Arndt-Corden Department of Economics

Crawford School of Public Policy

ANU College of Asia and the Pacific

Australian National University

Four Decades in the global apparel value chain: Evidence from Bangladesh

Abul Bashar Mohammed Fakhruzzaman

Arndt-Corden Department of Economics

Crawford School of Public Policy

Australian National Univ

u4458903@alumni.anu.edu.au

January 2025

Working Papers in Trade and Development

No. 2025/01

This Working Paper series provides a vehicle for preliminary circulation of research results in the fields of economic development and international trade. The series is intended to stimulate discussion and critical comment. Staff and visitors in any part of the Australian National University are encouraged to contribute. To facilitate prompt distribution, papers are screened, but not formally refereed.

Copies are available at https://acde.crawford.anu.edu.au/acde-research/working-papers-trade-and-development

Four Decades in the Global Apparel Value Chain: Evidence from Bangladesh

Abul Bashar Mohammed Fakhruzzaman *

Abstract

The remarkable growth of the Bangladesh apparel industry within the global apparel value chain is an interesting case because the industry grew from virtually zero export capacity to become the second largest apparel exporter in the world. The country attained its unprecedented success against the speculations made by some industry experts that it would lose its market share after the abolition of the Multi-Fibre Arrangement (MFA) with effect from 2005. This paper aims to delineate the role of national policies and world demand and abolition of MFA through an econometric analysis using data from 1976-2018. The findings suggest that, contrary to the gloomy predictions, ample availability of labour and the pragmatic domestic policy posture helped Bangladesh to consolidate its position in the global apparel value chain in competitive market conditions during the post-MFA era. The policy challenge for the country is to achieve structural adjustments and industrial upgrading within the value chain as the surplus labour pool gradually depletes.

Keywords: Bangladesh**,** Exports, Multi-Fibre Arrangement (MFA); Apparel Value Chain

JEL Codes: O14, O53, F13, F14

---

* I acknowledge guidance, and the helpful comments on earlier versions of this paper by Yixiao Zhou, Prema-chandra Athukorala and Raghbendra Jha.

1. Introduction

The fast growth of Bangladesh's apparel industry can be largely attributed to the provision of the Multi Fibre Arrangement (MFA), an international quota regime imposed by the apparel importing countries that came into effect in 1974. The MFA quota-restriction was made to protect the developed countries' textile and clothing industry vis-à-vis rising competition from the growing number of efficient manufacturers from developing countries, especially those in Asia (World Bank, 2005a). This restriction has shaped the international fragmentation of the apparel spread out from Hong Kong, South Korea, Taiwan and later China, which reached their quota limit and allowed the low-cost Asia-Pacific region developing countries such as Bangladesh, Sri Lanka and Vietnam to assemble products and to avail these countries' unused quotas (Gereffi, 1999; Gereffi & Frederick 2010, p. 3). With the initial support of large quota-hopping suppliers from the Republic of Korea, such as Daewoo, Bangladesh entered into export-oriented apparel manufacturing. Bangladesh's apparel exports increased from 0.3 per cent of the total export basket in 1980 to 87.23 per cent of total exports in 2018. The share of manufacturing in total GDP grew from 9.8 per cent in 1980 to 18.7 per cent in 2014 and remains the major contributor to the growth in the past two decades (Kathuria et al. 2016, p. 3).

The apparel industry is considered to be the 'starter industry' of export-led industrialization for developing countries since it provides employment opportunities for un-skilled or semi-skilled workers and thus brings thousands of families out of poverty (Jones 2006). In Bangladesh, the apparel industry has gradually consolidated its position as the largest export earner, employment generator and source of multifaceted connected industries. The number of apparel firms grew from 384 in 1984-85 to more than 4,621 in 2018-19 (BGMEA 2020), while employment increased from 0.1 million in 1985 (Staritz & Frederick 2012b, p. 219) to 3.26 million in 2019 (BBS 2019). The apparel industry alone provides employment to 3.26 million people, which accounts for 59.6 per cent (BBS 2019, p. 74) of total manufacturing employment and also employs more than 10 million people indirectly working in relevant sectors (Staritz & Frederick 2012, p. 213).

In the lead-up to the abolition of the MFA, which came into effect from 2005, some industry experts predicted that the countries that grew under the MFA quota regime due to non-binding

or duty-free and quota-free (DFQF) facilities would lose market share. It was projected that the regional suppliers such as Mexico, Latin American, Caribbean, Central and Eastern European, North African countries, and Turkey which, are in close proximity to the big markets would gain at the cost of the countries located in the remotest locations in Asia (Hertel et al. 1995; Yang et al. 1996; Martin 1999; Evans and Harrigan 2003; Nordas 2004; Applebaum, 2005; Abernathy et al. 2006). Large producers such as China and India were also expected to capture substantial market share due to their economies of scale and low-wage. It was further argued that suppliers located in the remotest locations would be at a disadvantage due to long lead time. In a similar study based on the US unique dataset, Evans and Harrigan (2003, p. 4) claimed that countries located adjacent to the USA, such as the Caribbean countries and Mexico, would do better than the Asian apparel producers due to their flexible production and proximity. Abernathy et al (2006) argued that it will be difficult for countries such as Bangladesh to effectively survive although they may have low wage rate with insufficient infrastructure, remote location from large apparel market, political and climatic volatility. It was contended that Bangladesh's poor infrastructure remains a major obstacle for faster delivery of products from Bangladesh (Bhattacharya and Rahman 2002; Abernathy et al. 2006). Moreover, Mlachila and Yang (2004, p.32) predicted that Bangladesh's apparel exports would drop significantly following the MFA quota removal and country's apparel industry would face severe competition in the US and EU markets. Nevertheless, the extraordinary growth and achievements that the Bangladesh apparel value chain observed before and after the MFA trade regime invalidate those predictions. This remarkable achievement offers an interesting case study as to how a least developed country (LDC) could achieve such astounding growth within four decades of engaging in the global apparel value chain even though it did not have any significant manufacturing base in the 1980s.

The global apparel trade has witnessed many surprises over the last 15 years. As projected China has remained by far the clear winner in the global apparel trade. China's exports increased from an average annual level of US8.7 billion in 1985 to over US$ 200 billion by the end of 2014. At the same time Bangladesh has become the second largest exporter after China with its share of world exports surging from meagre US$ 0.17 billion in 1985 to over US$ 39 billion which constitutes 7.9 per cent of world market by 2019. Although many countries from Latin and Central America and Africa observed export contraction following the MFA phase-

out, countries such as Bangladesh, Vietnam, Cambodia, and Myanmar have gained substantial market share (Gereffi & Frederick 2010; Staritz 2010; Athukorala 2018; Pane 2019). Some other countries such as India, Sri Lanka, Turkey, Indonesia, and Hong Kong witnessed either slow progress or export contraction during the period. Contrary to the speculation, retailers in the EU and the US decreased their sourcing of apparel from regional suppliers in the face of growing competition from Asian countries. There also have been divergent forms in the global landscape of apparel exports from individual countries. Some countries lose market share in some traditional markets while their exports sometimes compensated for by an increase in exports to other non-traditional markets (Staritz 2011; Gereffi & Frederick 2010; Athukorala 2018).

Under the MFA regime, quotas were imposed by the apparel importing countries. On the one hand, the quota restrictions constrained the abilities of a country to grow but on the other hand it provided market access within a certain limit. In a way, the MFA quota regime helped shifting the industry to grow in different countries. The late comer new apparel exporting countries such as Bangladesh, Sri Lanka, Vietnam, Cambodia and others found an easy market under this quota provision. At the same time it remains a constraint due to quota limit on expanding export. Some of the countries such as Indonesia, Mexico, Turkey and India could not manage their export performance compare to Bangladesh and Vietnam in the post-MFA era. Understanding the differences in performances of these countries are very important for policy debate since apparel is a good starter industry in the export-led industrialization because it generates employment to millions of unskilled and semi-skilled workers. Bangladesh is an interesting case study of this debate because contrary to the bleak predictions, the industry has consolidated its position and has gone from strength to strength.

Although many contemporary studies have been conducted on the impact of the MFA quota abolition, there is a dearth of literature on how Bangladesh apparel industry consolidated its position in the global apparel value chain. The purpose of this study is to examine how Bangladesh has become the second largest exporter against the gloomy predictions. To identify the key drivers of Bangladesh's apparel exports performance, this paper investigates the roles of different international policies such as the provision of MFA and its abolition as well as the roles of different national policies and factors such as real effective exchange rate (REER),

back-to-back letters of credit (BBLC), and special bonded warehouses (SBWs) through a time-series analysis based on a dataset from 1976-2018. Based on a newly constructed REER index for Bangladesh, this chapter examines the impact of REER for export performance. This study also examines the trends of changes in commodity composition, and export similarity index (ESI), that Bangladesh observes over the last four decades by analyzing the top 20 apparel export products. Based on the empirical evidence, this study argues that the predictions made by some of the experts about Bangladesh's losing market share following the MFA abolition were erroneous since they considered apparel products as homogeneous products rather than as a bunch of apparel items in which any given country may specialize. This chapter claims that Bangladesh has successfully been able to secure its niche in high-volume and lower-end markets, which mainly comprises apparel items for both sexes and men or boys such as t-shirts, and trousers. The findings of this study suggest that the policy challenge for Bangladesh is to have structural adjustment and upgrading its range of export products from basic items to basic-fashion goods. The empirical findings suggest that Bangladesh's apparel export performance was mainly driven by demand side variables such as world demand for apparel, positive role of the MFA, and also some supply side variables such as domestic capacity for manufacturing output, stable REER regime, FDI and technology transfer, and government policy interventions. Based on a newly constructed REER index for Bangladesh apparel sector this chapter claims that REER remains a vital instrument for sustaining export competitiveness. The chapter also argues that government policy interventions such as BBLC, SBW have significantly contributed in the long-run for the industry. It further explains that under some favourable international trade regimes such as MFA (1974-2004), and EU GSP facilities, the national policies set the background while local young entrepreneurs utilized the country's export potential by capitalizing on the low-cost labour pool.

The study begins with a brief discussion on the analytical framework of the study. Section 3 provides a brief overview of the initial conditions and policy reforms that took place over the last four decades in Bangladesh's apparel industry. By analyzing Bangladesh's top 20 apparel export items, section 4 explains the dynamics of changes in commodity composition and ESI. Section 5 examines how Bangladesh's apparel exports evolved in the MFA and post-MFA era, paying particular attention to a time-series analysis to explain the determinants of exports and trends. The key findings and policy implications are summarized in the final section.

2. Initial conditions and policy reforms

Bangladesh was used to export primary resource based products such as raw jute, jute products, tea, leather goods, and shrimp before and after the liberation war of 1971. After the mid-1970s, the country started exporting apparel products and gradually the industry consolidated its position. The introduction of readymade garment industry for local and overseas market in Bangladesh was a new phenomenon although it had an extended history of textile and made-to-order clothing production. However, Bangladesh's remarkable apparel export success journey did not start smoothly. The country had been disappointed with the established import-substitution strategy that compelled the government to place an emphasis on export-led industrialization through its initial trade reforms in the mid-1980s. Different reforms initiatives were taken to adopt a new outward-oriented growth strategy with the objective of promoting rapid export by reducing and ultimately removing the anti-export bias (WTO 2000). In an attempt to boost both private investment and FDI in export oriented and labour intensive industries, the government took different initiatives to liberalize the tariff structure and reduce import restrictions. The Chattogram Export Processing Zone (CEPZ) was established under the management of Bangladesh Export Processing Zones Authority (BEPZA) that came to functioning in March 1983.

During the post-independence era until about the early 1980s, the apparel industry in Bangladesh was operating under heavy trade protection. Since then the government has gradually removed import restrictions and permitted exporters to export without any license (Rhee 1990). The growth of the apparel sector was initially supported by some specific policy instruments such as back to back letter of credit (BBLC), special bonded warehouse (SBW), and stable exchange rate regime. The government introduced policy interventions such as BBLC and SBW in 1984 that proved to be instrumental in promoting the apparel industry. The SBW system, one of the most significant policy instruments that was used to guarantee free trade status for imported inputs and applied to 100 per cent apparel exporters, is similar to a duty exemption system that maintains a stock accounting book method of administration (Rhee 1986). Government introduced the SBW in the early 1980s in order to reduce bureaucratic hassles, administrative procedures and deferrals (Staritz 2011; World Bank 2005b). These

facilities allow the exporters to source their raw materials at competitive world prices. On the other hand, the BBLC allows the local entrepreneurs to open a letter of credit (L/C) in a local bank for the import of their inputs such as yarn, fabrics and accessories against the export orders placed in their favor by the importer's master L/C. The local bank could deduct the cost of the imported inputs and interest as well as other charges from the income of the sales of the sold goods. As a result, the producers was free to have financial burden for the purchase of raw materials and accessories that sometimes amounted to more than 65 per cent of the total cost of the garments (World Bank, 2005b). This facility allows many small and medium enterprises (SMEs) that have low capital bases and no significant collateral to arrange enormous bank loans for big orders.

Bangladesh's real effective exchange rate (REER) was remarkably stable for over 20 years (from 1980-2000) except for some three years during the mid-1980s during which REER appreciated quickly but later on devalued at a modest rate (World Bank 2004). The stable exchange rate regime continued over the period of 2000-2020. However, government devalues Bangladesh Taka against the US dollar in different occasions to keep the industry competitive. Besides above mentioned policy supports, government provided low-cost export financing, export development fund (EDF), and several cash and non-cash incentives to apparel exporters. The government has taken a policy instrument of providing '5 per cent cash subsidy' on exports using local inputs (World Bank 2005a). It has also announced a package of three-year incentives for searching for new garment markets in 2008. Under this scheme, government exports to markets except the US, the EU, and Canada have received 5%, 4%, and 2% cash incentives for 2009, 2010, and 2011, respectively (Staritz & Frederick 2012; Alam et al. 2017).

Although government provided many policy interventions during the 1980s and 1990s, Bangladesh's large-scale apparel exports success would not have been possible without the technical and managerial support from the East Asian quota-hopping countries. The role of quota-hopping investors from East Asian countries (EACs) especially from Republic of Korea played a pivotal role in spreading the apparel industry in Bangladesh. The East Asian apparel producers faced some quota restriction during the late 1980s and wanted to invest in some other Asian countries that have both comparative advantages in labor and quota facilities. Daewoo Corporation of South Korea, one of the World's largest textile producers, was also searching

for a source to avoid quota restrictions imposed by the USA and Europe and found it a potential place for utilizing the quota (Easterly, 2002). Bangladesh entered into the large-scale export oriented garments manufacturing when a retired civil bureaucrat M Noorul Quader Khan, often considered as the pioneer of apparel export industry of Bangladesh, had established the Desh Garments Ltd on December 27, 1977.[1] Desh and Daewoo signed a monumental collaborative agreement on July 4, 1978. The agreement for five years contained some specific elements such as six months of training for Desh workers in Korea, start-up activities involving procurement of machinery from Daewoo, installation, supervision, and advising on actual start-up while production would be managed by Desh, marketing held by Daewoo (Rhee 1990b). For this agreement, Desh agreed to pay 3 per cent of its sales (based on ex-factory costs), as royalty fees to Daewoo for the technical training and supervision and also 5 per cent of the sales volume as a sales commission for marketing activities for the agreed period. It is notable that the agreement did not have elements of foreign direct investment (FDI), or loan provision except for supplying of fabrics and other inputs on credit (Rhee 1990b). This collaborative agreement seems to be one of the most vital elements to not only to Desh's success but also to Bangladesh's apparel exports that contained both on the job training at Daewoo's Pusan plant and also learning by doing at Desh. According to the agreement signed between these two, Daewoo brought 130 workers (four management positions, 97 production supervisory positions, and 29 actual production slots), including 14 females from Desh to Korea for seven months training in its Pusan plant (Rhee 1990).

The quota-hopping investors performed important roles in technology transfer and diffusion, production, marketing and managerial know-how in the Bangladesh apparel industry. These investors created a triangular network along with buyers to receive procurement orders and then source from supplying countries with their already established marketing and distribution channels. Korea, especially Daewoo's engagement through Desh Limited, had not only spread the production base but also helped the economy of Bangladesh in at least three specific ways. First, Daewoo provided training to 14 women in their Pusan plant that contributed in breaking the traditional taboo of working women outside their home in a moderate Muslim country; second, it offered technical and marketing know-how to a large pool of employees who later

[1] https://web.archive.org/web/20130604100330/http://www.deshgroup.com/html/corporate.htm

proved themselves as confident entrepreneurs; third, it supported the nascent Bangladesh apparel industry to replicate Korean policy environment by adopting best business practices such as SBW, BBLC, and President Award. The value chain worked as a 'triangular trade' in which Daewoo received a letter of credit (L/C) from an overseas buyer and then it opened a BBLC against Desh that finally shipped the products directly to the international buyer but received payment from Daewoo rather than from the buyer (Rhee 1990b).

3. Analytical framework

The governance structure of the global apparel value is important to assess export performance and industrial upgrading of a given country. The standard analytical tool for this purpose is to analyze the global value chain (GVC) framework advanced by Gereffi (1994, 1999) and expanded on by others (Gereffi et al. 2005, Bair & Peters 2006, Neidik & Gereffi 2006, Gereffi & Frederick 2010, Humphrey & Schmitz 2002, Athukorala & Ekanayake 2017). The GVC framework allows the manufacturers or suppliers to access global markets through lead firms especially in the demand-responsive apparel industry (Hamilton & Gereffi, 2009). Since only focusing on the demand side value chain does not capture the complete picture of the export competitiveness of a given country, this study also pays attention to the supply side of the apparel value chain.

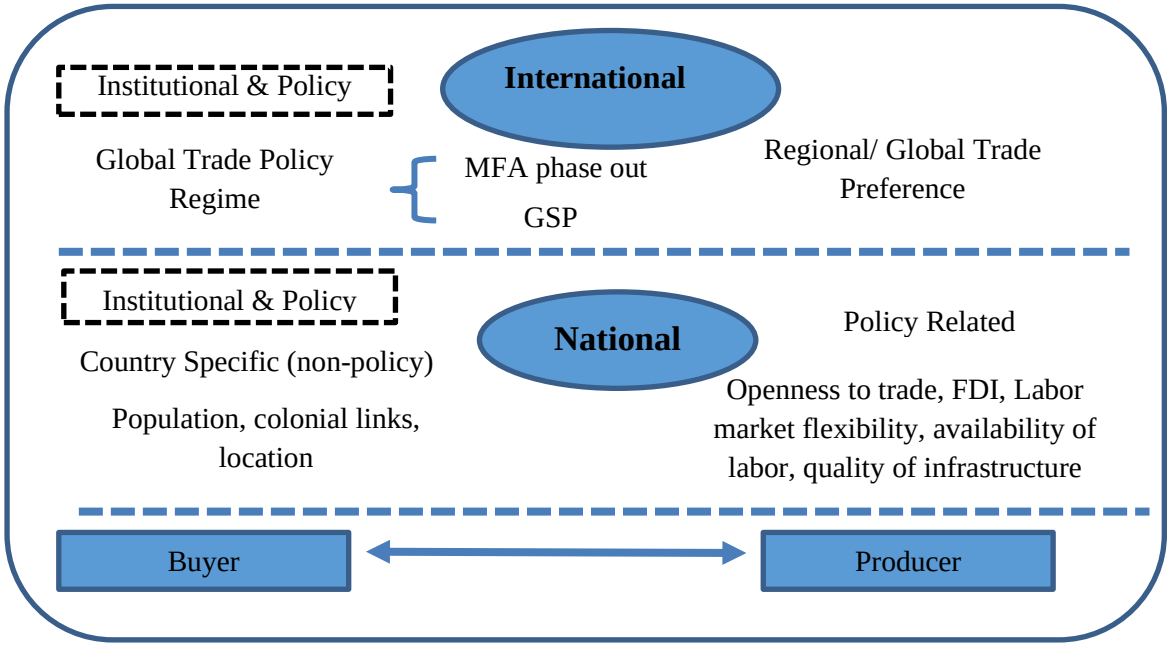

Figure 1. Buyer-manufacturer interaction for industrial upgrading within the broader national/international policy contexts

Source: Drawn by author based on Gereffi 1999; Bair & Peters 2006; Feenstra & Hamilton 2006; Athukorala and Ekanayake 2017.

Figure 1 shows the interaction between the buyers and sellers who are the main key players of international production and trade networks. We need to incorporate the GVC approach in a broader understanding of export-oriented industrialization with particular consideration to relevant country-specific characteristics and international and national institutional policy contexts (Bair & Peters 2006, Feenstra & Hamilton 2006, Athukorala & Ekanayake 2018b). It also shows that in the international institutional and policy context, global trade policy regimes such as the MFA and global or regional trade preferences such as the EU's Everything but Arms (EBA) under GSP for LDCs, bilateral or multilateral free trade agreements (FTAs) are some of the intrinsic components of functioning domains where the sourcing agents manage. On the national end, there are policy-related issues such as openness to trade, FDI, labor market flexibility, availability of labor, quality of infrastructure and non-policy related issues such as population, colonial background, and location that play vital role in influencing the character of buyer-manufacturer linkages and upgrading results. (Fenestra & Hamilton 2006; Neidik & Gereffi 2006).

The abolition of the MFA quota in 2005 allowed the lead firms to source apparel products according to their demand irrespective of the quota or country preferences. The exporting firms in developing countries find it very challenging to meet the buyers' increased demand for more quality goods at more competitive prices. Due to the increased competition for delivering better quality products at affordable prices, apparel producers in developing countries have undergone upgrading and restructuring in different networks of the value chain as well as their products, process, functions and chain. Different countries take different policy measures and instruments by reforming their tax base, creating bonded warehouses, banking facilities, providing cash incentives, reducing tariff structures, devaluing or stabilizing the currency against dollars, establishing backward (textile base) and forward linkages.

In view of these factors, this paper investigates the role of determinants in the growth of Bangladesh's apparel industry with particular attention to the supply side and demand side variables suggested in the governance structure of the global apparel value chain.

4. Export performance

Figure 2 shows Bangladesh's apparel export performance between 1976 and 2018. Bangladesh started apparel exports to four countries namely Ireland, New Caledonia, Saudi Arabia, and Sweden in 1976. Total exports in that year (US$26,840) amounted to only 0.086 per cent of the total merchandise exports of the country. Apparel exports value increased to US$178.6 million in 1985 as a result of compound annual growth rates (CAGR) of more than 138.5 per cent over the first 10 years. In 1987, the apparel exports of Bangladesh observe a 101.6 per cent increase from US$218.9 million in the previous year to US$441.5 million. And with this phenomenal growth, apparel exports with a 38.1 per cent share became the largest export earning sector of Bangladesh exceeding the export share of jute products. This robust growth phenomenon continued through the next decades while exports increased from US$218.9 million in 1986 to US$2.63 billion in 1995 with an average annual compound growth rate of 28.24 per cent.

It is notable that starting in 1976, Bangladesh's apparel industry consolidated its position with in the global apparel value chain only two decades of engagement by capitalizing on the MFA

quota regime. Bangladesh's apparel exports value increased from US$2.8 billion in 1996 to US$8.2 billion in 2004, with an average annual growth rates of more than 12.34 per cent over this 9 years (Appendix A). During the post-MFA period, Bangladesh's apparel exports observe CAGR of 11.79 per cent, which increases the exports from US$8.3 billion in 2005 to US$39.6 billion in 2018. However, the apparel exports increase to US$ 39.6 billion, which is about 87.23 per cent of the total exports in 2018.

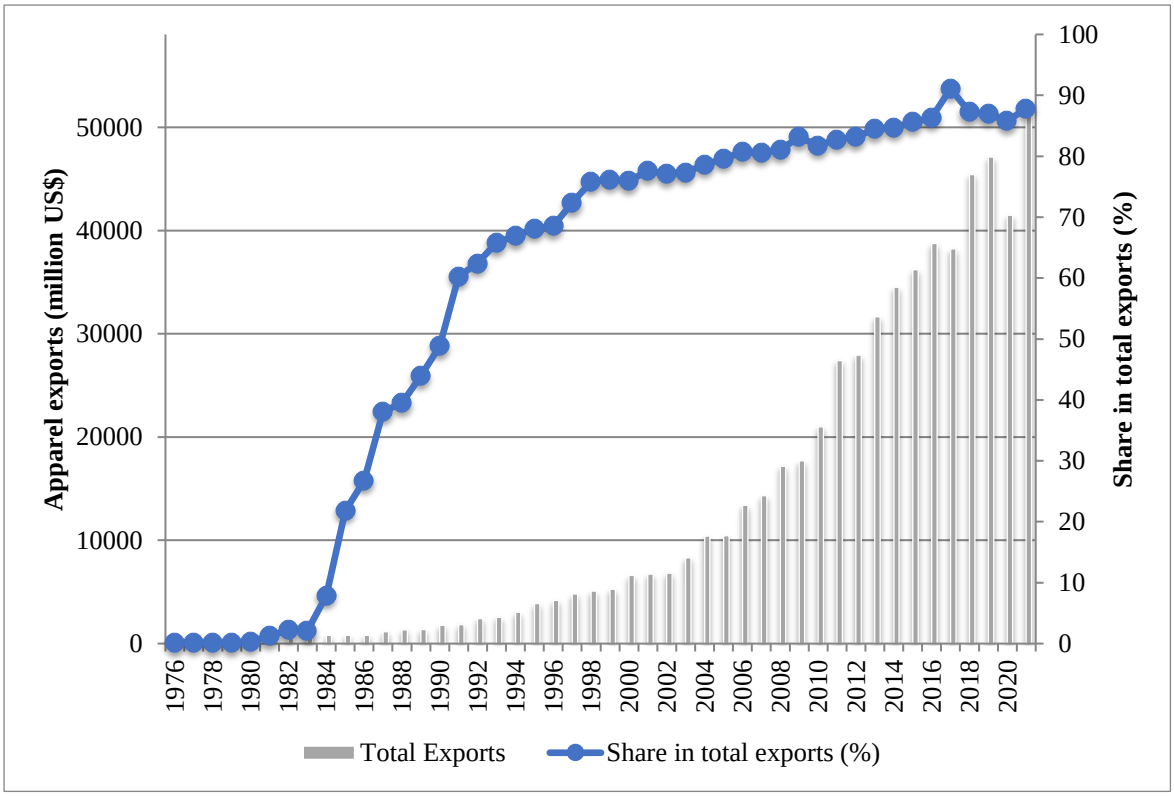

Figure 2. Apparel exports from Bangladesh, 1976-2021

Source: Data compiled from UNComtrade (based on SITC revision 2 until 1992; and revision 3 from 1993-2021).

The trend continued until recently in 2021 while the apparel exports belong to 87.85 per cent. UN Comtrade data shows that Bangladesh's apparel products were exported to 47 countries in 1991, which doubled to 97 countries in 1999, and increased to as many as 147 countries 2013.

4.1 Number of firms and employment

The number of apparel firms grew from about 384 in 1984-85 to more than 4,621 in 2018-19 (BGMEA 2020) while employment increased from 0.1 million in 1985 (Staritz & Frederick

2012b, p. 219) to 2.76 million in 2012 (BBS 2012, p. 19) and finally to 3.26 million in 2018 (BBS 2018). The number of workers has increased from 3.56 million in the apparel and textile industry in 2012 (BBS 2012, p. 19) to 3.93 million in 2018 (BBS 2018). Although the share of female was more than 90 per cent in the apparel segment in the 1980s and 1990s, it has been declined to 66.5 per cent in 1999 (BBS 2000) and further dropped down to 54.47 per cent in 2012 (BBS 2012; p. 19) and stabled to 54.62 per cent in 2018 (BBS 2018). The apparel industry alone provides employment to 2.76 million people which accounts for 55 per cent (BBS 2012, p. 19) of total manufacturing employment and also employs more than 10 million people indirectly working in relevant sectors (Staritz & Frederick 2012, p. 213). The industry indirectly provides employment to both manufacturing and service sectors such as apparel accessories, textiles, spinning, weaving, dyeing, printing, packaging, shipping, road and sea transport, stevedoring (clearing and forwarding, C&F), real estate, cosmetics and FMCGs, rental accommodation, banking, insurances, freight forwarding, merchandising and buying houses.

4.2 Bangladesh's changing role in world exports

A detailed analysis of the top 15 world apparel exporters and top five exporters' changing roles for the year 1985, 1995, 2005, 20015 and 2018 are given in the appendix table 22. China is by far the clear winner in the global apparel value chain during 1985-2018. During this period, Chinese apparel exports have increased from a meagre 4.8 per cent in 1985 to 31.5 per cent in 2018, and its value of exports rises from US$1.9 billion to US$158.2 billion during the period. On the other hand, Bangladesh's apparel exports share in the world market was 0.4 per cent in 1985, which has gradually increased to 1.3 per cent in 1995 and to 2.4 per cent in 2005. During the MFA era, Bangladesh's value of apparel exports increased from US$0.17 billion in 1985 to US$1.9 billion in 1995 and further to US$6.9 billion in 2005. Contrary to the predictions made by many industry experts, Bangladesh's market share further increased to 5.7 per cent in 2015 and to 7.9 per cent in 2018 while the value of apparel exports increased to US$26.7 billion in 2015 and US$39.6 billion in 2018. A striking trend is that Bangladesh, along with China, Vietnam, Cambodia, and Sri Lanka are clearly the winners that could either sustain or increase their market share in the world apparel market in the post-MFA era. It is also remarkable that Bangladesh's exports were even sustained during the global economic recession that severely

hit the apparel value chain of both developing and developed countries in 2008-09. This unique sustained position of Bangladesh apparel industry suggested that low-cost products coupled with low-price offering and price-competition play important roles in the export performance.

4.3 Commodity composition of apparel exports

In 1990, Bangladesh's share of knitwear in the export basket was only 13.5 per cent while the share of woven items was 86.5 per cent. However, it diversifies its export of knit products in the 1990s. The knit products (HS61) observed growth at a rate of 32.5 per cent during the 1991-2000 period, which later sustained to 21.4 per cent over 2001-10 and 13.2 per cent over 2011-19 (Appendix: Table 23). On the other hand, woven products enjoyed growth at a rate of 19.1 per cent, 9.7 per cent and 12.9 per cent during 1991-2000, 2001-10, 2011-19 periods respectively. The knitwear exports increases from US$1.4 billion in 2002 to US$2.1 billion in 2003 and further rises to US$3.0 billion in 2004 with an astonishing growth rate of 47.2 per cent and 41.6 per cent respectively. Later on, the share of knitwear grew to 48.3 per cent in 2004 and it further strengthened its position to 52.7 per cent and in 2007 and to 51.3 per cent in 2019. In recent years, both knit and woven products contribute equally in the export basket.

4.3.1 Bangladesh's changing composition of apparel

This section analyzes the changing patterns of commodity composition of apparel exports based on the three-way product classification proposed by Abernathy et al. (1999): basic products, fashion-basic products, and fashion products. Basic apparel products are the items that remain in retailers' possession or shop floor for many seasons which comprises mainly men or boys' shirts, trousers and underwear (Athukorala 2018, p, 0256). On the other end, fashion items are usually high-end products which contain major fashion elements and design content. These fashion products such as dresses and suits are usually made in France and Italy based fashion houses and not imported from the developing countries (ibid, p. 0256). The demand for these fashion items is mainly driven by social status and historical cultural values.

In the middle of these two continuums, the fashion-basic items are basic apparels which contain some fashion and styling elements such as fashion lingerie, inner-wear, pants with pleats or trim, stone-washed jeans). Out of these products categories, basic apparels on average account

for more than half of the globally traded goods while the other two categories each accounting for quarter. In the basic product categories, the major retailers such as Walmart, K-mart, Target imports low-cost products from low-cost suppliers in bulk volume such as from Bangladesh. The basic apparel items do not have to replenish the shop floor too frequently and as such they do not require higher flexibility and faster delivery or faster lead time. However, it needs to have higher flexibility, short lead time, higher capabilities to manage the lean retailing (faster replenishment of items from shop floor) which are major pre-requisites for supplying in the fashion-basic categories. It is often argued that countries with significant comparative advantage, higher capacities upgrade themselves from basic to fashion-basic segments of the global apparel value chain.

Table 1. Bangladesh's Top 20 Apparel Export Products, 1990, 2004, 2019[2]

HS Code	HS Description			Exports Composition			World Market Share (%)		
	Description	Fibre	Products	1990	2004	2019	1990	2004	2019
Total Apparel Exports				%	%	%	%	%	%
610910	M&W	COT	T-Shirts	2.4	18.9	14.9	0.8	6.6	20.7
620342	M&B	COT	Trousers	5.5	12.2	14.7	2.6	4.7	24.0
620462	W&G	COT	Trousers	2.9	5.3	9.0	2.0	2.0	18.5
611020	M&W	COT	Sweaters	0.9	3.2	7.2	0.4	1.1	11.3
611030	M&W	MMF	Sweaters	1.3	1.8	6.5	0.6	0.8	10.7
620520	M&B	COT	Shirts	11.5	6.6	4.9	4.7	5.0	18.6
610462	W&G	COT	Trousers	0.5	0.4	3.1	0.9	1.0	18.6
610510	M&B	COT	Shirts	0.5	3.0	2.5	0.5	5.5	18.1
611120	Baby	COT	Garments	…	0.1	2.1	…	0.2	13.7
610990	M&W	TEX*	T-Shirts	1.2	1.2	2.1	2.1	1.5	6.4
620343	M&B	SYN	Trousers	0.2	1.6	1.8	0.2	2.3	9.5
620193	M&B	MMF	Jackets	0.3	0.1	1.4	0.3	0.1	5.6
621210	W&G	SYN	Brassieres	…	0.4	1.4	…	0.4	5.7
610711	M&B	COT	Underpants	…	0.7	1.2	…	1.8	12.3
620640	W&G	MMF	Blouse	2.2	0.2	1.1	1.1	0.4	5.4
610342	M&B	COT	Trousers	…	0.7	1.1	…	5.2	10.5
620293	W&G	MMF	Jackets	0.5	0.1	1.1	1.0	0.1	4.4
610442	W&G	COT	Dresses	…	0.1	1.0	…	1.8	14.4
610821	W&G	COT	Panties	0.5	0.7	1.0	1.4	1.8	15.2
620469	W&G	TEX**	Trousers	1.4	1.6	1.0	3.7	3.3	10.1

[2] Top 20 products identified based on the export composition of 2019.

Top 20 Products' Share (%)	31.7	59.0	79.2			
Men & women wear	18.3	42.5	30.9			
Women & girls wear	25.2	14.9	23.6			
Men & boys wear	56.5	42.6	42.8			
Baby wear			2.7			
Bangladesh's export value in Billion (US$)	0.64	6.2	40.0			

Source: For year 1990 & 2004 exports data from UN Comtrade database; for year 2019 mirror data from ITC, Trade Map database; Note: … = insignificant amount of exports; M&W= men & women (both gender); M&B= men & boys; W&G=women & girls; COT=Cotton; MMF=man-made fiber; SYN= synthetic; TEX*= textile other than COTTON; TEX**=textile other than wool, cotton, or synthetic.

The available export data do not allow exact disaggregation of Bangladesh's apparel exports into these three market segments. Bangladesh's top 20 (based on 2019 exports statistics) apparel export products at 6 digit level (HS code) and their composition in total exports for some different period of 1990, 2004, and 2019 has been given in Table 1. The data summarized in Table 1 shows a clear pattern of concentration of Bangladeshi apparel exports in the basic products category even following the post-MFA period. Bangladesh's apparel products, mainly woven and knit are highly concentrated in a few products. The degree of concentration of exports in top 20 products has increased from 31.7 per cent in 1990 to 59.0 per cent in 2004, and finally to 79.2 per cent in 2019. Out of these 20 items, 11 comprise knitwear and 9 comprise woven products. There are six categories of trousers, two items of T-shirts, two items of shirts, two items of jackets in top 20 export items. Of the top 20 apparel export products to the world, 12 are cotton based, 4 are based on man-made fibers (MMF), two are based on synthetic, and two are made from textiles other than cotton, wool or synthetic.

The leading woven export products are trousers and shirts while top exporting knit items are T-shirts, sweaters, and trousers. Table 1 also shows that, the shares of major export products are consisted of 17 per cent (US$6.8 billion) for both products of T-shirts, 30.7 per cent (US$12.3 billion) for all items of trousers, 13.7 per cent (US$5.5 billion) for both sweater products, 7.5 per cent (US$2.9 billion) for shirts, 2.5 per cent (US$1 billion) for jackets, 2.1 per cent (US$847 million) for baby garments, 1.4 per cent (US$574 million) for Brassieres, 1.2 per cent (US$473 million) for underpants, 1.1 per cent (US$441 million) for blouse, 1 per cent (US$ 415 million) for women and girls' dresses, and 1 per cent (US$408 million) for panties.

It is notable that the baby garments (HS611120) were almost negligible amounting to only US$29,755 in 1990, which rapidly grew to US$8 million in 2004 and further to US$847 million in 2019 claiming a share of 2.1 per cent in 2019.

Bangladesh exports of Brassieres (HS621210) were virtually zero in 1990 which have been increased to US$26 million and to US$574 corresponding to 0.4 per cent and 1.4 per cent in 2004 and 2019 respectively. Bangladesh's export of these two items amounts to 13.7 per cent and 5.7 per cent of the world market share in respective product categories (Table 1). The data clearly shows the dominant role of basic products such as T-shirts, trousers, and sweaters for men/women (both gender) as well as men and boys' items (73.7%) in Bangladesh's apparel exports even in 2019.

4.3.2 Bangladesh's export similarity with its competitors

Data on the commodity composition of apparel exports from Bangladesh and six other competitors for the year 2018 are summarized in Table 2. In the table, the top 20 apparel products identified relating to the export basket in 2018 is used as the base for comparing changes in the product mix over time. Bangladesh's share of women products which is usually considered as fashion-basic products amounts to only 23.4 per cent of the total export which is lower than those of China, Vietnam, Indonesia and Sri Lanka. In the first column of the table, the top twenty apparel products are ranked according to the export share of 2018 given in column 4. The detailed description of the products based on the types and nature of contents are demonstrated in column 2 and 3. The share of each of the other countries is given for these 20 items for comparison in other columns. The export similarity index (ESI) suggested by Finger and Kreinin (1979) has been used to estimate Bangladesh's export composition among top 20 product categories at the 6-digit level for 2018. The ESI measures the similarities or dissimilarities of the commodity composition of a given country with other countries or total world trade (Athukorala 2018a, p. 26).

The ESI[3] can be defined as by the following formula:

[3] Where 'a' and 'b' mean two countries (or groups of countries) exporting to market 'c', *Xi(ac)* is the share of commodity *i* in a's exports to *c*, and *Xi(bc)* is the *share* of commodity *i* in *b*'s exports to *c*. If the commodity

S(ab,c) = {∑Minimum[Xi(ac), Xi(bc)]}100,

This ESI compares patterns of exports among product categories which is not influenced by the relative size or scale of total exports.

Figure in each column measures the degree of similarity of Bangladesh's export composition to that of each of the reported country. The index in Table 2 shows higher degree of variability among these seven countries in 2018. The ESI shows a noticeable difference of Bangladesh's export composition compared to each of these six countries.

In 2018, the ESI varies from 29.7 in case of Cambodia to 41.2 of Indonesia. This implies that the competing countries such as Indonesia, Vietnam, China, Sri Lanka and India have different bundles of apparel products offering. These countries have identified and differentiated their market segment and serves in their respective niche market based on their comparative advantages.

Table 2. Composition of exports from Bangladesh and Asian countries, 2018 (%)

HS Code	HS Description		Bangladesh	China	Vietnam	India	Indonesia	Cambodia	Sri Lanka
	Top 20 Products		79.4	46.0	52.4	43.2	51.9	34.4	59.6
610910	M&W	T-Shirts	14.9	2.8	4.4	11.4	3.2	12.4	3.3
620342	M&B	Trousers	15.0	3.6	2.6	2.8	3.4	0.8	5.8
620462	W&G	Trousers	9.1	5.0	2.6	1.3	3.4	1.6	4.2
611020	M&W	Sweaters	6.9	4.3	5.5	1.1	6.9	2.3	2.7
611030	M&W	Sweaters	6.5	7.4	5.3	0.5	3.0	1.3	2.9
620520	M&B	Shirts	5.0	1.4	2.6	5.0	4.4	0.8	3.6
610462	W&G	Trousers	3.1	1.6	2.0	0.7	3.6	1.2	2.6
610510	M&B	Shirts	2.6	0.4	1.1	2.5	0.6	0.3	1.6
611120	Baby	Garments	2.3	1.3	0.6	4.1	1.5	1.6	3.5
610990	M&W	T-Shirts	2.2	3.0	4.2	4.3	3.2	5.1	4.1
620343	M&B	Trousers	1.8	1.5	4.6	0.6	2.3	0.4	1.2
620193	M&B	Jackets	1.4	2.8	5.1	0.0	2.0	0.2	0.1
621210	W&G	Brassiere	1.4	2.7	2.5	0.7	4.3	0.8	13.1
610711	M&B	Underpants	1.2	0.8	1.0	1.3	0.1	0.6	3.4

distribution of a's and b's exports are alike that is *Xi(ac) = Xi(bc))*, the index will take on a value of 100. If a's and b's export patterns are completely dissimilar the index will take on a value of zero.

620640	W&G	Blouse	1.2	0.7	1.9	3.7	5.6	0.1	1.5
610342	M&B	Trousers	1.1	1.1	0.6	0.8	1.4	1.3	0.2
620293	W&G	Jackets	1.0	3.5	3.7	0.0	0.8	0.1	0.3
610442	W&G	Dresses	1.0	0.6	0.6	0.7	0.7	0.3	0.4
610821	W&G	Panties	1.1	0.7	0.3	0.9	0.2	0.8	4.5
620469	W&G	Trousers	0.8	0.6	1.1	0.7	1.2	2.6	0.6
Other Products			20.6	54.0	47.6	56.8	48.1	65.6	40.4
Total			100	100	100	100	100	100	100
Trade Value (billion US$)			39.5	138	28	15.6	8.5	7.8	5.3
Men & women wear			38.5	38.0	37.3	40.0	31.4	61.2	21.8
Women and girls wear			**23.4**	**33.6**	**27.8**	**20.1**	**38.2**	**21.7**	**45.5**
Men and boys wear			35.2	25.5	33.7	30.4	27.4	12.5	26.8
Baby wear			2.9	2.9	1.2	9.6	2.9	4.7	5.9
Export Similarity Index (ESI)			**100**	**38.9**	**39.0**	**36.6**	**41.2**	**29.7**	**38.9**

Source: Trade Map database. Note: Top 20 products identified based on Bangladesh's export composition in 2018; Krenin-Finger (1979) index of export similarity.

5. Determinants of apparel exports

In this section, an econometric analysis is conducted to examine the determinants of apparel export performance based on time-series data from 1976-2018. The analysis focuses on demand side and supply side determinants. On the demand side, the basic determinants for Bangladesh apparel exports are world demand and MFA quota facilities for Bangladeshi products. On the supply side, the determinants are Bangladesh's production capacity or manufacturing output, real effective exchange rate (REER), apparel sector foreign direct investment (FDI), liberalization and other policy supports from government such as introducing the back-to-back letter of credit and special bonded warehouse.

5.1. The model

The export equation is specified as follows:

$$lbexpr_t = \beta_0 + \beta_1\, lwexpr_t + \beta_2\, lmvar_t + \beta_3\, lrer_t + \beta_4\, dpmf_t + \beta_5\, lnrer\_mfa_t + \beta_6\, lwexpr\_mfa_t + \beta_7\, dpblc_t + \beta_8\, lfdir_t + u_t \quad (1)$$

Where, $lbexpr_t$ is the natural logarithm of Bangladesh's export of apparel from Bangladesh (deflated by the Bangladesh clothing price index, base year = 1995). The explanatory variables are explained below with the expected sign of the regression coefficients in brackets:

$lwexpr_t$ *(+)*	World's apparel export (real export has been deflated by the US apparel import price index, base=1995)
$lmvar_t$ *(+)*	Bangladesh's manufacturing value added (real output deflated by Bangladesh's wholesale price index, base=1995). Here, one year lagged value of manufacturing output has been considered to remove the endogeneity issues.
$lrer_t$ *(+)*	Real effective exchange rate. Two sets of REER have been used: (i) bilateral REER with USA apparel import price index and (ii) bilateral REER with 10 apparel importing countries' producer price index (an REER index has been constructed based on 10 major export destinations of Bangladesh apparel products based on weighted average). base=1995;
$dpmf_t$ (+)	Dummy of post MFA period to capture the impact of MFA quota abolition (1 if year 2005-2018; and zero otherwise)
$lrer\_mfa_t$ (+)	Interaction variable of *lrer* and dummy variable of *dpmf* (REER in the post MFA era)
$lwexpr\_mfa_t$ (+)	Interaction variable of *lwexpr* and dummy variable of *dpmf* (world apparel export in the post MFA era)
$dpblc_t$ (+)	Dummy variable of introduction year of government policy instruments i.e. back to back letter of credit (BBLC) period and special bonded warehouse (SBW) (1 for both BBLC and SBW period 1984-2018, and zero otherwise)
$lfdir_t$ (+)	Foreign direct investment (FDI); since apparel sector-wise FDI data are available only for 1996-2018 (23 years), the variable has been

	discarded from the first equation and a separate equation has been formed while results have been shown later.
u_t	Disturbance term

Among the explanatory variables, world apparel export (*lwexpr*) is expected to capture the impact of world demand for apparels on export performance. The foreign currency in terms of Bangladeshi Taka faced by Bangladeshi apparel exporters is determined exogenously. It is notable that there is an ongoing process of shifts in global demand to emerging developing nations which is driven by global production sharing in overall world demand that is pertinent for explaining Bangladesh's export performance. It is expected that the global demand has a positive relationship with Bangladesh's apparel exports. The manufacturing value added (*lmvar*) is included to capture the impact of production capacity expansion in manufacturing on apparel exports. It is expected that the export increases with increase in Bangladesh's manufacturing or production capacity. The REER (*lrer*) captures the impact of export performance of changes over time in the relative profitability of exporting and selling locally. The REER is measured by the multiplication of the domestic currency price (BDT) of foreign currency i.e. USD and partner countries' price (P_w) to domestic price (P_d) ratio [REER= (NEER* Partner countries' CPI)/ Bangladesh's CPI)]. If REER increases (decreases), Bangladesh's export competitiveness increases (decreases). Here NEER is the domestic price (BDT) of a unit of foreign currency, i.e. how many local currencies can be bought with one USD. The dummy of post-MFA variable (*dpmf*) captures the impact of MFA quota abolition. It is expected that after the MFA quota abolition the exports should increase as the country could utilize its full potential. The interaction variable of REER in the post-MFA period (*lrer_mfa)* captures whether the REER still impacts the export performance in the post-MFA era. It is expected that the variable has a positive relationship with exports as the export competitiveness increases with an increase in REER devaluation. The interaction variable of world export demand in the post-MFA era (*lwexpr_mfa*) captures the relationship of world export demand with Bangladesh's export performance in the post-MFA era. It is expected that the world apparel export demand is positively related with Bangladesh's export especially in the quota-free regime. The dummy variable of policy variables (*dpblc*) is expected to have a

positive and strong relationship with exports as government policy interventions such as back-to-back letter of credit (BBLC), special bonded warehouse (SBW) which had been introduced in 1984 are expected to have positive impacts on exports. Finally, the FDI (*lfdi*) variable is expected to have a positive relationship with exports since it is usually considered to be a medium of capital, technology, and knowledge transfer. All data series other than the dummy variables were used in logarithmic form.

5.2 Data sources and variable construction

Bangladesh apparel export values were compiled from the UN Comtrade database.[4] The data on apparel exports from all the exporting countries have also been compiled from Comtrade database. The manufacturing output data or value addition (*lmvar*) has been compiled from the World Bank website. The manufacturing output and the apparel exports can have some endogeneity threats which can be mitigated by taking one year lagged value of manufacturing output ($lmvar_{t-1}$). Researchers often suggest applying a lagged value of an explanatory variable (X) to 'exogenise' it while estimating the effect of X on Y (Bellemare et al. 2017, p. 951). Here, this implies that the Y_t ($lbexpr_t$) cannot cause X_{t-1} (or $lmvar_{t-1}$) and while we replace the X_t (or $lmvar_t$), with X_{t-1} (or $lmvar_{t-1}$), it mitigates the concern that X (or $lmvar_t$) is endogenous to Y ($lbexpr_t$).

A unique REER index has been constructed based on weighted average of top 10 export destinations (Germany, the USA, the UK, Spain, France, Italy, Netherlands, Canada, Japan and the Kingdom of Saudi Arabia) of Bangladesh apparel products from 1976 to 2018. The advantages of autoregressive distributed lag model (ARDL) model is that when it is modeled with levels and differences under ARDL, the endogeneity issue is addressed. It can be intuitively found that there should not have any reverse causality from apparel exports to REER. If there were any reverse causality, the issue would have been addressed by the ARDL model. When the estimation is modeled with levels and differences and we get a persistence

[4] In this paper, import (export mirror) data has been used since it has two benefits over export statistics of Bangladesh. Firstly, most of the exports from Bangladesh are done via Singapore as the feeder vessels carry the goods to Singapore and then they are loaded in mother vessels there. So exports from Bangladesh to the destination country are not well represented in such cases. Secondly, since Bangladeshi products do not have any export tariffs or duties, the export statistics are not well maintained there.

specification, the endogeneity issue is addressed. Moreover, when exports increase, the exchange rate appreciates. So, if there were any endogeneity issue, the coefficient of REER (*lrer*) would have been bigger. If export impacts on REER, naturally the impact would be appreciating, then it works as counter balancing. The methodology allows for endogeneity at least to some extent and even if there is any endogeneity, the result could have been stronger because exports lead to appreciation. The foreign direct investment (*lfdir)* variable has been dropped from the main equation since the sector-wise data is not available for the whole period (1976-2018) under study. Because the FDI data are available only for 1996-2018 (23 years), we run a second regression which results are shown later (Appendix: Table 10-11). These results are similar to that of the main equation (2) and the *lfdir* variable is found to be significant at 1 per cent level of significance with an expected positive sign.

5.3 Estimation method

The export equation is estimated using the autoregressive distributed lag (ARDL) bounds testing approach introduced by Pesaran and Shin (1999) and later extended by Pesaran et al. (2001) to examine the long-run cointegration relationship among the time series. The ARDL approach has some specific advantages over other cointegration techniques. It does not impose a restrictive assumption that all the variables under study must be integrated of the same order such as order one [I(1)], order zero [I(0)] or partially integrated (Odhiambo 2009, p. 619). The ARDL test is also suitable in case of small sample size while other approaches are sensitive to small samples. Moreover, the ARDL test usually provides unbiased estimates of long-run model and valid t-statistics even though some of the regressors are endogenous (Pesaran et al. 2001). In addition to these advantages, this approach helps to explain both short-run effects and long-run cointegration. It also addresses endogeneity issues and spurious regression problems by using an optimum lag structure that fits the data (Pesaran, 2015).

The ARDL framework of equation (1) can be rewritten as follows:

$$\Delta lbexpr_t = \alpha + \sum_{i=1}^{m} \beta_{1i}\Delta lbexpr_{t-i} + \sum_{i=0}^{m} \beta_{2i}\Delta lwexpr_{t-i} + \sum_{i=0}^{m} \beta_{3i}\Delta lmvar_{t-i} + \sum_{i=0}^{m} \beta_{4i}\Delta lrer_{t-i} + \sum_{i=0}^{m} \beta_{5i}\Delta dpmf_{t-i} + \sum_{i=0}^{m} \beta_{6i}\Delta lrer\_mfa_{t-i} + \sum_{i=0}^{m} \beta_{7i}\Delta lwexpr\_mfa_{t-i} + \sum_{i=0}^{m} \beta_{8i}\Delta dpblc_{t-i} + \sum_{i=0}^{m} \beta_{9i}\Delta lfdir_{t-i} + \beta_{10}\, lbexpr_{t-1} + \beta_{11}\, lwexpr_{t-1} + \beta_{12}\, lmvar_{t-1} + \beta_{13}\, lrer_{t-1} + \beta_{14}\, dpmf_{t-i} + \beta_{15}\, lrer\_mfa_{t-i} + \beta_{16}\, lwexpr\_mfa_{t-i} + \beta_{17}\, dpblc_{t-i} + \beta_{18}\, lfdir_{t-i} + \nu_t \quad (2)$$

According to the Bounds test, null hypothesis implies no cointegration among variables. The null hypothesis is H_0:$\beta_{10}=\beta_{11}=\beta_{12}=\beta_{13}=\beta_{14}=\beta_{15}=\beta_{16}=\beta_{17}=\beta_{18}=0$ against the alternative hypothesis H_1: $\beta_{10}=\beta_{11}=\beta_{12}=\beta_{13}=\beta_{14}=\beta_{15}=\beta_{16}=\beta_{17}=\beta_{18}=0$. If the calculated value of F statistic is higher than the upper bound critical value I(1) for the number of explanatory variables (k) [in this case variables (7)] by Pesaran et al. (2001), null hypothesis will be rejected. If the F statistic is lower than the lower bound critical value I(0), null hypothesis cannot be rejected. If the F statistic falls between the bounds then the cointegration test becomes inconclusive. Optimal lag values in equation (2) is chosen based on the model selection criteria such as Akaike (AIC) or Schwarz information criteria (SIC). The minimum AIC or SIC of the model implies optimal period of lags (m). However, there must not be any serial correlation in residuals for the model. The preferable estimated model is the one which gives the minimum information criteria or the maximum adjusted R-squared value. If there is cointegration or long run relationship, we need short-run estimation of ARDL model also known as error-correction model (ECM) which is as follows:

$$lbexpr_t = \delta_0 + \sum_{i=0}^{p} \delta_{1i} \Delta lbexpr_{t-i} + \sum_{i=0}^{q1} \delta_{2i} \Delta lwexpr_{t-i} + \sum_{i=0}^{q2} \delta_{3i} \Delta lmvar_{t-i} + \sum_{i=0}^{q3} \delta_{4i} \Delta lrer_{t-i} + \sum_{i=0}^{q4} \delta_{5i} \Delta dpmf_{t-i} + \sum_{i=0}^{q5} \delta_{6i} \Delta lrer\_mfa_{t-i} + \sum_{i=0}^{q6} \delta_{7i} \Delta lwexpr\_mfa_{t-i} + \sum_{i=0}^{q7} \delta_{8i} \Delta dpblc_{t-i} + \sum_{i=0}^{q8} \delta_{9i} \Delta lfdir_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad (3)$$

Here the first part of the differenced part in the right hand side of the equation (3) represents the short-run dynamics while the λECM_{t-1} represents the long run dynamics. The coefficient of the error correction term (ECM_{t-1}) λ in equation (3) is the speed of adjustment parameter that demonstrates how fast the series achieves a long-run equilibrium if there is any shock. To select the lag values p, q_1, q_2, q_3, q_4, q_5, q_6, q_7 and q_8 in equation (3), model selection criteria such as AIC, SIC, adjusted R-squared are used. Several diagnostic tests such as the serial correlation, normality, heteroscedasticity are conducted to examine the acceptability of the model. Stability test such as cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) suggested by Brown et al. (1975) are conducted to check the stability of the coefficient of the regression. The following section reports the summary statistics (Table 3).

Table 3. Summary statistics of the variables used in estimating export equations

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
LBEXPR	10.51	11.85	14.07	0.36	3.68	-1.29	3.63
LWEXPR	15.57	15.91	17.42	11.37	1.58	-0.81	2.88
LMVAR	12.61	12.53	14.46	11.04	0.93	0.25	2.15
LRER	4.44	4.55	4.81	3.59	0.28	-1.26	4.00
DPMF	0.33	0.00	1.00	0.00	0.47	0.74	1.55
LRER_MFA[1]	1.50	0.00	4.81	0.00	2.19	0.75	1.56
LWEXPR_MFA	5.58	0.00	17.42	0.00	8.13	0.75	1.56
DPBLC	0.81	1.00	1.00	0.00	0.39	-1.61	3.60

Source: Author's calculation. 1. LREER based on USA apparel import price index

In this table, log values are used for estimating the descriptive statistics. From this table, LWEXPR has the topmost average of 15.57 and the DPMF has the lowest average of 0.33. LWEXPR_MFA is the most volatile variable with 8.13 while LRER is the less volatile variable (0.28). LBEXPR, LWEXPR, LRER, and DPBLC show negative skewness indicating the distribution's left tail is longer or fatter than the right tail, while the remaining variables show positive skewness indicating the opposite. LBEXPR, LRER, and DPBLC indicate leptokurtic, and the remaining variables are platykurtic.

5.3.1 Stationary test

We use the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) estimators to check the stationary process of the data series. The summary statistics is shown in Table 3 while the results of the ADF and PP tests are presented in Table 4.

Even though the bounds test does not require all variables to be integrated of order I(1) or I(0), it is important to conduct stationary test to ensure that the variables are not integrated of order I(2). With the null hypothesis (H_0: data is not stationary) against the alternative hypothesis, the unit root test shows that all of the variables are stationary either at levels or at first difference with the ADF and PP test. Since the results in Table 4 show that no data series are integrated I(2), rather they are integrated of different orders, meaning a combination of level and difference stationarity, the appropriate cointegration test is the Bounds test instead of the Johansen cointegration test, and additionally, it is justified to use ARDL estimators.

Table 4. Unit root tests

Variables	At level				Remarks
	ADF		PP		
	C	CT	C	CT	
LBEXPR	-4.99***	-3.69**	-10.10***	-5.39***	I(0)/I(1)
LWEXPR	-6.15***	-5.44***	-6.15***	-5.24***	I(0)/I(1)
LMVAR	0.96***	-3.50*	1.59***	-3.84***	I(1)/I(0)
LRER	-1.95***	-3.12***	-1.96***	-3.54**	I(1)/I(0)
DPMF	-0.67***	-2.00***	-0.67***	-2.00***	I(1)
LRER_MFA	-0.74***	-2.01***	-0.74***	-2.04***	I(1)
LWEXP_MFA	-0.61***	-1.97***	-0.61***	-1.97***	I(1)
DPBLC	-2.084***	-1.759***	-2.15***	-1.83***	I(1)

Note: C denotes the intercept; CT marks the trend and intercept.

***significant at 1%, **significant at 5%, and * significant at 10%.

The Akaike info criterion (AIC) gives optimum lag (3,3,3,2,3,3,2,3) for bilateral REER with USA apparel import price index and optimum lag (2,2,0,0,0,0,0,2) for bilateral REER with 10 apparel importing countries' producer price index in ARDL model in equation (2) and (1,0,1,0,0,0,0,1) for FDI equation.

Table 5. Bounds F-test for cointegration

Equation	Dependent variable	F-statistic	Asymptotic critical value					
			1%		5%		10%	
			I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Eq (2)	LBEXPR (USA apparel import price index)	19.67***	3.31	4.63	2.69	3.83	2.38	3.45
	LBEXPR (10 major importing countries' producer price index)	13.49***	3.31	4.63	2.69	3.83	2.38	3.45
With FDI	LBEXPR (USA apparel import price index)	10.52***	2.96	4.26	2.32	3.5	2.03	3.13

Note: *** denotes statistical significance at the 1% level.

The next step is to apply a bound F-test to establish the long-run relationship among the variables. The initial findings report that there is a cointegration among the variables. The bounds test reports the result of F-statistic as 19.67, 13.49, and 11.13 which are significant at 1% level (Table 5). Since the F-statistic for this model is higher than the upper critical values

by Pesaran et al. (2001), it can be concluded that there is a long-run relationship among the variables.

6. Results

The results of the long-run estimates are presented in Table 6. The model estimated for the entire period (1976-2018) does not contain FDI due to data unavailability. FDI is included in an alternative estimate for the period of 1996-2018. In the long run, the coefficient of world apparel export (*lwexpr*) is statistically significant at 1% level with an expected positive sign. It indicates that Bangladesh's apparel export increases by 2.07 per cent with 1 per cent increase in world apparel export.

The coefficient of the lagged value of log of manufacturing output (*lmvar*) is statistically significant at 5% level with an expected positive sign. This implies that Bangladesh's apparel exports increases by 2.32 per cent with 1 per cent increase in the one year lagged value of manufacturing output. The bilateral real effective exchange rate (LRER) with USA apparel import price index is also significant at 5% level with an expected positive sign. It implies that Bangladesh's apparel exports increases by 1.07 per cent with 1 per cent devaluation in real exchange rate of Bangladeshi currency Bangladesh Taka (BDT). This implies that Bangladesh's competitiveness is largely dependent on the devaluation of its currency and still Bangladesh operates in the lower segment of the global apparel value chain in which price remains a dominating factor.

Table 6. Long-run estimation based on bilateral REER with USA apparel import price index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LWEXPR	2.068***	0.573	3.609	0.006
LMVAR	2.317**	0.844	2.747	0.023
LRER	1.066**	0.386	2.756	0.022
DPMF	7.626	8.178	0.932	0.375
LRER_MFA	-1.047	0.794	-1.319	0.219
LWEXPR_MFA	-0.168	0.422	-0.399	0.699
DPBLC	1.844***	0.376	4.907	0.001

EC = LBEXPR - (2.07*LWEXPR + 2.32*LMVAR + 1.07*LRER + 7.63*DPMF – 1.05*LRER_MFA – 0.17*LWEXPR_MFA + 1.85*DPBLC)

Note: ***1%, **5% and *10% level of significance

The dummy variable of post MFA era (*dpmf*) is not significant but has an expected positive sign. In the long run, the interaction variables of REER in the post MFA era (*lrer_mfa*) and world apparel export in the post MFA era (*lwexpr_mfa*) are not statistically significant and have negative signs. These findings indicate that the impact of world export and real exchange rate have been declined in the long run following the MFA era. The long run results report that dummy of the introduction of the policy instruments (*dpblc*) such as back-to-back letter of credit (BBLC) and special bonded warehouse (SBW) are significant at 1% level with an expected positive sign. This finding shows that the policy instruments have a significant impact on the apparel exports of Bangladesh which were introduced in 1984. Since the bounds test shows that there exists a cointegration among the variables, we conduct the short-run error correction tests which results are shown in Table 7a.

The coefficient of the error correction term (*Coineqn(-1)* or ECM_{t-1}) is negative and significant as expected. The coefficient of the ECM_{t-1} shows the speed of the adjustment back to the long-run equilibrium after a short-run shock. The coefficient of -0.6355 indicates that about 63.55% of the disequilibrium of the previous year's shock adjusts back to the long run equilibrium in the current year.

Table 7a. ARDL error correction (ECM) regression (short-run estimates)

Dependent Variable: LBEXPR				
Variable	Coefficient	Std. Error	t-Statistic	P-Value
ECTt-1	-0.635***	0.038	-16.726	0.000
Δ(LWEXPR_USAPRL_MPI)	2.507***	0.144	17.382	0.000
Δ(LMVAR)	0.937***	0.108	8.649	0.000
Δ(LRER_UMPI)	-0.119	0.093	-1.275	0.234
Δ(DPMF)	34.796***	3.273	10.632	0.000
Δ(LRER_UMPI_MFA)	0.901***	0.162	5.556	0.000
Δ(LWEXPR_MFA)	-2.340***	0.206	-11.355	0.000
Δ(DPBLC)	0.938***	0.046	20.541	0.000
C	-32.882***	1.936	-16.983	0.000
@TREND	-0.149***	0.009	-15.835	0.000

Note: ***1%, **5%, and *1% level of significance.

Table 7b.Short-run Diagnostics test

R-squared:	0.998
Adjusted R-squared	0.994
DW:	2.213
$\chi 2$ (Serial correlation): Breusch-Godfrey LM Test	0.304
$\chi 2$ (Heteroscedasticity): Breusch-Pagan-Godfrey Test	0.553
$\chi 2$ (Normality): Jarque-Bera	0.532
CUSUM:	Stable
CUSUMSQ:	Stable

The model also passes through the diagnostic tests (Table 7b). The Durbin-Watson (dwatson) test is used to determine whether the error term in the linear regression model follows an AR(1) process. Since the value of the dwatson test is d=2.21 which is higher than d>1.518 (upper bound at 1% significance level), we fail to reject the null hypothesis which implies that there is no first-order autocorrelation. A further Breusch-Godfrey (BG) lagrange multiplier (LM) test is conducted to check for serial correlation. The BG LM test result shows that the value of chi2 (0.3044) is greater than 0.05 or at 5% level of significance which implies that the null hypothesis of no serial correlation cannot be rejected. The result of the Breusch-Pagan-Godfrey test for homoscedasticity is 0.5531 which is greater than 0.05 or at 5% level which implies that we fail to reject the null hypothesis that there is homoscedasticity in the residuals. The Jarque-Bera normality test reports Chi(2) of 0.5315 which implies that we cannot reject the null hypothesis of normality. The cumulative sum of recursive residuals and cumulative sum square of recursive residuals show that our model is stable at 5% level.

6.1 Results with FDI for the period 1996-2018

Since apparel sector FDI data is available for 23 (1996-2018), we estimated a separate equation and conducted the test. But the dummy variable of policy instruments (*dpblc*) has been removed from this equation because this dummy variable takes 1 for years 1984-2018 and zero otherwise. The base year for FDI equation is 2007. The long run and short-run results with taking FDI (and dropping *dpblc*) are presented in the appendix (Table 12 and 13 respectively).

It seems that the results have not changed much for the other variables when FDI is added. The coefficient of FDI (*lfdir*) is significant at 1% level with an expected positive sign. It implies that Bangladesh's apparel exports increases by 0.22% with 1% increase in FDI in apparel sector. It is, however, important to mention that the FDI variable used here does to fully capture the effect of spillover effects of FDI in the form of technological diffusion and foreign market links.

6.2 Robustness check

We can check the robustness of the results with the results based on bilateral REER with 10 apparel importing countries' producer price index which are shown in Table 8 and 9. The findings are similar to those of the long run estimates based on REER with USA apparel import price index (Table 20).

Table 8. Long-run estimation based on bilateral REER with 10 apparel importing countries' producer price index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LWEXPR	1.965***	0.555	3.542	0.002
LMVAR	3.399***	0.621	5.479	0.000
LRER_COMBINED	0.929	1.269	0.733	0.470
DPMF	4.080	11.106	0.367	0.716
LRER_COMBINED_MFA	1.498	1.604	0.934	0.359
LWEXPR_MFA	-0.695	0.674	-1.032	0.311
DPBLC	1.866***	0.405	4.602	0.000

EC = LBEXPR - (1.97*LWEXPR + 3.39*LMVAR1 + 0.93* LRER_COMBINED + 4.08*DPMF + 1.49*LRER_COMBINED_MFA – 0.69*LWEXPR_MFA + 1.87*DPBLC)

Note: ***1%, **5%, and *1% level of significance.

The coefficient of world apparel export (*lwexpr*) is significant at 1% level with expected positive sign. It implies that Bangladesh's apparel export increases at 1.97 per cent with 1 per cent increase in world apparel exports. The coefficient of lagged value of manufacturing output (*lmvar*) is significant at 1% level with an expected positive sign. It implies that with a 1 per cent increase in one year lagged value of manufacturing output Bangladesh's apparel exports increases by 3.39 per cent. The coefficient of REER (*lrer*) is not significant which is unlike the findings of the bilateral REER based on USA apparel import price index presented in Table

18. The dummy of post MFA era is not significant. The coefficients of the two interaction variables REER in the post MFA era (*lrer_combined_mfa*) and world apparel export in the post MFA era (*lwexpr_mfa*) are not significant but have similar results to those of the previous findings (Table 18). The coefficient of dummy policy instrument variable (*dpblc*) is significant at 1% level with an expected positive sign similar to the main results.

The short-run results and error correction term (ECM) is shown in Table 9. The coefficient of the error correction term ((*Coineqn(-1)* or ECM_{t-1}) is negative and significant as expected. The coefficient of the ECM_{t-1} shows the speed of the adjustment back to the long-run equilibrium after a short-run shock. The coefficient of -0.4356 indicates that about 43.56% of the disequilibrium of the previous year's shock adjusts back to the long run equilibrium in the current year. Our model passes through the diagnostic tests (Table 9).

Table 9. ARDL error correction (ECM) regression (short-run estimates)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-26.592***	2.323	-11.447	0.000
@TREND	-0.134***	0.010	-12.932	0.000
D(LBEXPR(-1))	-0.338***	0.078	-4.320	0.000
D(LWEXPR)	0.602***	0.164	3.664	0.001
D(LWEXPR(-1))	-0.588***	0.127	-4.618	0.000
D(DPBLC)	1.001***	0.103	9.681	0.000
D(DPBLC(-1))	0.551***	0.109	5.055	0.000
CointEq(-1)*	-0.436***	0.037	-11.705	0.000

Diagnostic test statistics	
R-squared:	0.93
Adjusted R-squared	0.91
DW:	2.43
χ^2 (Serial correlation): Breusch-Godfrey LM Test	0.09
χ^2 (Heteroscedasticity): Breusch-Pagan-Godfrey Test	0.15
χ^2 (Normality): Jarque-Bera	0.98
CUSUM:	Stable
CUSUMSQ:	Stable

Note: ***1%, **5%, and *1% level of significance.

7 Conclusion

This chapter has analyzed Bangladesh apparel industry's growth, transformation, changes in commodity composition and determinants of apparel exports in the MFA and post-MFA era. It has argued that even though Bangladesh did not have a manufacturing base in the 1970s, it emerged as a low-cost apparel manufacturer primarily capitalizing on the MFA quota and EU GSP facilities and subsequently consolidated its position even in the post-MFA period. How Bangladesh adjusted itself against different international trade and quota regimes and sustained its position in the world apparel value chain against the gloomy predictions is an interesting story because it grew from virtually zero export capacity to become the second largest exporter of the world. This study argues that many of those industry experts in the both developing and developed countries did not realize when the MFA quota is removed countries such as Bangladesh can be more competitive and can go beyond the quota limit. It further argues that those industry experts erroneously thought that since Bangladesh and many other countries had easier access due to quota facility, they would face stringent competition and would be wiped out of the global competition. They never thought that a country may specialize in specific product segment in the global value chain or they may have possibility for diversifying. This chapter explains with empirical findings that when the MFA quota was removed, countries such as Bangladesh with capabilities are free to expand.

The disaggregation of Bangladesh's top 20 apparel export items reveals that the degree of concentration of exports in the top 20 items increased from 31.7 per cent in 1990 to 79.2 per cent in 2019. The three-way product classification proposed by Abernathy et al. (1999) namely basic products, fashion-basic products, and fashion products used in section 3 of this chapter indicates that Bangladesh apparel value chain has continued to position itself in the basic items categories. The export similarity index (ESI) results suggest that Bangladesh has different bundles of products offering than those of China, Vietnam, Sri Lanka and India which implies that the country has differentiated its market segment in the low-cost basic niche market based on its comparative advantage due to low-cost labour.

The empirical results suggest that Bangladeshi apparel export performance is largely affected by demand side variables such as world demand for apparel, the positive role of the MFA and also supply side variables such as domestic capacity for manufacturing output, REER, FDI,

and government policy instruments. Based on a newly constructed REER index for Bangladesh apparel exports, this study has also argued that REER remains a vital instrument for sustaining export competitiveness. However, the impact of REER has decreased in the post-MFA era. It also argues that government policy instruments such as back-to-back-letter of credit (BBLC), special bonded warehouse (SBW) have contributed critically in the long-run to promote export. This paper also claims that apparel sector FDI plays a significant role in Bangladesh's apparel industry. Overall, the findings suggested that, contrary to the gloomy predictions made by some industry experts, the abolition of the MFA helped Bangladesh to carve out a niche in the high-volume low-end of the apparel value chain based on ample availability of labour. The policy challenge for the country is to achieve structural adjustment and industrial upgrading within the value chain as the surplus labour pool has gradually depleted.

A. Appendix 1

Table 10. Changes in Top 15 World Apparel Exporters: 1985, 1995, 2005, 2015, and 2018

(Top 15 by Year, Value in US$ billion at Current Prices)

Country/ Region	1985	1995	2005	2015	2018	2021
	%	%	%	%	%	%
China	4.8	15.3	25.8	37.4	31.5	33.2
EU-15/ EU-27	41.2	30.4	27.2	24.4	28.6	26.4
Bangladesh	0.4	1.3	2.4	5.7	7.9	7.8
Vietnam	-	-	1.6	4.7	5.7	5.3
Turkey	2.9	3.9	4.1	3.2	3.3	3.5
India	2.2	2.6	3.0	3.9	3.1	3.7
Hong Kong	16.5	13.6	9.5	3.9	2.8	1.4
Indonesia	0.8	2.2	1.8	1.6	1.8	1.5
Cambodia	-	-	-	1.3	1.6	1.4
Mexico	-	1.7	2.5	0.9	0.8	1.0
United States	1.8	4.2	1.7	1.3	1.2	1.4
Thailand	1.4	3.2	1.4	0.8	-	0.4
Pakistan	-	-	1.3	1.1	1.2	2.2
Tunisia	0.7	1.5	1.1	-		0.4
Malaysia	0.8	1.4	-	1.0	1.2	0.2
Sri Lanka	0.7	-	1.0	1.0	1.1	0.9
Korea, Rep	10.9	3.2	-	-	-	0.5
Taiwan	-	2.0	-	-	-	-
Philippines	0.6	-	-	-	-	0.1
Poland	0.7	1.5	-	-	-	2.2
Japan	1.7	-	-	-	-	0.2
Romania	-	-	1.6	-	-	0.4
Myanmar	-	-	-	-	0.8	0.7
Top 15	**88.1**	**88.0**	**86**	**92.2**	**92.6**	**94.8**
World Market ($ billion)	40.7	156.8	287.5	466.8	502.9	597.1

Source: UN Comtrade, Apparel exports represented by SITC 84; (a) 1985: Standard International Trade Classification, SITC Rev 2; although the EU-15 was not in existence during 1985, the exports of EU-15 countries have been added for the sake of brevity; (b) 1995: SITC Rev 3; EU-15EU values represent EU-15 in 1995; (c) 2005: SITC Rev 3; EU-19; (d) 2015 and 2018: SITC Rev 3; EU-27; (e) the mirror data (import) has been used where the export data was unavailable.

Table 11. Bangladesh's knit and woven share of apparel exports to the world

Products	1991-2000	2001-10	2011-19
Woven (HS61)	32.5	21.4	13.2
Knit (HS62)	19.1	9.7	12.9

Source: UN Comtrade; Note: Harmonized System 61= Knit, 62 = Woven.

Table 12. Long-run estimation with FDI (based on bilateral REER with USA apparel import price index, period 1996-2018)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LWEXPR	0.369	0.268	1.381	0.195
LMVAR	0.732***	0.131	5.597	0.000
LRER	2.168*	1.076	2.014	0.069
DPMF	12.739***	3.773	3.376	0.006
LRER_MFA	-1.616	1.100	-1.469	0.169
LWEXPR_MFA	-0.333	0.283	-1.179	0.263
LFDIR	0.222***	0.055	4.008	0.002

EC = LBEXPR - (0.61*LWEXPR + 0.69*LMVAR + 1.45*LRER + 12.24*DPMF – 0.85*LRER_MFA – 0.51*LWEXPR_MFA_07 + 0.23*LFDIR)

Note: ***1%, **5%, and *1% level of significance.

Table 13. ARDL error correction (ECM) regression (short-run estimates) with FDI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.066***	1.302	-11.570	0.000
D(LMVAR)	0.094	0.286	0.328	0.749
D(LFDIR)	0.108***	0.017	6.469	0.000
CointEq(-1)*	-1.067***	0.091	-11.737	0.000

Diagnostic test statistics	
R-squared:	0.898
Adjusted R-squared	0.881
DW:	2.478
χ^2 (Serial correlation): Breusch-Godfrey LM Test	0.142
χ^2 (Heteroscedasticity): Breusch-Pagan-Godfrey Test	0.437
χ^2 (Normality): Jarque-Bera	0.768
CUSUM:	Stable
CUSUMSQ:	Stable

Note: ***1%, **5%, and *1% level of significance.

Bibliography

Abernathy, FH, & Volpe, A, Weil, D 2006, 'The future of the apparel and textile industries: Prospects and choices for public and private actors', *Environment and Planning A*, vol.38, no.12, pp. 2207-2232.

Adhikari, R & Weeratunge, C 2007, 'Textiles and clothing in South Asia: Current status and future potential', *South Asia Economic Journal*, vol. 8, no. 2, pp. 171-203.

Agnosteva, D, Anderson, JE, & Yotov, YV 2014, 'Intra-national trade costs: Measures and aggregation', National Bureau of Economic Research (NBER) Working Paper No. 19872, Cambridge, MA.

Ahmed, N 2009, 'Sustaining ready-made garment exports from Bangladesh', *Journal of Contemporary Asia*, vol. 39, no. 4, pp. 597-618.

__, Bakht, Z, & Yunus, M 2011, 'Size structure of manufacturing industry and implications for growth and poverty: Bangladesh Country paper', Dhaka, Bangladesh Institute of Development Studies (BIDS).

Alam, MS, Selvanathan, EA, & Selvanathan, S 2017, 'Determinants of the Bangladesh garment exports in the post-MFA environment', *Journal of the Asia Pacific Economy*, vol. 22, no. 2, pp. 330-352.

Anderson, JE 1979, 'A theoretical foundation for the gravity equation', *American Economic Review*, vol. 69, no. 1, pp. 106-116.

__, & van Wincoop, E 2003, 'Gravity with gravitas: A solution to the border puzzle', *American Economic Review*, vol. 93, no. 1, pp. 170-192.

__, Larch, M, & Yotov, YV 2015, 'Estimating general equilibrium trade policy effects: GE PPML', CESifo Working Paper No. 5592, Munich.

Arvis, J-F, & Shepherd, B 2013, 'The Poisson quasi-maximum likelihood estimator: A solution to the adding up model in gravity models', *Applied Economic Letters*, vol. 20, no. 6, pp. 515-519.

Athukorala, P 2018, 'Industrial upgrading in the apparel value chain: The Sri Lanka experience', in D. Nathan, M. Tewari and S. Sarkar (eds.), *Development with global value chains: Upgrading and innovation in Asia*, Cambridge: Cambridge University Press, pp. 193-228.

Athukorala, P, & Yamashita, N 2006, 'Production fragmentation and trade integration: East Asia in a global context', *The North American Journal of Economics and Finance*, vol. 17, no. 3, pp. 233-256.

__, Talgaswatta, T, & Majeed, O 2017, 'Global production sharing: Exploring Australia's competitive edge', *The World Economy*, vol. 40, no. 10, pp. 2172-2192.

__, & Ekanayake, R 2018, 'Repositioning in the global apparel value chain in the post-MFA era: strategic issues and evidence from Sri Lanka', *Development Policy Review*, vol. 36, pp. O247-263.

__ 2020, 'Export expansion in a changing global order: Challenging times for post-conflict Sri Lanka', in S. Jayasuriya and D. Weerakoon (eds.), *Managing domestic and international challenges and opportunities in post-conflict development: Lessons from Sri Lanka*, pp.151-169.

Audet, D 2004, 'Structural adjustment in textiles and clothing in the post-ATC trading environment', *OECD Trade Policy Papers*, no. 4, OECD Publishing, Paris.

Baier, SI, & Bergstrand, JH 2001, 'The growth of world trade: Tariffs, transport costs, and income similarity', *Journal of International Economics*, vol.53, no.1, pp.1-27.

__&__2007, 'Do free trade agreements actually increase members' international trade?' *Journal of International Economics*, vol. 71, no. 1, pp. 72-95.
__, Yotov YV, Zylkin, T 2019, 'On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration', *Journal of International Economics*, Elsevier, vol. 116, no. C, pp. 206-226.
Bair, J & Peters, ED 2006, Global commodity chains and endogenous growth: Export dynamism and development in Mexico and Honduras, *World Development*, vol.34, no.2, pp.203-221.
Baldwin, R & Taglioni, D 2006, 'Gravity for dummies and dummies for gravity equations', National Bureau of Economic Research, Cambridge, MA 02138, USA.
Bangladesh Bank BCD Circular No. 5, March 13, 1981
Bangladesh Bank BCD Circular No. 5, July 21, 1983
Bangladesh Bank BCD Circular No. 35, September 4, 1984
Bangladesh Bank BCD Circular No. 42, October 15, 1984
Bangladesh Bank Circular Letter No. ECP.COM. 241/A-583, April 22, 1984
Bangladesh Bank 2009, Master Circular for Export Development Fund, FE Circular No. 25, Foreign Exchange Policy Department, Bangladesh Bank, Dhaka.
Bangladesh Bureau of Statistics, 1999-2000, *Report on Bangladesh Census of Manufacturing Industries (CMI), 1999-2000*, Ministry of Planning, Dhaka, Bangladesh.
Bangladesh Bureau of Statistics, 2019, *Survey of Manufacturing Industries (SMI) 2019*, unpublished data, from BBS, Dhaka, Bangladesh.
Bangladesh Export Processing Zones Authority, 2022, *Annual Report 2021-22*, Prime Minister's Office (PMO), Dhaka, Bangladesh.
Bangladesh Garments Manufacturing Exporters' Association, 2020, 'Trade information', BGMEA, Dhaka, Bangladesh, viewed 20 February, 2020, ` < https://www.bgmea.com.bd/home/pages/TradeInformation>.
Bellemare, MF, Masaki, T, Pepinsky, TB 2017, 'Lagged explanatory variables and the estimation of causal effect', *Journal of Politics*, vol.79, no.3, pp.949-963.
Bergstrand, JH 1985, 'The gravity equations in international trade: Some microeconomic foundations and empirical evidence', *Review of Economics and Statistics*, vol. 67, no. 3, pp. 474-481.
Bhattacharya, D, & Rahman, M 2002, 'Experience with implementation of WTO-ATC and implications for Bangladesh', OP7, Centre for Policy Dialogue, Dhaka, Bangladesh.
BIDS, 2011, *Trade Liberalization, Changes in Industrial Structure, and Job Creation in Bangladesh.* Dhaka: Bangladesh Institute of Development Studies, background paper by Bangladesh Institute of Development Studies, Dhaka, for the book *More and Better Jobs in South Asia*, Washington DC: World Bank.
Borchert, I & Yotov, YV 2017, 'Distance, globalization, and international trade', *Economics Letters*, vol. 153, issue. C, pp. 32-38.
Brown, RL, Durbin, J, Evans, JM 1975, Techniques for testing the constancy of regression relations over time, *Journal of the Royal Statistical Society*, Vol. 37, pp. 149-163.
Brun, JF, Carrere, P, Guillaumont, P & Melo, JD 2005, 'Has distance died? Evidence from a panel gravity model', *World Bank Economic Review*, vol. 19, no. 1, pp.99-120.
Business Research Associates, 1984, 'Final Report of Study on Impact of Incentives on the Growth of Export in Bangladesh', August 30, 1984.
Business Week 2004, Just how cheap is Chinese labor? 2 December 2004.

Cairncross, F 1997, *The death of distance: How the communications revolution will change our lives*, Harvard Business School Press, Cambridge.
Cameron, A, & Trivedi, P 1998, *Regression analysis of count data*, Cambridge University Press.
Chaney, T 2008, 'Distorted gravity: the intensive and extensive margins of international trade', *American Economic Review*, vol. 98, no. 4, pp. 1707-1721.
Chaudhuri, KN 1978, *The Trading World of Asia and the English East India Company, 1660-1760*, Cambridge University Press, Cambridge, the UK.
Chi, DQ 2020, 'Social and economic upgrading in the garment supply chain in Vietnam', Institute for International Political Economy Berlin Working Paper, No. 137/2020
Coe, DT, Subramaniam, A, Tamirisa, NT & Bhavnani, R 2002, 'The missing globalization puzzle', IMF Working Paper No. WP/02/171, International Monetary Fund, Washington DC.
____2007, 'The missing globalization puzzle: Evidence of the declining importance of distance', IMF Staff Paper, vol.54, no.1, pp. 34-58.
Cookson, F 2003, 'Facing 2005-Outlook for the garment sector', Dhaka, March.
Correia, S 2016, 'reghdfe: Estimating linear models with multi-way fixed effects', 2016 Stata conference, Stata User Group.
Correia, S, Guimaraes, P, & Zylkin, T 2020, 'Fast Poisson estimation with high-dimensional fixed effects', *The Stata Journal*, vol. 20, no. 1, pp. 95-115.
Disdier, A-C, & Head, K 2008, 'The puzzling persistence of the distance effect on bilateral trade', *The Review of Economics and Statistics*, vol. 90, no.1, pp. 37-48.
Dowlah, CAF 2009, 'The Future of the Readymade Clothing Industry of Bangladesh in the Post-Uruguay Round World' *World Economy*, vol. 22, no. 7 pp. 933-953.
Easterly, W 2002, *The elusive quest for growth: Economists' adventures and misadventures in the tropics*, The MIT Press, Cambridge, Massachusetts, London, England.
Eaton, J, & Kortum, S 2002, 'Technology, geography and trade', *Econometrica*, vol. 70, no. 5, pp. 1741-1779.
Egger, P & Nigai, S 2015, 'Structural gravity with dummies only: Constrained ANOVA-type estimation of gravity models', *Journal of International Economics*, vol. 97, no. 1, pp. 86-99.
Eichengreen, B, & Irwin, DA 1998, 'The role of history in bilateral trade flows', in JA Frankel (eds.), *The regionalization of the world economy*, University of Chicago Press, Chicago and London.
Evans, CL & Harrigan, J 2003, 'Distance, time and specialization', NBER Working Papers, No. 9729, National Bureau of Economic Research, Cambridge, MA 02138, USA, <https://www.nber.org/papers/w9729.pdf>.
__&__ 2004, 'Tight clothing: How the MFA affects Asian apparel exports', NBER Working Papers, No. 10250, National Bureau of Economic Research, Cambridge, MA 02138, USA, <https://www.nber.org/papers/w9729.pdf>.
Fally, T 2015, 'Structural gravity and fixed effects', *Journal of International Economics*, vol. 97, no. 1, pp. 76-85.
Frankel, JA 1997, *Regional trading blocks in the world economic system*, Washington DC, Institute for International Economics.
Feenstra, R & Hamilton, GG 2006, *Emergent economies, divergent paths: Economic organization and international trade in South Korea and Taiwan*, Cambridge: Cambridge University Press.

__ 2016, *Advanced international trade: Theory and evidence*, Princeton University Press.
Fukunishi, T 2014, 'The Bangladesh garment sector in the libealised market: Is upgrading needed?', in Dirk Williem te Velde (eds.), *Enhancing productivity in Bangladesh's garment sector: Current policy and research debates*, DFID-ESRC Growth Research Programme (DEGRP), the United Kingdom.
Gereffi, G 1994, 'The organization of buyer-driven global commodity chains: How US retailers shape overseas production networks', in G. Gereffi and M. Korzeniewicz (eds.), *Commodity and global capitalism*, pp. 95-122, Westport, CT: Preager.
__ 1999, 'International trade and industrial upgrading in the apparel commodity chain', *Journal of International Economics*, vol. 48, no. 1, pp. 37-70.
__, Humphrey, J, Sturgeon, T 2005, The governance of global value chain, *Review of International Political Economy*, vol.12, no.1, pp.78-104.
__ 2009, 'Development models and industrial upgrading in China and Mexico', *European Sociological Review*, vol. 25, no. 1, pp. 37-51.
__ & Frederick, S 2010, 'The global value chain, trade and the crisis: Challenges and opportunities for developing countries', Policy Research Working Paper No. 5281, World Bank, Washington DC: World Bank, pp. 1-41.
Goto, K 2012, 'Is the Vietnamese garment industry at a turning point? Upgrading from the export to the domestic market', IDE Discussion Paper No. 373, Institute of Developing Economies (IDE), JETRO, Chiba, Japan.
Hamilton, GG & Gereffi, G 2009, 'Global commodity chains, market makers, and the rise of demand-responsive economies', in Jennifer Bair (eds.), *Frontiers of commodity chain research*, Stanford University Press.
Hausmann, R, & Rodrik, D 2003, 'Economic development as self-discovery', *Journal of development Economics*, vo.72, no. 2, pp. 603-633.
Head, K, Mayer, T, & Ries, J 2010, 'The erosion of colonial trade linkages after independence', *Journal of International Economics*, vol. 81, no. 1, pp. 1-14.
__ & __ 2014, 'Gravity equations: Workhorse, toolkit, and cookbook', in G, Gopinath, E, Helpman, and K, Rogoff (eds.), *Handbook of International Economics*, vol. 4, Oxford: Elsevier B.V.
Heitzman, J & Worden, RL 1988, 'Bangladesh: a country study, Library of Congress', Federal Research Division, September 1988, USA.
Helpman, E, Melitz, M, & Rubinstein, Y 2008, 'Estimating trade flows: Trading partners and trading volumes', *Quarterly Journal of Economics*, vol. 123, no. 2, pp. 441-487.
Hertel, T, Martin, W, Yanagishima, K & Dimaranan, B 1995, 'Liberalizing manufacturers trade in changing world economy', in Will Martin and L. Alan Winters (eds.), *The Uruguay round and the developing economies*, The World Bank, Washington DC, pp. 73-96.
Hummels, D 1999, 'Have international transportation costs declined', mimeo, Purdue University.
____2001, 'Time as a trade barrier', mimeo, Purdue University.
Humphrey, J & Schmitz, H 2002, How does insertion in global value chains affect upgrading in industrial clusters? *Regional Studies*, vol.36, no.9, pp.1017-1027,
International Monetary Fund (IMF), 2002, *World Economic Outlook*, September.
__, 2007, *World Economic Outlook*, September.
__, 2007, *The ready-made garment industry in Bangladesh: An update*, by Jonathan Dunn, Report for International Monetary Fund, Washington DC.

Jones, RM 2006, *The apparel industry*, Oxford:Wiley-Blackwell.
Kathuria, S, Malouche, MM, Pierola, MD, & Reyes, JD 2016, 'Bangladesh's trade performance', in S Kathuria & MM Malouche (eds), *Strengthening competitiveness in Bangladesh- Thematic Assessment: A diagnostic trade integration study*, Directions in Development, Washington DC: World Bank, pp. 1-35.
Kee, HL 2005, 'Foreign ownership and firm productivity in Bangladesh garment sector', Development Research Group, Mimeo, World Bank, Dhaka
Khan, MH 2005, 'Technological upgrading in Bangladeshi manufacturing: Governance constraints and policy responses in the ready-made garments industry', School of Oriental and African Studies (SOAS), the United Kingdom.
Khan VA, 2015, *Desh garments – A pioneer's gift to his country*, March 12, 2015, accessed March 2, 2020. < https://www.thedailystar.net/supplements/24th-anniversary-the-daily-star-part-3/desh-garments-%E2%80%93-pioneer%E2%80%99s-gift-his-country-71128>.
Krugman, PR 1995, 'Increasing returns, imperfect competition, and the positive theory of international trade', in G, Grossman, and K, Rogoff (eds.), *Handbook of International Economics*, vol. 3, Amsterdam: Elsevier.
Larch, M, Norback, P-J, Sirries, S, & Urban, D 2016, 'Heterogeneous firms, globalization and the distance puzzle', *The World Economy*, vol.39, no.9, pp. 1307-1338.
Larch, M & Yotov, YV 2016, 'General equilibrium trade policy analysis with structural gravity', World Trade Organization (WTO) Working Paper ERSD 2016-8, Geneva.
Leamer, A 1993, 'The commodity composition of international trade in manufacturers: An empirical analysis', *Oxford Economic Papers*, vol. 26, no.3, pp. 350-374.
Leamer, E, & Levinshon, J 1995, 'International trade: The evidence', in G.M. Grossman and K. Rogoff (eds.), *Handbook of International Economics*, vol.3, New York: Elsevier, North-Holland.
Martin, W 1999, 'The abolition of the Multi-fibre Arrangement and its implications for fibre markets' in Beneoit Blarel, Gary Pursell and Alberto Valdes (eds.), *Implications of the Uruguay round agreement for South Asia: The case of agriculture*, The World Bank, Washington DC, pp. 137-149.
Mayer, T, & Zignago, S 2011, 'Notes on CEPII's distance measures: the GeoDist Database', CEPII Working Paper No. 25, Centre d'Etudes Prospectives et d'Information Internationales (CEPII), Paris.
McCallum, J 1995, 'National borders matter', *American Economic Review*, vol. 85, no. 3, pp. 615-623.
Mlachila, M, & Yang, Yongzheng 2004, 'The end of textile quotas: A case study of the impact on Bangladesh', IMF Working Paper, No. WP/04/108, International Monetary Fund, Washington DC.
Moazzem, KG & Sehrin, F 2016, 'Economic upgrading in Bangladesh's apparel value chain during the post-MFA period: An exploratory study', *South Asia Economic Journal*, vol. 17, no. 1, pp. 73-93.
Neidik, B & Gereffi, G 2006, Explaining Turkey's emergence and sustained competitiveness as a full package supplier of apparel, *Environment and Planning A*, vol.38, pp.2285-2303.
Nordas, HK 2004, 'The global textile and clothing industry post the agreement on textiles and clothing', WTO Discussion Paper No. 5, Geneva: World Trade Organization.

< https://www.wto.org/english/res_e/booksp_e/discussion_papers5_e.pdf>. viewed 15 March 2020.
Odhiambo, N 2009, 'Energy consumption and economic growth nexus in Tanzania: An ARDL bounds testing approach', *Energy Policy*, vol.37, no. 2, pp.617-622.
Olivero, MP & Yotov, YV 2012, 'Dynamic gravity: endogenous country size and asset accumulation', *Canadian Journal of Economics*, vol. 45, no. 1, pp. 64-92.
Pane, D 2019, 'Firms in international trade: Evidence from Indonesia', PhD Thesis Paper, Crawford School of Public Policy, The Australian National University, Australia.
Pesaran, MH, Shin, Y 1999, 'An autoregressive distributed lag modeling approach to cointegration analysis', in Strom, S. (eds.), *Econometrics and Economic Theory in 20th Century: The Ragnar Frisch Centennial Symposium*, Chapter 11, Cambridge University Press, Cambridge.
___, Smith, RJ 2001, Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometrics*, Vol. 16, pp. 289-326.
Pickles, J, 2006, 'Trade liberalization, industrial upgrading, and reorganization in the global clothing industry', *Environment and Planning A: Economy and Space*, vol. 38, no. 12, pp. 2201-2206.
Rana, MB & Allen, MC 2021, 'Why apparel suppliers are locked into the upgrading ladder in Bangladesh: An institutional and business system perspective', in Mohammad B. Rana and Matthew M.C. Allen (eds.), *Upgrading the Global Garment Industry: Internationalization, Capabilities, and Sustainability*, Edward Elgar Publishing, pp. 138-161.
Redding, SJ, & Venables, AJ 2004, 'Economic geography and international inequality', *Journal of International Economics*, vol. 62, no. 1, pp. 53-82.
Rhee, YW 1986, 'Bangladesh: Export Policy and Administration', World Bank Background Paper No. 6, Industrial Strategy and Policy Division, World Bank.
__ 1990a, 'Bangladesh: Successful Garment Exporting', in YW Rhee & T Belot (eds) *Export Catalysts in Low-Income Countries: A Review of Eleven Success Stories*, World Bank Discussion Papers No. 72, The World Bank, Washington DC
__, 1990b, "The catalyst model of development: Lessons from Bangladesh's success with garment exports." *World Development* 18, no. 2 (1990): 333-346.
Sakhawatullah, K, M 1984, 'Evaluation of the Duty Drawback Scheme', TIP Programme, September, 1984.
Santos Silva, JMC, & Tenreyro, S 2006, 'The log of gravity', *The Review of Economics and Statistics*, vol.88, no.4, pp. 641-658.
Shepherd, B 2012, *The gravity model of international trade: A user guide*', United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Thailand.
Soloaga, I, & Winters, LA 2001, 'Regionalism in the nineties: What effect on trade?', Centre for Economic Policy Research Working Paper No. 2183.
Spinanger, D, & Verma, S 2003, 'The coming death of the ATC and China's WTO Accession: Will push come to shove for Indian T&C exports?", Unpublished, Kiel and New Delhi: Institute for World Economics and OXFAM, June.
Staritz, C 2011, 'Making the Cut? Low-Income Countries and the Global Clothing Value Chain in a Post-Quota and Post-Crisis World', A World Bank Study No. 58851, The World Bank, Washington DC.

__, & Frederick, S 2012b. “Bangladesh” in L.G. Acevedo and R. Robertson (eds), *Sewing success? Employment and Wages Following the End of the Multi-Fibre Arrangement*, Directions in Development, Washington DC: World Bank, pp. 214-242.
Tinbergen, J 1962, *Shaping the world economy: Suggestions for an international economic policy*, New York: The Twentieth Century Fund.
Trefler, D 2004, ‘The long and the short of the Canada-US Free Trade Agreement’, *American Economic Review*, vol. 94, no. 4, pp. 870-895.
United Nations Conference on Trade and Development (UNCTAD), 2013, Investment Policy Review of Bangladesh, Geneva, Switzerland.
Wang, MY & Meng, X 2004, ‘Global-local initiatives in FDI: The experiences of Shenzhen, China’, *Asia Pacific Viewpoint*, vol. 45, pp. 181-196.
Whitfield, L, Staritz, C & Morris, M 2020, ‘Global value chain, industrial policy and economic upgrading in Ethiopia’s apparel sector’, *Development and Change*, vol. 51, no. 4, pp. 1018-1043.
Woodruff, C 2014, ‘Managing for efficiency in the garment sector’, in Dirk Williem te Velde (eds.), *Enhancing productivity in Bangladesh’s garment sector: Current policy and research debates*, DFID-ESRC Growth Research Programme (DEGRP), the United Kingdom.
Woolridge, JM 2010, *Econometric analysis of cross section and panel data*, The MIT Press, 2nd Cambridge, MA.
World Bank, 2005a, *End of MFA Quotas – Key issues and strategic options for Bangladesh readymade garment industry*, Bangladesh Development Series – paper no 2, PREM Unit, The World Bank Office, Dhaka.
__, 2005b, *Bangladesh Growth and Export Competitiveness*, Report No. 31394-BD, Poverty Reduction and Economic Management Sector Unit, South Asia Region, World Bank, Washington DC.
__, 2013, *The World Bank Enterprise Survey*, The World Bank Office, Dhaka.
World Trade Organization (WTO) 2000, *Second Trade Policy Review for Bangladesh*, Geneva: World Trade Organization, Switzerland.
__ 2012, *A practical guide to trade policy analysis*, Geneva: World Trade Organization, Switzerland.
__ 2019, Fifth Trade Policy Review for Bangladesh, World Trade Organization Secretariat, Switzerland.
Yang, Y, Martin, W, & Yanagishima, K 1997, ‘Evaluating the benefits of abolishing the MFA in the Uruguay Round Package’, in Thomas Hertel (eds.), *Global trade analysis: Using the GTAP model*, Cambridge University Press, New York, pp.253-279.
Yotov, YV 2012, ‘A simple solution to the distance puzzle in international trade’, *Economics Letters*, vol. 117, no. 3, pp.794-798.
__, Piermartini, R, Monteiro, JA, & Larch, M 2016, *An advanced guide to trade policy analysis: The structural gravity model*, World Trade Organization, Geneva, Switzerland.
Zhang, Q & Felmingham, B 2002, ‘The role of FDI, export and spillover effects in the regional development of China’, *Journal of Development Studies*, vol. 38, pp. 157-178.