, United Kingdom, Germany, and Italy. The increase of Stringency Index reflects the cancellation of workplaces, universities, and school closures, prohibition of public gatherings and leisure activities, and cancellation and postponement of public events and occasions which reduce the demand for apparel products. Hence social distancing measures disrupted daily activities, and the need to buy new clothes. Also, due to the lockdown, people were accustomed to leaving the house to buy only the essentials, and people were reluctant to go to the crowded shopping centres or malls for fear of being infected with the virus. After it was scientifically proven that the virus persisted on the surface for several days, people tried to avoid buying clothes for fear that the virus would infect through clothes.

Moreover, as Chanona *et al.* (2020) explained, asymmetric labour supply shocks might cause more significant demand decreases than the initial

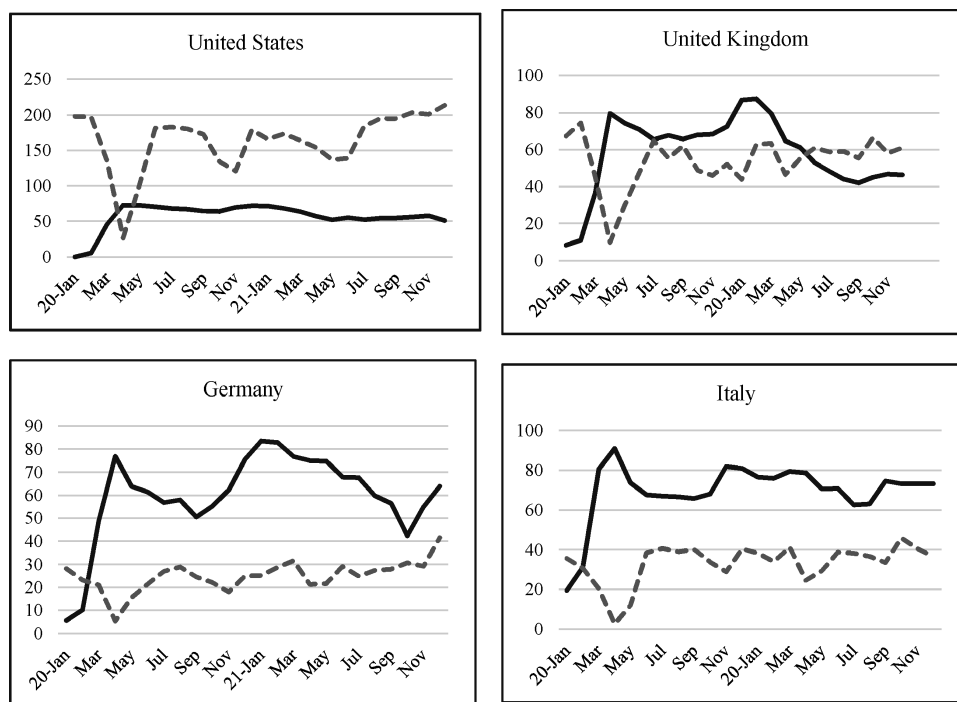


Figure 1: Stringency Index and Sri Lanka’s Apparel Exports

Source: Author’s Construction

shock. As the mortality rate increases, more workers become ill (or die) and they isolate themselves socially. Also, on the other hand, the infected and his/her family members should also be quarantined for 14 days. Under this situation, businesses decrease (or halt) their operations to avoid spreading the disease among their employees. It may have caused unemployment as well as loss of additional income-generating sources available to them previously. Those changes may have led to reduce the disposable income while increasing the cost of medical and other expenses thereby resulting in fewer expenses on apparel products. Moreover, Baldwin and Tomiura (2020) distinguish between 'practical' (inability to shop) and 'psychological' (consumers' wait-and-see attitude in the face of high uncertainty) demand shocks. Hence, COVID-19 induced demand declines may have emanated from the revenue impact, changes in consumption patterns, and a decrease in in-store shopping.

Following Baldwin and Timura (2020) framework, $COVID_{it}$ (Sri Lanka's COVID-19 deaths) was introduced into each regression model to capture the supply-side impacts on apparel exports. It is theoretically expected that higher the deaths reported, the harsher the social distancing measures enforced by the country; resulting in disruptions in production and exporting activities in the economy. The estimated coefficient of $COVID_{it}$ is negative, yet statistically insignificant in all models (see Table 2). It implied that apparel production and export activities in Sri Lanka were hardly affected by COVID-19 pandemic and associated social distancing measures. This may be largely due to the policy measures adopted during the pandemic to avoid any negative impacts on the export sector. In particular, the government allowed exporting firms to operate amidst various social distancing measures introduced so as to allow exporting firms to run as smoothly as possible knowing its ramifications on the economy. On the other hand, firms adjusted themselves in carrying out their activities while adhering to health guidelines (UNDP, 2021). Accordingly, special provisions were made available, even during the lockdown period, for the firms to engage in production and export activities. The industry also ventured into new products categories, such as personal protective equipment and masks, which were heavily demanded during the pandemic⁹. Sri Lanka's export firms had the production capacity to respond to market development thereby minimising the supply-side impacts.

Traditional Gravity Model Covariates

Table 2 reports results related to key traditional Gravity model covariates, namely distance ($\ln DIS_{ijt}$), exporting country GDP ($\ln GDP_{it}$), partner country GDP ($\ln GDP_{jt}$), partner country GDP per capita ($GDPPC_{jt}$), real exchange

rate ($\ln RER_{ijt}$), trade openness ($\ln TO_{it}$), and industrial sector performance (IIP_{it}). Accordingly, there is a statistically significant positive relationship between apparel exports and partner country GDP as evident in all models, except in Fixed Effects estimator. The results indicate that 1 per cent increase in partner country GDP leads to almost equal percentage increase in Sri Lanka's apparel exports. In other words, there is a one-to-one relationship between partner country GDP and Sri Lanka's apparel exports. Hence, one of the key drivers of Sri Lanka's apparel export is the partner country's healthy economic performance. Similarly, Sri Lanka's GDP also makes a positive impact on her apparel exports. The estimated coefficient of $\ln GDP_{it}$ is positive and statistically significant in all the regression models (see Table 2). This result clearly indicates that there are supply-side barriers for promoting Sri Lanka's apparel exports. Overall economic performance matters for the apparel export performance. This fact is further confirmed by the association between index of industrial production ($\ln IIP_{it}$) and apparel exports. The estimated coefficient of the index of industrial production is positive and statistically significant at 1 per cent level indicating overall performance of the industrial sector is a key determinant of the apparel exports (see Table 2). Hence, Sri Lanka needs to prioritise addressing supply-side constraints for apparel exports while looking for market opportunities abroad. In line with the theoretical expectation, the estimated coefficient of partner country GDP per capita ($\ln GDPPC_{jt}$) is positive and statistically significant across all the estimators. Accordingly, demand for Sri Lanka's apparel products increases with the rise of consumers' purchasing power abroad. Hence, not only the sizes of the economy of the trading partner, but also its purchasing power are the key determinants of Sri Lanka's apparel exports. The estimated coefficient of distance ($\ln DIST_{ij}$) is negative and statistically significant in Ordinary Least Square (OLS) estimator. Nevertheless, the estimated coefficient is statistically insignificant both in Fixed Effects and Random Effects models. In other words, apparel trade volume is least affected by the distance. Most of the neighbouring destinations are, in fact, Sri Lanka's competitors in the global apparel market and access to market has largely been restricted from apparel products in those destinations. For instance, India has provided a quota for Sri Lanka's apparel products under the Indo-Lanka free trade agreement. Real exchange rate movement is also an important determinant of Sri Lanka's apparel exports. The estimated coefficient of real exchange rate ($\ln RER_{ijt}$) is positive and statistically significant in the model except in Fixed Effect model.

Overall, it is found that most traditional covariates of the gravity model appear with theoretically expected signs and are statistically significant at

the conventional level of significance. In terms of goodness of fit, the models explain around 50 per cent of the total variation of the apparel exports. Each model was examined for possible violation of underlying assumptions and necessary correction procedures were applied accordingly.

Mostly affected product category

The other factor to consider in this context is whether this COVID pandemic affects all sectors of the apparel industry homogeneously or, not. Table 3 shows the regression results for the four major apparel categories estimated by employing Random Effects model¹⁰.

Table 3: Impact of COVID-19 on Major Apparel Export Products
Random Effects Estimator

	<i>lnWOMAN</i>	<i>lnMEN</i>	<i>lnBABY</i>	<i>lnOTHER</i>
Constant	-20.628*** (2.775)	-17.881*** (2.843)	-28.568*** (4.547)	-21.978*** (2.234)
$\ln\text{GDP}_j$	0.928*** (0.174)	1.040*** (0.184)	1.209*** (0.290)	1.327*** (0.141)
$\ln\text{GDP}_i$	1.094*** (0.181)	0.528** (0.226)	1.499*** (0.345)	0.572*** (0.169)
$\ln\text{PCGDP}_j$	0.741*** (0.202)	0.698*** (0.209)	1.315*** (0.336)	0.832*** (0.166)
$\ln\text{RER}_{ij}$	0.223*** (0.086)	0.134 (0.095)	-0.198 (0.155)	0.401*** (0.075)
COVID _j	-0.027** (0.011)	-0.004 (0.015)	-0.006 (0.021)	-0.011 (0.011)
COVID _i	0.039 (0.180)	0.020 (0.237)	0.263 (0.341)	0.051 (0.180)
IIP _i	0.003*** (0.001)	0.005*** (0.001)	0.004*** (0.001)	0.002*** (0.001)
TRO _j	0.001 (0.002)	0.003* (0.002)	0.007** (0.003)	0.005*** (0.001)
R ²	0.583	0.494	0.164	0.668
N	868	848	797	868

Note: in the above table, *lnWOMEN*, *lnMEN*, *lnBABY*, and *lnOTHER* stand for exports (in natural logarithm) of women's wear, men's wear, baby wear and other apparel products respectively. In the table 2, standard errors are reported in parentheses and *, **, and *** indicate that the estimated coefficient is statistically significant at 10%, 5%, and 1% respectively.

In this exercise, four different apparel product categories were considered; namely men's wear, women's wear, baby wear, and the other apparels. Accordingly, export value (in log) of each category was considered as the dependent variable in regression specification given in equation 2. In consistent with the previously obtained results, the estimated coefficient of COVID -19 deaths of trading partners is negative; however, the estimated

coefficient is statistically significant only in models where the dependent variable is women's wear. In other words, COVID-19 pandemic had a significant negative impact on women's apparel exports compared to the other major apparel export categories. This result indicates that if the pandemic gets worse (more deaths) in a trading partner country, it would significantly reduce women's apparel exports to that destination. In numerical terms, additional 10,000 deaths are associated with 2.68 per cent reduction of women's apparel exports. Nevertheless, contrary to the general expectation, exports of men's wear, baby wear, and other apparel exports have not been significantly affected by the pandemic.

Hence, it is interesting to look at what factors led to the above results, namely pandemic having statistically significant negative impact on women's apparel exports. In terms of Sri Lanka's total apparel exports, women's apparel exports account for 47 per cent. Women are more interested in clothing and fashion than men (Chea, 2011). However, women and girls bear the brunt of the economic consequences, as they earn less, save less, work in insecure jobs or informal sectors, or live in poverty, and are mostly confined to homes during a pandemic such as the COVID-19. Thus, as a result, their ability to absorb economic shocks is lower than that of males (United Nations, 2020). The initial round of layoffs in many economies has been particularly severe in the services sector, including retail, hotel, and tourism, where women are over represented (United Nations, 2020). Accordingly, the increase in unemployment among women is the prime reason for the decrease in the demand for goods such as apparel. In addition, unpaid care work has increased because of school closures, rising care demands for older people, and overburdened healthcare systems (OECD, 2020). As a result, the average amount of time spent in the home increased, and the lockdown of countries reduced the chances of women leaving home again, causing a reduction in demand for apparel. In general, women control household income expenditure, responding more quickly than men to disasters, thus limiting consumption to essential things. Also, the entertainment of the youth community was severely restricted due to the postponement and/or cancellation of public gatherings and parties, and women are more likely than men to go shopping but are reluctant to go to shopping malls for fear of being infected with viruses as well as lockdown measures, which has led to lower demand for clothing. Under the influence of all these factors, demand in apparel product decreased¹¹.

CONCLUSION

Sri Lanka's textile and apparel industry took off soon after the country's economy was liberalised in 1977. Since then, Sri Lanka has become a world-

class apparel producer, supplying worldwide key clothing brands for over four decades. This study aimed to analyse the impact of the COVID-19 pandemic on Sri Lankan apparel exports. Following Baldwin and Tomiura (2020), this study employed a variant of gravity model in identifying the impact of the pandemic on Sri Lanka's apparel exports. In addition to traditional gravity model variables, such as GDP and GDP per capita of trading partners and GDP of home country, Real Exchange Rate, Distance, Index of Industrial Production, and Trade Openness index, COVID-19 pandemic related deaths were considered in the regression models. It was assumed that COVID-19 related deaths, both in the home country and trading partners, capture the severity of the pandemic and associated social distancing measures. Estimation was done utilising a panel dataset from 2010 to 2021 for quarterly export values with its key 20 trading partners for the commodity classifications HS61 (Articles of apparel and accessories, knit or crochet) and HS 62 (Articles of apparel and accessories, not knit or crochet).

The most exciting findings of this study were as follows. First, Sri Lanka's bilateral apparel exports are negatively affected by the intensity of the current pandemic outbreak (death toll) in trading partners. For instance, 10,000 deaths increase due to the COVID-19 pandemic in the trading partners would decrease the value of the Sri Lankan apparel exports by 1.85 per cent. This implies that the demand for apparel products declined in trading partners' markets when the pandemic got severe. The decline of demand could be due to restrictive social distancing measures followed as well as decline of disposable income following widespread layoffs and unemployment in trading partner countries. On the other hand, the severity of the current pandemic outbreak (number of deaths) in Sri Lanka had a insignificant impact on Sri Lankan apparel export. Hence, decline in apparel exports could largely be explained by the demand shocks rather than supply-side impacts. Absence of a supply-side impact is largely due to the measures taken by the government as well as the industry to continue production activities amidst the pandemic in Sri Lanka. In addition, Sri Lanka's apparel industry shifted to exports of personal protection equipment products demanded during the pandemic.

This study also examined the impact of the pandemic on major apparel exporting categories. Accordingly, apparel products were classified into key four sub-segments namely women's wear, men's wear, baby ware, and other apparel products. As per the results, the severe the COVID -19 pandemic (as captured by the number of deaths) in trading partner countries, the faster the women wear apparel exports decline to such destinations. Nevertheless, it was found that other apparel export categories

were unaffected. In numerical terms, an increase of 10,000 deaths was associated with a decrease of women wear apparel exports by around 2.68 per cent. This was mainly attributed to vulnerability of females in a crisis due to unemployment and increased household responsibilities, low disposable income and savings, faster consumption changes than men and generally lockdown policies.

As per results, GDP and GDP per capita of trading partners have an elastic demand and are important factors influencing exports of Sri Lankan apparel. Similarly, apparel exports are positively and significantly impacted by home country GDP and industrial sector performance. It indicates that supply-side barriers could negatively affect the apparel industry's overall performance. In addition, real exchange rate and trade openness of the trading partners are also important determinants of apparel exports. Hence, it is important to maintain a competitive exchange rate while pursuing greater market access to major exporting destinations.

Notes

1. The textile and apparel industry is the world's fourth-largest industry, with a market value of USD 2-3 trillion which corresponds to 2 per cent of global Gross Domestic Production (GDP) (<https://fashionunited.com/global-fashion-industry-statistics>).
2. See <https://fashionunited.com/global-fashion-industry-statistics>.
3. See <https://www.srilankabusiness.com/apparel/about/export-performance.html>
4. The strict confinement and distancing measures forced households, firms, and government to carry out most activities online, including shopping, communication, entertainment, public administration, schooling, and conferencing.
5. For instance, Liberia mainly exports rubber and Sierra Leone produces rice as well as cash crops such as cocoa and palm oil.
6. HS stands for Harmonized System of Classification.
7. It is assumed that the number of COVID-19 deaths reflect the level of spread of the COVID-19 transmission in the country and restiveness in the social distancing measures, implicitly or explicitly, maintained by the law enforcing agencies and general public. Higher the number of deaths in a given country/period, it is more likely that general public and law enforcement agencies follow social distancing measures more strictly compared to a situation where COVID-19 related deaths remain lower.
8. Note that the indicator ranges from 0 to 100, with a higher number implying more robust country measures in response to COVID-19. Because these variables are acquired daily, they have been transformed into monthly averages for analysis.
9. Board of Investment (BOI) of Sri Lanka reported that Sri Lanka received over US\$ 500 million worth of orders for personal protective equipment and over 33

manufacturing companies engaged in producing such products as of mid-2020 (http://www.xinhuanet.com/english/2020-05/22/c_139079934.htm).

10. The results reported in Table 3 are broadly held under the other two estimators, namely OLS and Fixed Effects Model.
11. The rest of the results are in line with what was discussed previously, hence, attempt was not made to discuss them for saving the space.

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